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DOCUMENT NO. AND TYPE	SUBJECT/TITLE	DATE	RESTRICTION
001. resume	Resume, Edwin W. Cake, Jr., PH. D. [partial] (1 page)	nd	P6/b(6)

COLLECTION:
Clinton Presidential Records
Domestic Policy Council
Brian Burke
OA/Box Number: 4430

FOLDER TITLE:
Sea Pride

2013-1074-S
sb44

RESTRICTION CODES

Presidential Records Act - [44 U.S.C. 2204(a)]

P1 National Security Classified Information [(a)(1) of the PRA]
P2 Relating to the appointment to Federal office [(a)(2) of the PRA]
P3 Release would violate a Federal statute [(a)(3) of the PRA]
P4 Release would disclose trade secrets or confidential commercial or financial information [(a)(4) of the PRA]
P5 Release would disclose confidential advice between the President and his advisors, or between such advisors [a)(5) of the PRA]
P6 Release would constitute a clearly unwarranted invasion of personal privacy [(a)(6) of the PRA]

C. Closed in accordance with restrictions contained in donor's deed of gift.
PRM. Personal record misfile defined in accordance with 44 U.S.C. 2201(3).
RR. Document will be reviewed upon request.

Freedom of Information Act - [5 U.S.C. 552(b)]

b(1) National security classified information [(b)(1) of the FOIA]
b(2) Release would disclose internal personnel rules and practices of an agency [(b)(2) of the FOIA]
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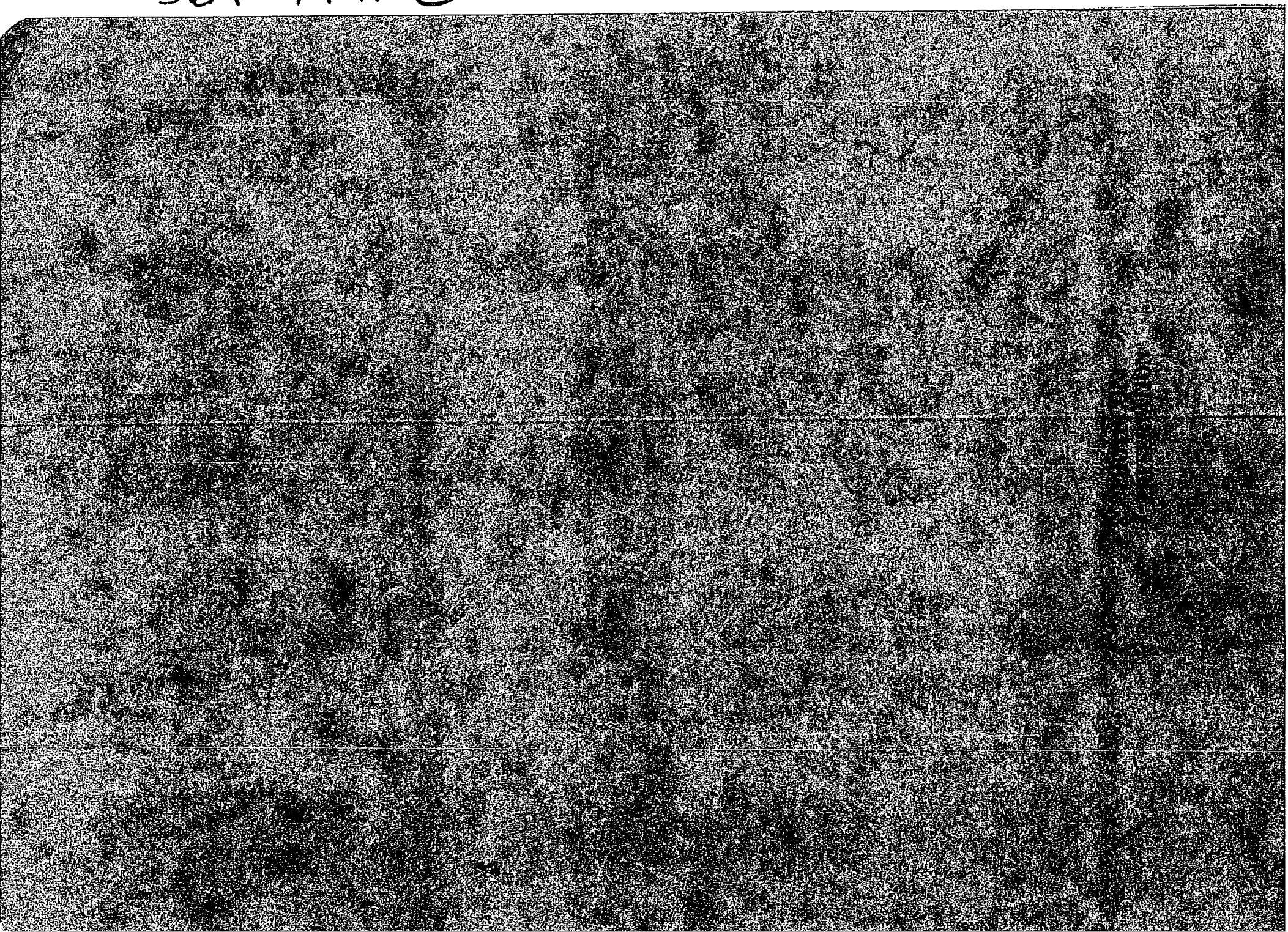
b(4) Release would disclose trade secrets or confidential or financial information [(b)(4) of the FOIA]
b(6) Release would constitute a clearly unwarranted invasion of personal privacy [(b)(6) of the FOIA]
b(7) Release would disclose information compiled for law enforcement purposes [(b)(7) of the FOIA]
b(8) Release would disclose information concerning the regulation of financial institutions [(b)(8) of the FOIA]
b(9) Release would disclose geological or geophysical information concerning wells [(b)(9) of the FOIA]

SEA PRIDE



OFFICE OF DOMESTIC POLICY NOV 15 RECD

THE WHITE HOUSE

FROM THE OFFICE OF: **CAROL H. RASCO**
ASSISTANT TO THE PRESIDENT
FOR DOMESTIC POLICY

TO: Sylvia

DRAFT RESPONSE FOR CHR BY: _____

PLEASE REPLY (COPY TO CHR): _____

PLEASE ADVISE BY: _____

LET'S DISCUSS: _____

FOR YOUR INFORMATION: _____

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RETURN ORIGINAL TO CHR: _____

SCHEDULE: _____

REMARKS:

Is this on NEC
[illegible]
[illegible]

Carol,

This one is new to me. However, it is probably a joint effort. I have alerted Michael Deich on our staff that this may come his way and that someone from the DPC may contact him on this. Let me know if you would like Deich to take the lead. Thanks Sylvia

SEA PRIDE INDUSTRIES, INC.

1101 GULF BREEZE PARKWAY • GULF BREEZE, FL 32561

November 12, 1993

Ms. Carol Rasco
Assistant to the President
for Domestic Policy
The White House
Washington, D.C. 20500

Dear Ms. Rasco:

This letter is to request your assistance to arrange a meeting with Clinton administration officials in Washington, D.C. to discuss the following:

a. Inform about the economic potential of the new mariculture industry proposed to be established in the Gulf of Mexico and sponsored by Sea Pride Industries, Inc.

b. Request assistance in obtaining federal loan guarantees and research grants to build the first offshore fish farming research and commercial production platform in the history of the United States.

c. To discuss the federal-state permitting gridlock which results in years of delays in granting federal and state permits.

d. To request President Clinton's and the Department of Agriculture's assistance in sending us to the right federal officials to obtain the special support required for the birth of our new Gulf mariculture industry.

I am sending with this letter, two copies of our 27 minute video about the new offshore mariculture technology and industry being launched into the Gulf of Mexico for you and for President Bill Clinton.

I have read with great interest recent articles about how the Clinton administration and Secretary Espy supports the aquaculture industry.

A dramatic effort by the President to help launch this new industry into the economically deprived and often destressed gulf coast economy would be a well received by the American public.

Your Special Assistance is Sincerely Appreciated,

John D. Ericsson
President, C.E.O.

CC: Agriculture Secretary Mike Espy

Enclosure: Video- Sea Pride Industry introduces the Sea Trek Ocean Farming System.

PHONE: 904-934-8888 • FACSIMILE: 904-934-8889

Center for Marine Conservation

April 8, 1993

Mr. Edwin Cake
2510 Ridgewood Rd.
Ocean Springs, MS 39564

Dear Mr. Cake:

This is your personal invitation to attend what I think is a very important environmental gathering. Enclosed is a preliminary announcement of a marine fish conservation workshop we are organizing in St. Petersburg Florida on June 4, 5, and 6, 1993. You are one of about fifty environmental advocates who we hope will be interested in learning more about how to improve the conservation and management of marine fish and fisheries in the waters off the South Atlantic coast and the Gulf of Mexico.

Our oceans are in a state of crisis. Well over half of all commercial fish stocks off the coasts of the United States are over-exploited or are at least fully utilized. Marine birds and animals are literally starving in some areas of the oceans and entire ecosystems are being disrupted by intentional and careless overfishing. Some species of marine fishes are even in danger of becoming extinct from the cumulative effects of habitat degradation and overfishing. The management system is failing and the ocean ecosystem in some areas is stressed to the breaking point.

We are inviting you to join us at this workshop to increase your knowledge and understanding of the problem of overfishing and fishery mismanagement and to share with us and the participants your ideas about ways to address the problems. We'll also share with you some approaches that have worked for us and some of our brother and sister organizations.

Our presentations will provide you with information and practical tools which you will be able to use immediately to begin to change the decisions of federal fisheries managers in the Southeastern US and in Congress. If you decide to work on this issue, we will provide you with print and audio-visual materials to help you educate your personal, professional, and environmental friends, associates and organizations.

The Center for Marine Conservation is reaching out to you because of the seriousness of the impending crisis in the oceans. We are a national group of 100,000 members who focus exclusively on ocean issues. Our staff has attended Regional Fishery Management Council meetings regularly for more than a year, learning how the Magnuson Fisheries Conservation and Management Act is supposed to work, and how it has failed. Now we need your help to make the necessary changes in the law and in the process. We can, if we work quickly and effectively, keep the shark, the snapper, the grouper, and the bonefish from the fate suffered by the wolf, woodland caribou, passenger pigeon, and California Condor.

1725 DeSales Street, NW, Ste. 500 Washington, D.C. 20036 (202) 429-5609 Telefax (202) 872-0619

SEA PRIDE INDUSTRIES, INC.

1101 GULF BREEZE PARKWAY
GULF BREEZE, FLORIDA 32561

TO:

Ms CAROL RASCO
ASSISTANT TO THE
PRESIDENT OF THE
UNITED STATES FOR
DOMESTIC POLICY

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PRIVATE PLACEMENT MEMORANDUM

80 Units

SEA PRIDE

AN INVESTMENT IN THE SECURITIES OFFERED HEREBY IS SPECULATIVE AND INVOLVES A HIGH DEGREE OF RISK.

Prior to the date of this Memorandum, there has been no public market for the securities of Sea Pride Industries, Inc. ("Company"), a development stage Delaware corporation, and there can be no assurance that a public market will develop. Each $10,000 unit offered hereby consists of 4,000 shares of the Company's Common Stock, $.01 par value, or $2.50 per share, and 4,000 Class A warrants. One Class A warrant entitles the holder to purchase one share of Common Stock at $2.50 per share, exercisable beginning 90 days from the effective date of a proposed initial public offering of the Common Stock of the Company and for a period of 48 months thereafter. The Class A warrants are redeemable at $. 10 per warrant upon 30 days written notice to the holders thereof, beginning 12 months from the effective date of a proposed initial public offering until their expiration. The minimum purchase is one-half unit at $5,000. See "Description of Securities."

The price at which the securities are being offered to investors has been arbitrarily determined by the Company. The Company is offering the securities on a "best efforts" basis during an offering period of 180 days, which may be extended for an additional 90 days. There is no minimum number of units necessary to be sold and paid for to close any sale of the units offered hereby. All offers to purchase units from qualified, suitable, accredited investors will be accepted by the Company (up to $800,000) and the net proceeds from such sales deposited into the operating accounts of the Company. See "Offering and Sale of Units" and "Investor Suitability Standards" and "Plan of Distribution.

The Company intends to file an SB-2 Registration Statement, and related prospectus, with the Securities and Exchange Commission, Washington, D.C. 20549, for a proposed initial public offering of the Company's Common Stock at approximately $5.00 per share, aggregating up to approximately $5,000,000, general market conditions and other factors permitting. Upon the closing of the proposed initial public offering, the Company intends to have its securities trade on the over the-counter market under the symbol "SEAS." The Company can make no assurances that its proposed initial public offering will successfully close under any circumstances. See "Summary-Proposed Combination" and "Summary-Proposed Initial Public Offering."

If requested, the Company has agreed to use its best efforts to grant certain registration rights in its proposed initial public offering to the investors in this offering, and prior offerings of common stock and warrants of the Company. See "Summary-Registration Rights in Proposed Initial Public Offering."

THESE SECURITIES HAVE NOT BEEN APPROVED OR DISAPPROVED BY THE SECURITIES AND EXCHANGE COMMISSION NOR HAS THE COMMISSION PASSED UPON THE ACCURACY OR ADEQUACY OF THIS MEMORANDUM. ANY REPRESENTATION TO THE CONTRARY IS A CRIMINAL OFFENSE.

	Offering Price (1)	Underwriting Discounts and Commissions (2)	Proceeds to the Company (3)
Per Unit.....	$10,000	$1,000	$9,000
Total ...	$800,000	$80,000	$720,000

(See Notes, Page 3)

SEA PRIDE INDUSTRIES, INC.
1101 Gulf Breeze Parkway
Gulf Breeze, Florida 32561
(904) 934-8888

The Date of This Memorandum is November 15, 1993.

4. Sea Pride's choices of a Mississippi-proven hatchery technology (for fingerling production) and of Atlantic-, Pacific-, and Mediterranean-proven net-pen technology appear to be very appropriate for Mississippi waters given the present state of mariculture science and technology and the successes of similar ventures elsewhere in the world. When the State of Mississippi finalizes its mariculture guidelines (in early 1992) and grants Sea Pride's mariculture permit (shortly thereafter), additional research and development efforts will be needed to adapt the at-sea, net-pen culture technology to the northern Gulf of Mexico. We perceive no insurmountable biological, environmental, or physical barriers to the successful application of that technology in the coastal waters of Mississippi or other Gulf Coast states.

In summary, we support and recommend Sea Pride's proposed *Offering Memorandum* and mariculture objectives to potential investors based on our examination of the *Memorandum* and our knowledge of the culture requirements and grow-out potential of the primary finfish candidate (redfish) and the secondary finfish candidates (striped bass, snappers, groupers, etc.) in Mississippi. The *Memorandum* needs to be redrafted for clarification and to correct the minor errors and inconsistencies that we have marked on the enclosed copy.

We are assisting Sea Pride in its attempts to finalize its mariculture permit with the Mississippi Department of Wildlife, Fisheries, and Parks (Bureau of Marine Resources) because we believe in mariculture. We shall continue to provide mariculture assistance to Sea Pride Industries, Inc., if and when the need arises.

Thank you for your corporate and personal efforts to enhance mariculture development in Mississippi. We look forward to assisting you and Sea Pride in the future. In the meantime, this review is....

....Respectfully submitted,

Edwin W. Cake, Jr., Ph.D.
Biological Oceanographer and
Mariculture Consultant

Enclosure: Copy-edited draft of Business Plan

Withdrawal/Redaction Sheet
Clinton Library

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RESUME

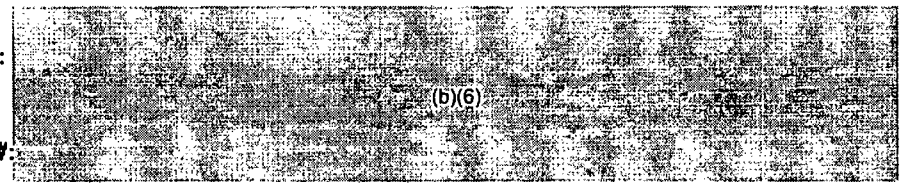
EDWIN W. CAKE, JR., PH.D.

GULF ENVIRONMENTAL ASSOCIATES
POST OFFICE BOX 176
OCEAN SPRINGS, MS 39564

PERSONAL DATA

Born:
Military Service:

Marital Status:
Social Security #:



EDUCATION

U.S. Air Force Technical Training School: 10/60 - 04/61. Air Traffic Control Certificates: USAF No. 15320; Federal Aviation Agency No. 1536698.

Central Florida Community College, Ocala, FL: 06/64 - 12/65; Associate of Arts Degree awarded on 12/15/65.

Florida State University, Tallahassee, FL: 01/66 - 08/67; Dept. of Biological Sciences; Major: ***Marine Biology***; Minor: ***Chemistry***. Bachelor of Arts Degree awarded on 08/12/67.

Florida State University, Tallahassee, FL: 09/67 - 08/70; Dept. of Oceanography; Major: ***Biological Oceanography***; Major Professor: Dr. Winston Menzel; Thesis Title: *Some Predator-Prey Relationships Involving the Sunray Venus Clam,* Macrocallista nimbosa, *(Lightfoot, 1786) (Pelecypoda; Veneridae) along the Gulf Coast of Florida.* Master of Science Degree awarded on 06/13/70.

Florida State University, Tallahassee, FL: 09/70 - 10/73; Depts. of Oceanography and Biological Sciences; Major: ***Biological Oceanography***; Major Professors: Dr. Winston Menzel (Marine Biologist) and Dr. James Byram (Parasitologist); Dissertation Title: *Larval and Postlarval Cestode Parasites of Shallow-Water, Benthic Mollusks of the Gulf of Mexico from the Florida Keys to the Mississippi Sound.* Doctor of Philosophy Degree awarded on 03/21/75.

HONORS

Graduate Assistantship, Dept. of Oceanography, Florida State University, 1967-1973.
Honor Society of Phi Kappa Phi, 1971.
The Society of Sigma Xi, 1972.
Thurlow T. Nelson Award, National Shellfisheries Assoc., 1972.
Listed in *Outstanding Young Men in America,* 1973.
Conservation Award, Mississippi Chapter of the Sierra Club, 1981.
Meritorious Service Award, National Shellfisheries Association, 1985 (for service as President, President-Elect, Vice-President, and Secretary-Treasurer of the Association).

PROFESSIONAL SOCIETY MEMBERSHIPS

Estuarine Research Federation	Mississippi Academy of Science	Society of Wetland Scientists
Gulf Estuarine Research Fed.	National Shellfisheries Assoc.	The Coastal Society
Gulf Coast Aquaculture Group	Society of Sigma Xi	World Aquaculture Society

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GULF BREEZE, FL 32561

DRAFT

SEA TREK OCEAN FARMING SYSTEM: OCEAN DISCHARGE CRITERIA INFORMATION

Prepared for:

Sea Pride Industries, Inc.
1101 Gulf Breeze Parkway
Gulf Breeze, Florida 32561

Prepared by:

Edwin W. Cake, Jr., Ph.D.
Gulf Environmental Associates
Post Office Box 176
Ocean Springs, MS 39566

November 14, 1993

INTRODUCTION

The following information, facts, opinion, etc., were assembled from many existing sources that relate to the proposed operation of SEA PRIDE's SEA TREK Ocean Farming System in the nearshore waters off Mobile Bay, Alabama. Much of that information has been assembled in the accompanying SEA TREK Site Characterization document (Cake, 1993) and other information is available from several US Minerals Management documents that are submitted with this Ocean Discharge document. The reader is referred to those accompanying documents and by reference, they are made a part of this document. The information on the criteria listed below is summarized from those reports and from facts known to SEA PRIDE officials.

The US Environmental Protection Agency is required as part of its Ocean Discharge Criteria regulations (*Federal Register* [45 FR 65457, 3 October 1980]; 40 CFR Part 125, Subpart M) to consider ten factors discussed in the remainder of this document prior to granting an Ocean Discharge Permit. Those regulations require at least three determinations: 1) whether a discharge will or will not cause unreasonable degradation of the marine environment; 2) whether the discharge will produce irreparable harm (that cannot be reversed by cessation or modification of the discharge; and 3) whether there are any reasonable alternatives to the ocean discharge.

At the outset of this process SEA PRIDE officials believe that the discharge of aqueous fish feces into 50-foot+ deep waters of the open Gulf of Mexico will not cause any unreasonable degradation of the marine environment therein including any long-term, adverse impacts to the fauna or flora of the bottom communities, the demersal or pelagic fish populations, the phytoplankton or zooplankton component, or the sensitive hard-bottom habitats elsewhere in the Alabama shelf waters. SEA PRIDE officials have submitted a proposed monitoring program (see attached copy) and they recognize that only post-discharge monitoring will finally answer the question of *unreasonable degradation*.

At the outset, also, SEA PRIDE officials believe that the discharge of aqueous fish feces in to the nearshore Gulf of Mexico will cause

no irreparable harm to the marine environment inside or outside of a 100-meter mixing zone that represents the 5-acre permitted SEA TREK mariculture site. The fish feces represent a finite, but small, nutrient source in an area that has limited nutrient input and large assimilative capacity via dilution, dispersion, and biotic uptake. If a lens of solid fish feces and/or unconsumed feed were to build up on the bottom within the permitted 5-acre SEA TREK mariculture site (both unlikely events), that lens would be naturally utilized and/or removed within a short time period via natural biochemical processes when the facility terminates its activities or is moved elsewhere within the 500-acre operating area.

There are no *reasonable alternatives* to the ocean discharge of aqueous fish feces from the SEA TREK Ocean Farming System. Part of the fact of at-sea mariculture is the use of oceanic waters to dilute, disperse, and assimilate the metabolic wastes that will be produced by the concentrated fishes in such a facility. One of the unreasonable alternatives would be the on-land aquaculture of the same estuarine and marine fishes; but, that would require the loss of existing coastal habitats for pond construction, the expenditure of increased amounts of fossil energy reserves for water pumping and cleansing, and the loss of the nutrient cycling that the SEA TREK fishes will ultimate replace from declining native fish populations.

OCEAN DISCHARGE GUIDELINES

1. Quantities, composition, and potential bioaccumulation or persistence of the pollutants to be discharged:

The materials to be discharged in the Gulf of Mexico from the SEA TREK mariculture platform offshore of Fort Morgan Peninsula, Alabama, will consist of fish feces (liquid solid components), unconsumed (escaping) feed pellets, and biofouling organisms that area removed form the barrel-cage, fish-rearing containers. Until the SEA TREK system is fully operations, the volumes of those materials will not be known. The mariculture system has been designed to rear approximately 1,000,000 fish of up to 4 pounds (weight) when operational. At an average food-conversion ratio of

1.5 pounds of feed to 1 pound of body weight, those 1,000,000 fish will produce approximately 0.5 pound of feces per pound of body weight or 2,000,000 (dry-weight) pounds of aqueous fish feces per year at full capacity. The loss (to the local environment) of fish feed pellets cannot be predicted at this time, but will be minimized via automated feeding systems. All escaping feed pellets are expected to be rapidly consumed by the myriad finfishes and shellfishes that will be attracted to the mariculture platform. The fate of the discharged biofouling organisms should be the same as they be consumed by a thriving community of benthic finfish and shellfish and demersal finfish species.

The fish feces will consist of aqueous nitrogenous wastes; the lost feed pellets will consist of grain products, fish meal, fish oil, and prophylactic chemicals (vitamins, minerals, etc.); the discharged fouling organisms will consist of cellulose and calcareous materials, live plants and animals, and parts thereof. The aqueous fish feces will be mixed, diluted, and transported away from the immediate mariculture site via tidal and other currents. Heavy components may settle to the bottom during periods of slack currents and contribute to a lens of waste products that some predict will accumulate below and down current form the barrel cages. Escaping feed (neutrally-buoyant pellets) and the heavy remains of detached fouling organisms may also add to the lens of waste around the mariculture platform.

None of the waste materials is considered persistent and all can be consumed and/or assimilated by the biological community that already exists in the SEA TREK area or that will be attracted to the site or settle therein as a benthic community. The aqueous feces are expected to normally increase the phytoplankton and zooplankton within the immediate area, which will, in turn, increase the populations of primary, secondary, and tertiary consumed. Numerous species of finfishes, shellfishes, marine birds, etc., will take advantage of these food sources in an otherwise-food deficient area. The only anticipated bioaccumulation will be the weight added by vertebrate and invertebrate consumers that take advantage of the expanded food chain.

If a lens of waste products builds up on the bottom, saprophytic organisms (e.g., bacteria, etc.) and infaunal invertebrates (e.g., polychaete worms) and their predators (e.g., crabs, shrimps, fishes, etc.) are expected to utilize the protein source and add to the overall food chains in the immediate area of the mariculture platform. The calcareous shells of the detached fouling organisms will form a biodeposit of calcium and other biologically active chemicals that will add to the abundant supply of old mollusk shells throughout the nearshore area of the Gulf of Mexico. If the waste lens becomes a limiting factor (i.e., via increased BOD, etc.) in the future, the SEA TREK platform can be move some distance away to allow prolonged recovery of the bottom. There will be no irretrievable commitment of benthic substrates as a result of these waste products since bioaccumulation and dispersion will return the bottom to its original condition is a relatively short time span (e.g., a few years).

The SEA TREK platform will be constructed with the requisite sewage waste treatment systems as required by Federal Law. At present, SEA PRIDE has no plans to discharge human metabolic wastes into the Gulf of Mexico.

2. Potential transport of the pollutants by biological, physical, or chemical processes:

The discharged aqueous fish feces will be diluted and transported via currents into the surrounding marine environment. No other alternative exists for the collection and removal of fish feces from an open-water mariculture system such as the SEA TREK ocean farming system. Some chemical flocculation may occur and aid in the transport and/or sinking of the aqueous waste constituents. Those consumers that utilize the increased phytoplankton and zooplankton populations in the general area, will hasten the transport of the fish wastes throughout the mariculture area.

The term "pollutants" may be a misnomer in this situation. SEA PRIDE officials and other marine biology experts who have reviewed this open-water mariculture concept firmly believe that the aqueous fish wastes will serve as nutrient enrichment for an offshore area that will benefit from increased productivity at all levels of the

food chain. Only time and regular monitoring will determine the net affect of the nutrient enrichment in the area after SEA TREK reaches full capacity.

3. Composition and vulnerability of potentially exposed biological communities including:

a. Unique species or communities

At present, SEA PRIDE is aware of no unique species or communities within the proposed SEA TREK mariculture area south of Fort Morgan Peninsula near the entrance to Mobile Bay, AL. SEA PRIDE is also not aware of any unique communities within that area. SEA PRIDE is aware of several topographic hard-bottom features (e.g., *Southeast Banks, Southwest Rock, 17-Fathom Hole*) as well as several permitted artificial reef areas (e.g., "Fish Havens") well offshore of its permitted mariculture site. In addition, there are numerous oil and natural gas production platforms in the immediate area that "function" as artificial reefs with all of the requisite firm substrates and fouling communities.

Because of the uniformly flat, generally featureless sand and mud bottoms offshore of Alabama, hard bottoms and fish havens provide habitat and niches for numerous sessile and mobile invertebrates and predatory finfishes and shellfishes that would not otherwise occur. The presence and operation of the SEA TREK mariculture platform (and the concomitant release of aqueous fish wastes and escaping feed pellets) will foster and encourage the development of another firm-substrate "fish haven" community with all of its unique marine organisms and reef fishes. Instead of adversely affecting any of the hard-bottom or fish-haven communities in the area, SEA TREK will add to the available habitat and niches for additional members of the species that depend thereon in the adjacent areas of the Gulf of Mexico.

Prior to the final placement of its SEA TREK mariculture platform off Fort Morgan Peninsula SEA PRIDE will conduct a thorough assessment of the bottoms within its permitted 5-acre

site via side-scan sonar, SCUBA-diver inspections and video documentation, and benthic sampling to determine the exact nature of the habitat and its fauna and flora. If that assessment reveals the presence of any unique communities, the 5-acre permitted mariculture site will be moved elsewhere within the 500-acre mariculture area to avoid damage to or destruction of that community.

b. Endangered or threatened species

SEA PRIDE is aware of a number of Federal and Alabama endangered, threatened, or otherwise-protected species including marine birds, mammals, and turtles occur over the inner continental shelf waters of the shallow Gulf of Mexico. Those species are listed in the SEA TREK Site Characterization document (Cake, 1993). None of those species is tied specifically to the proposed 500-acre mariculture area or the permitted 5-acre site within that area. All of those protected species are actively mobile and migrate throughout the inner-shelf waters.

The SEA TREK platform, its barrel cages, and their operation and ocean "discharge" plans are being designed to prevent any harm to any protected species to the maximum extent possible under existing engineering and technology capabilities. The US Fish and Wildlife Service has reviewed SEA PRIDE's mariculture plans and has required that certain mesh-size nets cover the barrel cages to prevent "entanglement" by marine birds, mammals, and turtles. The SEA TREK platform will be designed and constructed to meet the latest spill prevention and counter-measure requirements of the US Environmental Protection Agency and the US Coast Guard.

c. Species that are critical to the structure or function of the ecosystem

SEA PRIDE is aware of no species that are critical to the structure or function of the nearshore marine ecosystem that exists within the proposed 500-acre mariculture area offshore

of Fort Morgan Peninsula, AL, and/or that would be negatively affected by the placement and operation of the SEA TREK ocean farming system. The populations of most of the "critical" species (e.g., predators, hard-bottom coral colonies, etc.) will be positively affected by the presence of additional artificial, hard substrates and potential food organisms.

4. Importance of the receiving-water area to the surrounding biological community, e.g.:

a. Spawning sites

The nearshore Gulf of Mexico waters off Mobile Bay serve as essential spawning sites for numerous estuarine-dependent shellfishes and finfishes (e.g., penaeid shrimps, blue crabs, sciaenid fishes, striped mullet, etc.) as well as for resident marine shellfishes and finfishes (e.g., reef organisms and fishes). After hatching, the estuarine-dependent species migrate shoreward and into the coastal estuaries to complete their development before returning as mature adults the following year. Because of the relatively small size of the SEA TREK mariculture platform and its barrel cages (as compared to the wide expanse of inner-shelf water spawning habitats that are utilized by numerous spawning species), SEA PRIDE's mariculture activities should not adversely impact the area's continued use as nearshore spawning grounds. The increased productivity of the same area that is predicted to result from the aqueous fish wastes and escaping feed should increase the spawning potential of all species that utilize that area.

b. Nursery/forage areas

The nearshore Gulf of Mexico waters off Mobile Bay serve as nursery and forage areas for resident marine shellfishes and finfishes (e.g., demersal and pelagic species, and hard-bottom organisms). Most of those species range far and wide in search of security and food and only the benthic, hard-bottom organisms would be restricted to the unique bottom habitats

and fish havens. Since there are no hard-bottom, benthic habitats and communities in the proposed 500-acre SEA TREK mariculture area that would serve as nursery cover and food sources for those maine species, mariculture operations therein should have no negative impact on the area as a nursery or forage area.

On the contrary, the artificial-reef nature of the SEA TREK platform, the increased availability of microhabitats and niches, the increased abundance of food organisms, the discharge of fouling organisms, the escape of some feed pellets, and the increased area-wide productivity from the aqueous fish wastes will increase the importance of the 500-acre mariculture area as a nursery and forage area for existing and newly attracted shellfishes and finfishes. The extent of that increased productivity will be documented by scientists aboard SEA TREK; however, other studies of artificial reefs in the nearshore Alabama-Mississippi waters have already proven the importance of such artificial habitats to the marine environment.

c. Migratory pathways

The nearshore waters off Mobile Bay, AL, act as an important migratory pathway for numerous estuarine-dependent species of shellfishes and finfishes that grow up in the bay and adjacent estuaries and move into high-salinity water for spawning. (See subsection #4.a., above.) The adults of some of those species such as penaeid shrimps and blue crabs do not return to the coastal estuaries; however, adults of many species such as sciaenid fishes, striped mullet, etc., return to the estuary via the same migratory routes. The bay-to-gulf routes are also used by foraging marine birds, mammals, and turtles (and commercial fishermen) as they pursue many of those same migrating shellfishes and finfishes.

The presence and operation of the proposed SEA TREK ocean farming system will not hinder the migration of any of those species because of the relatively small size of the platform and its barrel cages and the relatively large expanse of open

water south of Mobile Bay that will remain available. The smaller, migratory species (e.g., shrimp, crabs, fish, etc.) that swim or crawl through the SEA TREK area will not be hindered by the barrel cages as they can still move under or around the cages (and platform base). The larger, migratory species (e.g., birds, mammals, turtles, etc.) that cannot or will not move below the barrel cages will naturally fly or swim around the barrel cages and platform with little or no regard for its physical presence.

The presence and operation of the SEA TREK facility should have a positive impact on those species that migrate through the proposed mariculture area. Many of the migrating species will feed on the pelagic, demersal, benthic, and sessile organisms that will associate with and/or attach to the platform (e.g., predatory animals). Some of those species will utilize the submerged platform as an orientation guide (e.g., marine mammals and turtles). And some will rest, roost, or "fall-out" on the aerial portions of the platform (e.g., foraging birds and migrating neotropical birds). In each of these cases the SEA TREK platform will aid rather than interdict the migrating species.

d. Areas that are necessary for critical life stages/functions of an organism

SEA PRIDE is unaware of any sites, areas, or habitats within its proposed 500-acre mariculture area that area necessary for critical life states or functions of any resident marine organisms, migrating estuarine organism, or protected species. No submerged seagrass beds or coral reefs exist therein and no critical habitats exist therein that don't exist throughout the entire nearshore northern Gulf of Mexico.

5. The existence of special aquatic sites, including (but not limited to):

a. Marine sanctuaries/refuges

There are no formal National Marine Sanctuaries in the area of the proposed 500-acre SEA TREK mariculture site. Several nearby areas have been proposed as potential sanctuaries including the Chandeleur Sound area of southeastern Louisiana (57 nmi, 105 km west of the site) and the offshore "hard-bottom" topographic areas (minimum distance: 10.5 nmi, 19.4 km from the site). These potential sanctuaries are discussed in the SEA TREK Site Characterization document (Cake, 1993). The location and operation of the SEA TREK ocean farming system will not affect those potential sanctuaries or their designation as federal sanctuaries.

Three existing and one proposed National Wildlife Refuges (NWRs) are located in adjacent coastal areas. Those wildlife refuges are discussed in the SEA TREK Site Characterization document (Cake, 1993). The Dauphin Island Unit of the Bon Secour NWR is located 9.0 nmi (16.7 km) northwest of the permitted SEA TREK site; the Perdido Unit of the Bon Secour NWR is located 7.5 nmi (14 km) northeast of the site; the Mississippi Sandhill Crane NWR is located 48 nmi (89 km) northwest of the site; and the Chandeleur Island unit of the Breton NWR is located 52 nmi (96 km) west of the site. The proposed Grand Bay NWR is located 28 nmi (52 km) northwest of the SEA TREK site. The placement and operation of the SEA TREK ocean farming systems will have no impact on the wildlife or ecosystems that are protected within those existing or proposed refuges because of their distance away from the permitted mariculture site in the Gulf of Mexico.

b. Parks

The closest state park (Gulf State Park) is located 20 nmi (37 km) northeast of the permitted SEA TREK mariculture site along the shoreline east of Gulf Shores, AL. The aerial portion of the SEA TREK platform should not be visible from the park

since it is more than 16 miles from the park boundary. The placement and operation of the SEA TREK ocean farming system will not affect the environments that are protected in that park nor will it detract from the visitors enjoyment of that park because of the separation thereof. No federal parks occur in the area, per se; however, the national seashore units discussed below are part of the National Park Service System.

c. Monuments

No national (Park Service) monuments occur in the immediate vicinity of the permitted SEA TREK mariculture site. The State of Alabama maintains two Civil-War era forts at the entrance of Mobile Bay, AL: Fort Morgan on the western end of Fort Morgan Peninsula and Fort Gaines on the eastern end of Dauphin Island. Those forts are located 5.5 nmi (10.2 km) and 8.5 nmi (15.7 km) northwest of the SEA TREK site, respectively. The placement and operation of the SEA TREK ocean farming system will have no affect on either of those forts; however, the SEA TREK platform will be visible on clear days from atop those forts but should not detract from the visitor's experience thereof,

Other Civil-War era forts exist in Gulf Islands National Seashore at the entrance to Pensacola Bay (Fort Pickens, Fort Barrancas, and Fort McRee: at least 42 nmi [78 km] east-northeast of the permitted SEA TREK site) and on West Ship Island, MS (Fort Massachusetts: 60 nmi [111 km] west of the permitted SEA TREK site). The aerial portion of the SEA TREK platform will not be visible from those forts since they are more than 16 miles away. The placement and operation of the SEA TREK ocean farming system will not affect those forts nor will it detract from the visitors enjoyment of those forts because of the separation thereof.

d. National Seashores

Five units of Gulf Islands National Seashore are located along nearby Florida and Mississippi coastal barriers but no Alabama seashores are included in that park. Those seashore units are discussed in the SEA TREK Site Characterization document (Cake, 1993). The two closest units of that seashore are the Perdido Key, FL, unit (western boundary: 37 nmi [69 km] east-northeast of the permitted SEA TREK mariculture site) and the Petit Bois Island, MS, unit (eastern end of island: 26 nmi [48 km] west-northwest of the SEA TREK site). The aerial portion of the SEA TREK platform will not be visible from these two seashore units since it is more than 16 nmi away. The placement and operation of the SEA TREK ocean farming system will not affect those seashore units nor will it detract from the visitors enjoyment of those seashore units because of the separation thereof.

e. Wilderness Areas

Two National Seashore units and one National Wildlife Refuge unit are protected as wilderness areas under federal wilderness legislation. Petit Bois Island and Horn Island units of Gulf Islands National Seashore and Chandeleur Islands of Breton NWR are designated national wilderness areas. Those wilderness areas are discussed in the SEA TREK Site Characterization document (Cake, 1993). The eastern ends of Petit Bois and Horn Island wilderness areas are 26 nmi (48 km) and 36 nmi (67 km) west-northwest of the permitted SEA TREK mariculture site, respectively. The eastern shoreline of the Chandeleur Island wilderness area is 52 nmi (96 km) west of the SEA TREK site. The aerial portion of the SEA TREK platform will not be visible from any of these wilderness areas since it is more than 16 nmi away. The placement and operation of the SEA TREK ocean farming system will not affect those wilderness areas nor will it detract from the visitors enjoyment of areas nor will its affect and wildlife or habitats protected thereon because of the separation thereof.

f. Coral reefs/seagrass beds

No seagrass beds (submerged aquatic vegetation: e.g., manatee grass [*Cymodocea filiforme* Kutzing], shoal grass [*Diplanthera wrightii* (Ascherson)], turtle grass [*Thalassia testudinum* Koenig & Sims], etc.) occur in the 500-acre proposed SEA TREK operating area because of water depths therein (50+ feet). Seagrass beds do occur in adjacent waters of lower Mobile Bay and eastern Mississippi Sound; however, they are too far removed from the operating area to be affected by any activities or ocean discharges therein.

No stony coral reefs or atolls occur in the proposed, 500-acre, SEA TREK operating area off Mobile Bay, AL; however, small stony and soft coral colonies grow on solid substrates (oil and gas platforms, artificial reefs, fish havens, etc.) in the general area. Three hard-bottom topographic features occur offshore of the proposed SEA TREK operating area including *Southeast Banks, Southwest Rock* and *17-Fathom Hole*. Hard bottoms are low-relief, seafloor features or deposits hard or indurated surfaces that may consist of lithogenous, biogenous, or hydrogenous materials including sandstone slabs, rock rubble, and reef-like outcrops. Hard-bottom areas are usually covered with encrusting epifauna and the remains of molluscan shells (shell-hash). The biological assemblages of these shallow, inner-shelf habitats are dominated by the soft corals, *Leptogorgia virgulata* and *Lophogorgia hebes*.

Southeast Banks is located approximately 10.5 nmi (19.4 km) south of the proposed SEA TREK operating area in water depths of 69 to 87 feet (21 to 26.5 m). *Southwest Rock* is located approximately 14 nmi (26 km) southwest of the proposed SEA TREK operating area in water depths of 66 to 77 feet (20 to 22 m). The *17-Fathom Hole* is located approximately 15.5 nmi (28.7 km) south-southwest of the proposed SEA TREK operating area in water depths of 98 to 105 feet (30 to 32 m). The activities of and ocean discharges from the proposed SEA TREK platform are not expected to affect the biological communities on these hard-bottom areas because of distance and dilution factors. On the other hand, finfishes and motile and epifaunal invertebrates that inhabit the hard-bottom areas are

expected to associate with and/or colonize the hard substrates of the SEA TREK platform once it is in place.

6. Potential direct or indirect impacts on human health:

The placement and operation of the SEA TREK Ocean Farming System is predicted to have no potential direct or indirect impacts on the health of humans who reside, visit, or fish along the coast of Alabama, Florida, or Mississippi because no lethal, poisonous, toxic, or otherwise harmful liquids, vapors, substances, etc., will be released into the air or water from the SEA TREK system. Only FDA-approved and EPA-approved feed additives and antifoulants, respectively, will be used during the mariculture operation. The fishes that are reared in the SEA TREK system will be fresh and wholesome when delivered to onshore processing facilities as a prerequisite for successful operation.

The proposed discharge of aqueous fish feces and detached biofouling organisms during continuous mariculture operations should have no direct or indirect impact on the health or well-being of any human residents of or visitors to the coastal area of Alabama or adjacent states. The assimilative and dispersal capacities of the offshore Gulf of Mexico and the effects of tidal and longshore drift currents off Alabama should prevent and deleterious levels of aqueous fish wastes. If a lens of solid or flocculent fish feces or feed builds up on the bottom, there will be no impact on humans either at the site or along the adjacent shore line.

In the unlikely event that mass fish mortalities occur as a result of unforeseen environmental, meteorological, or oceanographic events, the putrefaction of thousands of pounds of fish carcasses may cause short-term water quality and air quality problems that may in turn result in transitory human impacts. The vapors and stench that would be associated with large volumes of rotting fish may reach adjacent shorelines if onshore winds are blowing. Those vapors and smells may cause short-term eye irritation and nausea and cause shoreline residents and/or visitors to leave or remain indoors. SEA PRIDE's mariculture personnel would have to wear protective breathing apparatuses while removing and disposing of

the dead fish especially if the mass mortality occurred during the heat of the summer. The transitory health problems would cease as soon as the fish are removed and disposed of. If those fish were not handled properly onshore, the potential exists for additional short-term human health problems for the fish handlers.

Mariculture technicians and other personnel who work and live aboard the SEA TREK platform will be trained in the detection, control, and recovery of potential pollutants such as diesel fuel oil, domestic waste water, etc. As with any offshore, high-tech operation, certain dangers to human health always exist from accidents and weather-related phenomena. All live-aboard staff members, visiting personnel, and other visitors to SEA TREK will be advised and warned of the inherent dangers that are associated with life aboard and offshore platform, that are associated with SCUBA-diving and boating operations that will be required, and that may be encountered during their stay aboard SEA TREK.

Numerous dangerous and toxic marine animals occur in the SEA TREK operating area including (but not limited to) stinging jellyfishes; large and dangerous sharks; poisonous stingrays, scorpion fishes, and catfishes; shocking torpedo rays; poisonous octopuses; toxic spiny urchins; biting crabs and fishes; etc. These and other harmful marine animals are discussed in the SEA TREK Site Characterization document (Cake, 1993). On-staff SCUBA divers who maintain the barrel cages and perform environmental sampling as well as recreational fishermen who take advantage of the artificial reef nature of the platform may be harmed by these animals and require first aid and other medical care and treatment.

SEA PRIDE has no intention, at present, to rear oysters or mussels in its SEA TREK ocean farming system, therefore, microbial water quality is not at issue. If those molluscan shellfish or other high-salinity clams (e.g., southern quahog clams, *Mercenaria campechiensis* [Gmelin]) will be reared in the future the ambient water quality and its potential impact on the consumers of raw shellfish stocks that are reared therein will become a potential health issue. (See section #10 below.)

7. Existing or potential recreational and commercial fishing:

a. Recreational fishing (See Cake, 1993)

The proposed SEA TREK operating area is an important recreational fisheries area. Most of that activity involves rod-and-reel/hook-and-line trolling for pelagic species (mackerels, tunas, red drum, etc.) and/or bottom or still fishing over fish havens and hard-bottoms such as reefs and petroleum platforms for demersal and mid-water species (snappers, groupers, cobia, sharks, etc.).

Recreational fishing occurs year-round with activity peaks from spring through autumn. Depending on ambient weather and sea conditions, most of that activity will occur over or near the fish havens described and discussed in the following text and well clear of the proposed SEA TREK mariculture site. Some spear fishing by SCUBA divers occurs on and in the immediate vicinity of the fish havens and petroleum platforms but that activity is restricted to the spring through autumn period.

Numerous fish havens or artificial fishing reefs exist in an east-west band from south of East Ship Island, MS, to south of Perdido Bay (entrance), AL; they range from 5 to 17 nmi (9.2 to 31.5 km) from the nearest shoreline. Most of the fish havens are inshore of the 10-fathom (60-ft) contour; however, deeper fish havens occur offshore of Alabama.

The placement and operation of the SEA TREK mariculture platform off Fort Morgan Peninsula, AL, will have no adverse impact on the biotic assemblages that are associated with fish havens throughout the Alabama inner shelf area because of distance and dilution factors. The SEA TREK platform will have a positive impact on the total biotic potential of artificial-reef inhabitants and associates because it will attract and nourish those same organisms as they migrate to, settle on, and otherwise associate with the submerged substrates (concrete walls and pylons, etc.) of SEA TREK. Since recreational hook-and-line fishing will not be permitted within the restricted 5-acre mariculture site, SEA TREK will

serve as a reservoir of finfishes, shellfishes, and other organisms that will migrate to and colonize other nearby fish havens.

Most of the petroleum production platforms in the general SEA TREK area also serve as artificial reefs or unofficial fish havens and "hot spots." None of the fish havens or petroleum platforms is located within the proposed 500-acre SEA TREK operating area.

b. Commercial fishing (See Cake, 1993)

The general SEA TREK operating area is an important commercial fishing area for the following groups of species: pelagic fishes (e.g., butterfish, mackerels, menhaden, mullet, tunas, etc.) demersal fishes (e.g., croakers, spot, sea trouts, etc.), and hard-bottom/reef fishes (e.g., snappers, drum, amberjacks, etc.). Fishery methods include bottom trawling for brown, pink, and white penaeid shrimps, and bottom fishes for human consumption (butterfish) and petfood (numerous bottom-dwelling species of fish); purse seining for, menhaden, mackerels, and red drum; gill netting for mullet and surf-zone fishes; and hook-and-line bottom fishing for snappers and groupers. Bottom trawling occurs from the coastal barriers out across the Continental Shelf to about 85 nm offshore; and bottom fishing for demersal, hard-bottom species occurs over rock outcroppings, artificial reefs, and coral-covered pinnacles.

Commercial fisheries are active year-round with peaks in summer and early autumn. Depending on winter weather and concomitant sea conditions in the proposed area, about 10% of commercial fishing activities may occur between November and March. Commercial fishing vessels will also transit the proposed SEA TREK operating area when motoring to and from the area's ports and other fishing grounds outside of the operating area.

8. Any applicable requirements of an approved Coastal Zone Management Plan (CZMP):

SEA PRIDE is not aware of any CZMP covering the proposed SEA TREK mariculture area or the permitted 5-acre site since it is in Federal OCS waters. The Alabama Department of Environmental Management has, however, requested that SEA PRIDE's "Section 10 Permit" (Rivers and Harbors Act of 1899 [33 U.S.C. 403]) stipulate the following condition: *Steps should be taken to minimize the impact of the structure on recreational and commercial fishing; these impacts to fishing should be coordinated with the Alabama Department of Conservation and Natural Resources, Marine Resources Division, for their recommendations* (request letter to John Ericsson signed by James W. Warr, Deputy Director, ADEM, 10 August 1993).

As a result of that coordination, the Alabama Marine Resources Division through the Department of the Army, Corps of Engineers included the following "special condition" on SEA PRIDE's Section 10 Permit #AL93-01004-M: e. *All marine species, with the exception of those indigenous to the north central Gulf of Mexico, stocked in the facility are to be approved by the Marine Resources Division of the Alabama Department of Conservation and Natural Resources* (COE Section 10 Permit #AL93-01004-M signed by John Ericsson of Sea Pride Industries, Inc., on 27 October 1993 [see attached copy]).

ADEM's Deputy Director, James Warr, noted that: *Action pertinent to coastal certification is required by 33 U.S.C. §1251. et. seq. and the Alabama Coastal Area Management Program* [ACAMP]. *Regulations promulgated by EPA requiring discharge permits for storm-water runoff from individual and commercial facilities may be applicable* (letter SEA PRIDE dated 10 August 1993). James Warr's letter certified that SEA PRIDE's SEA TREK project *has been found to be consistent with the Alabama Coastal Area Management Program conditional upon compliance with the management program and condition* [see immediate preceding paragraph] *prescribed herein.*

ADEM's Water Division - Coastal Program (ADEM Admin. Code R. 335-8 [ADEM, 1988]) document provides the review process for Federal licenses and permits such as the EPA's Ocean Discharge Permit now being considered for SEA PRIDE. Pursuant to 15 C.F.R. Part 930,

Subpart D, SEA PRIDE's activities at its permitted SEA TREK site site must be consistent with ADEM's Coastal Program. At this time, SEA PRIDE has neither formulated nor signed a formal *Coastal Zone Management Consistency Plan* but shall do same when appropriate. SEA PRIDE's proposed mariculture activities shall comply with Alabama's approved Coastal Zone Management Program and shall be conducted in a manner that is consistent with that Program.

9. Such other factors relating to the effects of the discharge as may be appropriate:

a. Dilution of fish feces

As indicated in sections #1 and #2 (above) the aqueous fish feces that are discharged from the SEA TREK ocean farming system will serve as a potential nutrient enrichment source in the nearshore Gulf waters off Fort Morgan Peninsula. At present the low levels of dissolved nutrients that enter the proposed mariculture area are derived from up-current bays and rivers along the western coastline of Florida via the westerly flowing, longshore drift current. Nutrient-rich waters that flow from Mobile Bay are generally deflected westward as a result of the same westerly flowing, longshore drift current except during periods of prolonged nor'wester storms that are associated with winter frontal passages. As a result the nearshore Gulf waters off Fort Morgan Peninsula are remarkable transparent, relatively low in dissolved nutrients and suspended solids, and lower in generally productivity than adjacent coastal estuaries.

A potential daily discharge of approximately 5,500 pounds of aqueous fish wastes would result per day if SEA PRIDE system was filled to capacity with mature, ready to market fish: 1,000,000 fish X 4 pounds per fish X 0.5 pound of feces per pound of body weight ÷ 365 days per year = 5,500 pounds of fish feces per day. If all 5,500 pounds of those feces were excreted at once and remained in solution, one acre-foot of sea water would dilute them by a factor of 1 to 495 (or to 2 parts per thousand). The 250 acre-feet of water within the 5-acre SEA TREK site in 50 feet of water would dilute those same

wastes by a factor of 1 to 123,750 (or to 8 parts per million).

If we assume that excretion continues throughout the day, then 1,000,000 4-pound fish would excrete an average of 230 pounds of feces per hour. At that hourly discharge volume, the 250 acre-feet of water within the 5-acre SEA TREK site would dilute the fish wastes by a factor of 1 to 2,957,250 (or to 0.3 part per million). The dynamic nature of the tidally influenced Gulf waters would dilute those aqueous waste further as they currents, waves, etc., combine to dilute and disperse those wastes throughout the area. The discharged nutrients should not overburden the water column, nor promote high BOD loading given the dynamic nature of the offshore marine ecosystem. The net affect of those excreted fish wastes should be a slightly elevated nutrient level in the down-current area and a concomitant slight increase in area-wide productivity.

The release of approximately 5,500 pounds of aqueous fish feces in the open, dynamic waters of the Gulf of Mexico will not in SEA PRIDE's opinion produce an *unreasonable degradation of the marine environment*. Substantially larger volumes of fish feces area excreted into the same area daily by the native fish populations and especially those schooling fishes such as red drum, red snapper, striped mullet, etc. Those nutrients are readily and naturally assimilated into the marine environment and recycled through the food chains and food webs and the nearshore Gulf shows no evidence of environmental degradation from fish feces.

b. Increased biodiversity and fishery productivity

Previous research on Mississippi's artificial fishing reefs has demonstrated that marine biodiversity will increase as a result of artificial reef structures in the Gulf of Mexico. Native fishery production will also occur as wild finfish are attracted to those fish havens. The SEA TREK ocean farming system will act as an artificial reef by providing submerged structures to colonizing invertebrates which, in turn, will

attract carnivorous shellfishes and finfishes. Many of those species will consume the feed pellets that inadvertently escape from the barrel cages and the organisms that otherwise associate with the platform.

Artificial fishing reefs and fish havens in the northern Gulf of Mexico significantly increase biodiversity and the catches of commercially- and recreationally-important finfishes that associate with and/or depend of those habitats for food, cover, orientations, etc. SEA PRIDE is convinced that the SEA TREK platform and fish- culture activities at its 5-acre mariculture site will have a net positive impact on the marine environment therein. SEA PRIDE is also convinced that there will be no *significant adverse changes in ecosystem diversity, productivity, and stability of the biological community within* [or outside of] *the area of discharge and surrounding biological communities.*

c. Reduced dependence on wild stocks of native finfishes

Another factor that should be considered is the potential impact of reduced dependence on wild finfish populations with the advent of successful open-water mariculture in the Gulf of Mexico. Many commercially- and recreationally-important finfish species are now at risk from overharvesting, by-catch losses, poor resource management, coastal pollution, loss of habitats and nursery areas, and increased seafood demand. Successful mariculture of native finfishes such as red drum, red snapper, grouper, and mahi-mahi will stabilize the seafood market, reduce fishing pressure on wild populations, and encourage the recovery of those depleted stocks. Federal agencies including the USEPA and the Corps of Engineers have been encouraged by the Clinton Administration to facilitate the aquaculture and mariculture permitting process.

d. Reduced dependence on importation of foreign seafood

The importation of wild-caught and cultured seafood resources has increased dramatically recently as the US consumers switch

from "red meat" to "white meat" for health and dietary needs, and as native seafood species decline. Successful at-sea mariculture will provide additional seafood resources to the US market as well as displace some of the imported seafood products. The new Gulf mariculture industry can play a key role in the North American Free Trade Agreement if that treaty is approved and it the mariculture industry is assisted in its attempts to begin at-sea mariculture.

e. Potential impact to aesthetic, recreational, scientific, or economic values

The "discharge" of aqueous fish feces from the SEA TREK ocean farming system should have no potential impact on the *esthetic* [sic], *recreational, scientific or economic values* which would be *unreasonable in relation to the benefit derived from the discharge*. Throughout this document we have addressed these four "values" and the potential impacts of SEA TREK and its mariculture activities including the "discharge" of natural fish feces on the nearshore coastal waters of Alabama. In the final analysis, only time and an appropriate monitoring program will provide the conclusive facts to substantiate SEA PRIDE's claims regarding the overall positive impact of its proposed mariculture operations in the Gulf of Mexico. Although the "burden of truth" may rest on SEA PRIDE's shoulders, the USEPA and other federal agencies should facilitate the placement and operation of the SEA TREK ocean farming system so that the budding mariculture industry can reach its productive potential and assist with humankind's seafood needs while still protecting all of the inherent biological, aesthetic, recreational, scientific, and economic values that are presently derived from to nearshore waters 4 nautical miles southeast of the western end of Fort Morgan Peninsula, Alabama.

10. Marine water quality criteria:

The coastal waters of the Gulf of Mexico that are contiguous to the State of Alabama are classified for *shellfish harvesting/swimming and other whole-body, water-contact sports/fish and wildlife* by the Alabama Department of Environmental Management (ADEM Admin. Code R. 335-6-11: Water-Use Classifications for Interstate and Intrastate Waters [ADEM, 1993]). As such they are safe for molluscan shellfish production and harvesting as well as for human water-sport activities such as swimming and SCUBA diving. The planned "discharge" of 5,500 pounds per day of aqueous fish excretions from the SEA TREK ocean farming platform will not alter the classified microbiological status of those nearshore waters vis-a-vis water purity since no untreated human sewage will accompany those fish wastes.

DRAFT

SEA TREK OCEAN FARMING SYSTEM: SITE CHARACTERIZATION - GULF OF MEXICO

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A. LOCATION

The approved operating area for Sea Pride's SEA TREK OCEAN FARMING SYSTEM (mariculture platform plus six barrel cages) is located in the north-central Gulf of Mexico approximately 6.5 nautical mines (12 km) south-southeast of the mouth of Mobile Bay, Alabama (see Figure 1). The approved location is a 500-acre circular area with a geographic center at Latitude 30° 9.7' N and Longitude 87° 58.4' W. The location is close to port and seafood processing facilities at Dauphin Island and Bayou LaBatre, AL, respectively.

The approved, 5-acre mariculture site is 17 nmi (31.5 km) west-southwest of Gulf Shores, AL; 4.5 nmi (8.3 km) south of Bon Secour National Wildlife Refuge (on Fort Morgan Peninsula); 5.5 nmi (10.2 km) south-southeast of Mobile Point (western end of Fort Morgan Peninsula); 8.5 nmi (15.7 km) south-southeast of Fort Gaines (eastern end of Dauphin Island), 22.5 nmi (41.7 km) southeast of Bayou LaBatre, AL; and 26.5 nmi (49.1 km) east-southeast of Petit Bois Island, MS (eastern most part of Mississippi's units of Gulf Islands National Seashore) (Figure 1). The approved site is also 2.5 nmi (4.6 km) east of the eastern Safety Fairway limits of the Mobile Bay Entrance Channel and 1.0 nmi (1.9 km) north of the northern Safety Fairway limits of the Mobile-to-Pensacola shipping fairway. The approved site is within the U.S. Minerals Management Service's Outer Continental Shelf (OCS) Block 827 that is currently leased to the Exxon Energy Company. The proposed mariculture area lies within the Military Warning Area W-453 (Gulf of Mexico Control Area).

FIGURE 1: Location of Approved SEA TREK Site.

The attached copy of the 1986 Minerals Management Service (MMS, 1987) Visual No. 3 (*Recreation and Areas of Multiple Use*) is incorporated herein as Figure 1. That chart provides most of the areas of importance that are referred to in this **draft** document. The SEA TREK mariculture site [small black dot] is in the southwestern corner of OCS Block 827 (southeast of the mouth of Mobile Bay; colored with red). The back side of Visual No. 3 has a wealth of information on "Fish Havens" and National Historic Sites such as Sand Island Light which is about 5 nmi (9.3 km) west-northwest of the approved SEA TREK site.

B. CLIMATE

The following narrative was excerpted from unclassified information in US Navy Mine Warfare Pilot SP 1015 for Mobile, AL/Pensacola, FL, and Approaches (US Navy, 1988). The climate of the north-central Gulf of Mexico is humid subtropical with warm summers and mild winters. The Gulf of Mexico moderates air temperatures, thereby decreasing the range between extremes. Local land and sea breezes are prevalent over the coastal waters throughout most of the year and they affect the general air circulation and sea condition by increasing or decreasing the wind speed. Sea breezes will strengthen southerly winds during the day.

The Bermuda High dominates the air circulation over the area during spring and summer; however, this high-pressure system weakens in autumn and retreats eastward, thereby allowing cold, continental air masses and associated frontal systems to penetrate the area. Frontal passages occur 15 to 20 times a year and bring strong southerly winds as they approach the area and strong northerly winds after they pass. These northerly winds are accompanied by adverse weather that frequently lasts up to 4 days. Weather fluctuations continue until the Bermuda High strengthens in spring.

The area is subject to severe weather that is associated with tropical storms and hurricanes from June through November; but conditions are most severe in September. Tropical storms and hurricanes may affect the operation of SEA TREK. There is only about a 45% probability that at least one tropical storm or hurricane will enter the area during the June-to-November hurricane season; however, few late-season (November) storms occur in the area.

Air circulation and surface winds are controlled by the position and strength of the Bermuda High. Its western extension dominates the air flow during spring and summer and produces southerly and southeasterly winds. When the high begins to weaken and retreat eastward in autumn, the continental air masses that penetrate the area bring northerly winds. Average wind speed and direction in the SEA TREK operating area are presented in Table 1. The mean (average) annual wind speed is 11.7 knots (6.0 m/sec) and the wind usually enters the area from the north-through-east quadrants.

TABLE 1

PERCENT OCCURRENCE AND DIRECTION OF OFFSHORE WINDS IN SEA TREK OPERATING AREA

MONTH	MEAN SPEED	<3 kn	4-10 kn	11-21 kn	22-33 kn	>34 kn
JAN	13.1 kn = 6.7 m/s	6.1%	34.5%	48.8%	10.0%	0.6%
FEB	13.8 kn = 7.1 m/s	5.1%	33.2%	47.2%	13.4%	1.0%
MAR	13.1 kn = 6.7 m/s	5.2%	34.5%	49.2%	10.3%	0.8%
APR	12.3 kn = 6.3 m/s	5.6%	37.8%	49.2%	7.2%	0.2%
MAY	10.3 kn = 5.3 m/s	7.1%	50.2%	39.3%	2.9%	0.1%
JUN	9.2 kn = 4.7 m/s	12.2%	52.5%	33.5%	1.8%	0.0%
JUL	9.3 kn = 4.8 m/s	10.6%	54.5%	33.3%	1.5%	0.1%
AUG	8.9 kn = 4.6 m/s	13.2%	56.1%	28.1%	2.4%	0.2%
SEP	11.8 kn = 6.1 m/s	9.9%	39.0%	42.0%	8.5%	0.6%
OCT	12.4 kn = 6.4 m/s	6.8%	37.1%	47.6%	8.1%	0.4%
NOV	13.1 kn = 6.7 m/s	6.4%	33.4%	49.4%	10.0%	0.7%
DEC	12.8 kn = 6.6 m/s	6.2%	34.6%	50.3%	8.4%	0.5%
MEANS	11.7 kn = 6.0 m/s	7.9%	41.4%	43.2%	7.0%	0.4%

MONTH	N	NE	E	SE	S	SW	W	NW
JAN	18.6%	14.0%	13.0%	14.1%	12.1%	5.6%	6.1%	10.3%
FEB	14.5%	14.2%	11.1%	14.0%	12.3%	7.4%	9.8%	11.5%
MAR	11.4%	9.0%	14.1%	18.1%	12.7%	8.7%	9.0%	11.8%
APR	9.7%	8.3%	12.8%	22.4%	14.4%	11.0%	8.6%	7.2%
MAY	8.0%	9.4%	13.6%	21.0%	14.6%	11.6%	8.8%	5.5%
JUN	5.0%	7.4%	11.0%	13.5%	16.5%	16.4%	12.4%	5.6%
JUL	4.6%	5.1%	9.4%	13.4%	17.9%	17.6%	14.7%	6.7%
AUG	7.2%	11.8%	15.7%	13.2%	11.3%	11.3%	9.7%	6.6%
SEP	9.3%	17.5%	23.1%	14.6%	9.6%	6.1%	5.3%	4.6%
OCT	15.6%	23.7%	23.1%	8.7%	4.7%	3.6%	5.9%	7.9%
NOV	17.9%	16.4%	15.9%	11.7%	8.6%	5.0%	6.6%	11.5%
DEC	16.6%	17.5%	15.2%	12.5%	10.6%	4.3%	5.9%	10.2%
MEANS	11.5%	12.9%	14.8%	14.8%	12.1%	9.1%	8.6%	8.3%

Wind speeds of 11 to 21 knots (5.7 to 10.8 m/sec) occur about 43.2% of the times throughout the year; winds of 10 knots (5.1 m/sec) or less occur about 49.3% of the time; and winds of greater than 21 knots occur only about 7.1% of the time. The passage of approximately 15 to 20 frontal weather systems from October through March bring cold air and strong predominantly northerly winds with velocities that may exceed 33 knots (17 m/sec).

The prevailing sea surface winds in the SEA TREK mariculture area are northerly from January and February, southerly from March through August, and easterly from September through December (National Data Buoy Center, 1973).

From November through April the mean absolute maximum air temperature is about 86°F (range, 80 to 92°F); the mean absolute minimum air temperature is about 36°F (range, 29 to 47°F); and the mean of the air temperature means is about 63°F (range, 59 to 69°F) (see Table 2). The lowest air temperature recorded in the SEA TREK operating area was 29°F (-1.7°C); however, although subfreezing temperatures in the 10s to 20s may rarely occur during extreme cold spells.

Weather phenomena that affect the SEA TREK operating area include heavy rainfall, reduced visibility, low cloud ceilings, winter frontal passages, and tropical storms. Average annual rainfall over the area ranges from 41 to 87 in/yr (104 to 221 cm/yr) and the maximum rainfall that was recorded in one 24-hour period was over 14 in. (36 cm) in Pensacola in March and slightly more than 13 in. (33 cm) in Mobile in April. From November through April, slow steady rainfall is often associated with the passage of low pressure weather fronts. Cloud cover averages 6/10 throughout the year but is greatest in association with winter storm fronts which are often accompanied by gray, overcast skies. Cloud cover from November through April will be less than 3/8 for 41.7% of the time and more than 7/8 for 24.3%. Rain, fog, smoke, and haze are the major factors that reduce visibility in the area. Heavy fog occurs up to 39 days annually and may occur up to 60 nmi offshore. Offshore visibilities are generally greater than 5 nmi; poorer visibilities occur during winter. Table 2 provides weather phenomena summaries for the area.

TABLE 2
SUMMARY OF WEATHER PHENOMENA FOR PROPOSED SEA TREK OPERATING AREA

	AIR TEMPERATURE			RAINFALL AMOUNT		PRECIPITATION DAYS		
MONTH	MIN	MAX	MEAN	MAX(24-h)	MEAN	>0.01 in	>1.0 in	T-STORMS
JAN	9°	78°	51°F	4.6 in	4.3 in	10 days	1 day	1 day
FEB	19°	81°	54°F	7.7 in	4.4 in	8 days	1 day	3 days
MAR	21°	83°	60°F	14.2 in	5.1 in	9 days	1 day	5 days
APR	37°	88°	68°F	4.1 in	3.8 in	6 days	1 day	3 days
MAY	44°	94°	75°F	4.5 in	3.7 in	7 days	1 day	6 days
JUN	54°	101°	80°F	5.1 in	4.7 in	8 days	1 day	7 days
JUL	61°	104°	82°F	4.8 in	6.6 in	12 days	2 days	15 days
AUG	62°	100°	82°F	4.5 in	5.9 in	12 days	2 days	15 days
SEP	46°	98°	79°F	13.5 in	6.7 in	9 days	2 days	6 days
OCT	34°	91°	63°F	7.9 in	4.0 in	5 days	1 day	1 day
NOV	24°	86°	60°F	2.8 in	3.2 in	7 days	1 day	1 day
DEC	7°	81°	54°F	3.4 in	4.1 in	8 days	1 day	1 day
MEAN:	35.7°	85.7°	63.2°F	6.1 in	4.2 in	8 days	1 day	2.3 days

	CLOUDINESS*		CEILING HEIGHTS* (ft)				VISIBILITY* (nmi)
MONTH	>3/8	>7/8	<300	<1000	<2000	<5000	<1/2<1<2<5 <10
JAN	35%	30%	5%	12%	25%	35%	4%5%6%11%36%
FEB	40%	28%	3%	12%	20%	29%	1%2%3% 7%37%
MAR	41%	24%	5%	13%	21%	28%	4%5%6%11%37%
APR	46%	19%	2%	9%	16%	22%	1%1%2% 7%32%
MAY	43%	14%	2%	6%	13%	18%	1%1%1% 4%27%
JUN	36%	12%	0%	5%	10%	15%	0%0%0% 2%24%
JUL	25%	18%	1%	6%	13%	17%	0%0%0% 2%23%
AUG	29%	13%	0%	5%	11%	16%	0%0%0% 3%25%
SEP	34%	18%	1%	8%	16%	21%	0%0%1% 4%33%
OCT	50%	12%	2%	6%	15%	21%	0%0%1% 2%24%
NOV	46%	20%	1%	8%	17%	25%	0%0%1% 3%31%
DEC	42%	25%	3%	11%	21%	25%	1%1%2% 6%37%
MEAN:	41.7%	24.3%	3.2%	10.8%	20.0%	27.3%	1.8%2.3%3.3%7.5%35%

* (Percent of total weather observations)

The hours of sunrise, sunset, and morning and evening twilight for the SEA TREK operating area off Mobile Bay, AL, are provided in Table 3 for Central Standard Time (CST; November through April) and Central Daylight Savings Time (CDST; May through October). The earliest and latest sun rises occur about 15 April (04:35 hr CST) and 15 October (07:01 hr CDST), respectively. The earliest and latest sunsets occur about 1 December (17:00 hr CST) and 1 July (20:05 hr CDST), respectively. The longest period of daylight occurs about 15 June (14:32 hr) and the shortest period of daylight occurs between 15 December and 15 January (about 10:42 hr).

TABLE 3

APPROXIMATE HOURS OF DAYLIGHT AND DARK IN THE SEA TREK OPERATING AREA

DATE	MORNING TWILIGHT	SUNRISE TIME	SUNSET TIME	EVENING TWILIGHT	HOURS OF DAYLIGHT	HOURS OF DARKNESS
01 JAN	06:30 CST	06:56	17:12	17:38	10:42	13:18
15 JAN	06:31 CST	06:57	17:21	17:47	10:50	13:10
01 FEB	06:26 CST	06:51	17:37	18:02	11:12	12:48
15 FEB	06:15 CST	06:40	17:49	18:13	11:40	12:20
01 MAR	06:01 CST	06:25	18:00	18:24	12:00	12:00
15 MAR	05:47 CST	06:11	18:08	18:32	12:30	11:30
01 APR	05:25 CST	05:49	18:19	18:43	12:54	11:06
15 APR	05:11 CST	05:35	18:26	18:51	13:14	10:46
01 MAY	05:52 CDT	06:17	19:37	20:03	13:46	10:14
15 MAY	05:42 CDT	06:08	19:45	20:11	14:04	9:56
01 JUN	05:32 CDT	05:59	19:56	20:23	14:24	9:36
15 JUN	05:11 CDT	05:58	20:03	20:30	14:32	9:28
01 JUL	05:35 CDT	06:02	20:05	20:32	14:30	9:30
15 JUL	05:42 CDT	06:09	20:02	20:29	14:24	9:36
01 AUG	05:54 CDT	06:20	19:52	20:18	13:58	10:02
15 AUG	06:02 CDT	06:27	19:42	20:07	13:40	10:20
01 SEP	06:13 CDT	06:37	19:22	19:47	13:10	10:50
10 SEP	06:21 CDT	06:47	19:04	18:28	12:42	11:18
01 OCT	06:30 CDT	06:53	18:45	19:09	12:14	11:46
15 OCT	06:36 CDT	07:01	18:31	18:55	11:58	12:02
01 NOV	05:49 CST	06:13	17:14	17:38	11:26	12:34
15 NOV	06:00 CST	06:25	17:04	17:29	11:04	12:56
01 DEC	06:12 CST	06:38	17:00	17:26	10:48	13:12
15 DEC	06:22 CST	06:48	17:02	17:29	10:42	13:18

(CST = Central Standard Time) (CDT = Central Daylight Time)

C. AIR QUALITY

The following air quality information was excerpted from the Final Environmental Impact Statement for Proposed Oil and Gas Lease Sales 113/115/116 in the Gulf of Mexico Region (Minerals Management Service [MMS], 1987); and from unclassified information is a Navy mine warfare document (US Navy, 1988) that covers the approaches to Mobile, AL, and Pensacola, FL.

Air quality in the SEA TREK operating area is measured against the National Ambient Air Quality Standards (NAAQSs) contained in the Clean Air Act, as amended. Those standards are designed to preserve the air quality of an area at a threshold necessary to protect public health and welfare (MMS, 1987). Air quality in the SEA TREK operating area is generally considered good and is probably better than the national standards. Alabama's Mobile and Baldwin Counties exceed the primary standards for Ox. Alabama has an approved State Implementation Plan for air quality coupled with regulatory enforcement and monitoring programs in operation (MMS, 1987).

Ambient air quality is considered a function of size, distribution, and activity of a population, and more importantly, the industrialization of an area. Emissions from all sources (e.g., internal and external combustion, solid-waste incineration, evaporation, chemical processing, etc.) make up the ambient air quality at any given time according to the particular rates of emission, proximity of sources, local meteorological conditions, and the rate of dispersion. These factors preclude the ambient air quality from remaining the same at all times, and, in fact, work in unison such that maximum and minimum conditions are observed as a function of time (i.e., at certain periods the controlling factors may cause the ambient air quality to meet or exceed the NAAQS and at other times it may be far below).

Meteorological conditions play a very important role in the dispersion of emissions, and thus, on the ambient air quality. Generally, the long-range transport of emissions will cause a worst-case, onshore condition when a plume is traveling in a stable layer (strong inversion) over water, when the winds are persistent in reaching shore, and when unstable daytime conditions occur over

coastal areas. These conditions are rare in the proposed SEA TREK operating area primarily because of prevailing climatological conditions (MMS, 1987).

SEA TREK will not affect the ambient air quality in the Gulf of Mexico operating area; however, infrequent air emission events such as prescribed burning of coastal-plain forests in Mississippi and prefrontal-passage accumulations of industrial and domestic air pollutants may promote the accumulation of smoke and haze over the operating area such that horizontal visibility becomes a problem for platform personnel. Those events will dissipate with the passage of meteorological fronts or other wind-storm events.

Visibilities in the vicinity of the SEA TREK operating site in the northern Gulf of Mexico are generally greater than 5 nmi about 85% of the time; poorer visibilities generally occur during winter (US Navy, 1988). Rain, fog, smoke, and haze are the major factors that reduce visibility in the area. Heavy fog occurs up to 39 days annually. The potentials for fog in the SEA TREK operating area are: 11% (Jan), 4% (Feb), 9% (Mar), 4% (Apr), 2% (May), 0% (Jun), 0% (Jul), 0% (Aug), 0% (Sep), 1% (Oct), 1% (Nov), and 4% (Dec) (based on percentage of total weather observations in operating area [US Navy, 1988]). The potentials for smoke and haze in the SEA TREK operating area are: 4% (Jan), 6% (Feb), 6% (Mar), 10% (Apr), 8% (May), 5% (Jun), 4% (Jul), 6% (Aug), 6% (Sep), 5% (Oct), 4% (Nov), and 4% (Dec) (based on percentage of total weather observations in operating area).

Visibilities of 0.5 nmi or less should occur only about 1.0% of the time during any month (US Navy, 1988). Visibilities of 10 nmi or better should occur on the average of about 30.5% of the time during any month Except during periods of thick fog, visibilities of 0.5 nmi or less may prevent adequate visual monitoring of the entire 5-acre operating area.

D. HYDROLOGY & WATER QUALITY

The following narrative was excerpted from unclassified information in US Navy Mine Warfare Pilot SP 1015 for Mobile, AL/Pensacola, FL, and Approaches (US Navy, 1988). Tables 4 and 5 present shipboard sea and swell observations, respectively, for the area covered by this site characterization. Water depths within the 500-acre SEA TREK operating area range from 50 to 60 feet (15 to 18 m). The depth along the inner-shelf bottom in the SEA TREK mariculture area slopes about 3.7 feet/nautical mile (0.6 m/km) or about 3.2 feet (1 m) from the northern to the southern edge of the 500-acre (5366-ft diameter) circular mariculture area.

Wave heights within the mariculture area will be limited by fetch and attenuated by shallow depths. Seas of less than 5 feet (1.5 m) occur about 84% of the time during any month and seas of more than 5 feet (1.2 m) occur only about 16% of the time. Seas of 8 feet (2.4 m) or more are uncommon in the area and occur only about 3.8% of the time usually in association with air mass frontal passages. The mean annual wave height for the area is approximately 2.5 feet (76 cm).

Average wave directions are similar to the average wind directions since the former are generated by the latter. Table 4 also presents the average annual wave directions for the SEA TREK operating area. The greatest number of waves originate from the northeastern through the southeastern quadrant: 42.5%; the least number of waves originate from the southwestern through the northwestern quadrant: 27.3%.

Swell conditions in the area tend to be moderate because of limited fetch. Swell of less than 5 feet (1.5 m) occurs up to 73% of the time; and swell of 8 feet (2.4 m) or higher occurs for only about 7% of the time primarily during winter. Swell is predominantly from the eastern through the southern quadrant: 46%; and least likely from the southwestern through the northwestern quadrant: 19% (Table 5).

Tides in the SEA TREK operating area are diurnal, with one high and one low water every tidal day (24.8 hr) (National Ocean Service, 1993). Diurnal tidal ranges are characteristically small with a

TABLE 4

SEA STATE (SIZE) AND DIRECTION CHARACTERISTICS (BY PERCENTAGE OF OBSERVATIONS) IN THE APPROVED SEA TREK AREA

MONTHS	CALM (0')	1-2 (0-2')	3 (3-4')	4 (5-7')	5 (8-12')	6 (13-19')	>6 (>20')
JAN	3.0%	46.5%	26.8%	17.8%	5.4%	0.5%	0.0%
FEB	3.0%	46.5%	26.8%	17.8%	5.4%	0.5%	0.0%
MAR	3.0%	46.5%	26.8%	17.8%	5.4%	0.5%	0.0%
APR	4.1%	57.8%	25.9%	11.5%	0.6%	0.1%	0.0%
MAY	4.1%	57.8%	25.9%	11.5%	0.6%	0.1%	0.0%
JUN	15.0%	59.0%	19.1%	6.6%	0.6%	0.0%	0.0%
JUL	15.0%	59.0%	19.1%	6.6%	0.6%	0.0%	0.0%
AUG	15.0%	59.0%	19.1%	6.6%	0.6%	0.0%	0.0%
SEP	15.0%	59.0%	19.1%	6.6%	0.6%	0.0%	0.0%
OCT	5.1%	39.6%	32.1%	20.2%	3.0%	0.0%	0.0%
NOV	5.1%	39.6%	32.1%	20.2%	3.0%	0.0%	0.0%
DEC	3.0%	46.5%	26.8%	17.8%	5.4%	0.5%	0.0%
MEANS	7.5%	51.4%	25.0%	13.4%	2.6%	0.2%	0.0%

MONTHS	N	NE	E	SE	S	SW	W	NW	INDET.	CALM
JAN	11.5%	13.8%	12.3%	15.5%	11.5%	7.6%	11.0%	13.1%	0.7%	3.0%
FEB	11.5%	13.8%	12.3%	15.5%	11.5%	7.6%	11.0%	13.1%	0.7%	3.0%
MAR	11.5%	13.8%	12.3%	15.5%	11.5%	7.6%	11.0%	13.1%	0.7%	3.0%
APR	9.0%	8.8%	14.2%	23.3%	13.3%	11.8%	8.8%	6.8%	0.1%	4.1%
MAY	9.0%	8.8%	14.2%	23.3%	13.3%	11.8%	8.8%	6.8%	0.1%	4.1%
JUN	7.6%	11.6%	14.8%	13.6%	11.1%	12.3%	7.7%	5.6%	0.7%	15.0%
JUL	7.6%	11.6%	14.8%	13.6%	11.1%	12.3%	7.7%	5.6%	0.7%	15.0%
AUG	7.6%	11.6%	14.8%	13.6%	11.1%	12.3%	7.7%	5.6%	0.7%	15.0%
SEP	7.6%	11.6%	14.8%	13.6%	11.1%	12.3%	7.7%	5.6%	0.7%	15.0%
OCT	16.6%	14.2%	17.5%	14.1%	8.7%	3.4%	5.4%	12.7%	2.0%	5.1%
NOV	16.6%	14.2%	17.5%	14.1%	8.7%	3.4%	5.4%	12.7%	2.0%	5.1%
DEC	11.5%	13.8%	12.3%	15.5%	11.5%	7.6%	11.0%	13.1%	0.7%	3.0%
MEANS	10.7%	12.3%	14.3%	15.9%	11.2%	9.2%	8.6%	9.5%	0.8%	7.5%

TABLE 5

SWELL STATE (SIZE) AND DIRECTION CHARACTERISTICS (BY PERCENTAGE OF OBSERVATIONS) IN THE APPROVED SEA TREK AREA

MONTHS	CALM (0')	1-2 (0-2')	3 (3-4')	4 (5-7')	5 (8-12')	6 (13-19')	>6 (>20')
JAN	14.8%	28.8%	21.3%	24.3%	10.0%	0.5%	0.3%
FEB	14.8%	28.8%	21.3%	24.3%	10.0%	0.5%	0.3%
MAR	14.8%	28.8%	21.3%	24.3%	10.0%	0.5%	0.3%
APR	14.2%	32.2%	28.7%	20.2%	4.3%	0.4%	0.0%
MAY	14.2%	32.2%	28.7%	20.2%	4.3%	0.4%	0.0%
JUN	24.2%	36.2%	23.5%	12.1%	3.7%	0.0%	0.3%
JUL	24.2%	36.2%	23.5%	12.1%	3.7%	0.0%	0.3%
AUG	24.2%	36.2%	23.5%	12.1%	3.7%	0.0%	0.3%
SEP	24.2%	36.2%	23.5%	12.1%	3.7%	0.0%	0.3%
OCT	17.2%	16.0%	31.9%	26.8%	8.4%	0.4%	0.3%
NOV	17.2%	16.0%	31.9%	26.8%	8.4%	0.4%	0.3%
DEC	14.8%	28.8%	21.3%	24.3%	10.0%	0.5%	0.3%
MEANS	18.2%	29.7%	25.0%	20.0%	6.7%	0.3%	0.3%

MONTHS	N	NE	E	SE	S	SW	W	NW	INDET.	CALM
JAN	9.5%	10.5%	10.4%	13.2%	16.7%	11.2%	6.4%	7.0%	0.3%	14.8%
FEB	9.5%	10.5%	10.4%	13.2%	16.7%	11.2%	6.4%	7.0%	0.3%	14.8%
MAR	9.5%	10.5%	10.4%	13.2%	16.7%	11.2%	6.4%	7.0%	0.3%	14.8%
APR	5.7%	7.4%	13.9%	26.8%	18.4%	4.2%	5.0%	3.7%	0.7%	14.2%
MAY	5.7%	7.4%	13.9%	26.8%	18.4%	4.2%	5.0%	3.7%	0.7%	14.2%
JUN	7.3%	4.5%	14.1%	18.2%	12.2%	8.5%	4.6%	5.8%	0.6%	24.2%
JUL	7.4%	4.5%	14.1%	18.2%	12.2%	8.5%	4.6%	5.8%	0.6%	24.2%
AUG	7.3%	4.5%	14.1%	18.2%	12.2%	8.5%	4.6%	5.8%	0.6%	24.2%
SEP	7.3%	4.5%	14.1%	18.2%	12.2%	8.5%	4.6%	5.8%	0.6%	24.2%
OCT	9.6%	12.5%	17.2%	17.2%	9.9%	5.2%	3.7%	6.3%	1.2%	17.2%
NOV	9.6%	12.5%	17.2%	17.2%	9.9%	5.2%	3.7%	6.3%	1.2%	17.2%
DEC	9.5%	10.5%	10.4%	13.2%	16.7%	11.2%	6.4%	7.0%	0.3%	14.8%
MEANS	8.8%	8.3%	13.4%	17.8%	14.4%	8.1%	5.1%	5.9%	0.6%	18.2%

mean range of 1.2 feet (0.4 m) along the coastal barrier shoreline in the northern part of the area. Tidal ranges decrease seaward and tidal progression is from the south, with a slightly easterly component on the Continental Shelf near the head of DeSoto Canyon (lat. 29°23'00" N & long. 86°59'00" W) approximately 70 nmi (130 km) southeast of the SEA TREK operating area. Strong, persistent winds from the north or south may significantly affect water levels about which the tide oscillates. Northerly winds that are associated with winter storms may lower tide levels by as much as 2 feet (0.6 m) while southern winds may cause tide levels to rise by as much as 4 feet (1.2 m) along the coast.

Surface currents within the SEA TREK operating area result from winds, tides, and occasional Loop Current influences. Tidal currents are diurnal rotary with maximum speeds of less than 0.5 knot (0.3 m/sec). Wind-driven surface currents have variable directions, but preferentially move along isobaths (bottom contours of equal depths) that trend southwest through northeast across the center of the SEA TREK operating area. Winter wind events that occur during the passage of meteorological fronts will produce estimated current speeds of 0.5 to 1.4 knots (0.3 to 0.7 m/sec) at the surface, and 0.3 to 1.0 knot (0.2 to 0.5 m/sec) near the bottom.

Longshore currents that consist of tidal and wind-driven components predominate over across-shelf components within a narrow band close to the coast (on the order of 5 to 11 nmi, referred to as the coastal boundary layer). Typical maximum tidal currents within that band would be about 0.3 knot (0.15 m/sec), with tidal excursions of 1.1 to 1.6 nmi. Currents that are driven by synoptic-scale winds range up to 0.5 to 1.0 knot (0.25 to 0.5 m/sec) for nonextreme conditions, with 5 to 55 nmi excursions for a typical 5-day "wind event." Longshore currents that result from winter northers may range up to several knots, depending on local topography, fetch, and duration (MMS, 1987).

The Gulf Loop Current, a dominant offshore feature, enters the Gulf through the Yucatan Strait, curves northward, eastward, and southward before exiting through the Straits of Florida. The northern boundary of the Current fluctuates north and south several hundred miles in a systematic manner. As the Current reaches its

northernmost extension near the Alabama/Florida shelf, an eddy can detach, after which the Loop Current axis translates southward. Although the Loop Current seldom reaches the proposed SEA TREK operating area, strong, persistent currents that appear to be related to the Current or associated eddies and intrusions have been observed at all depths.

The Gulf Loop Current occasionally modifies currents on the outer Continental Shelf via eddies and detached intrusions of Loop water. The eddies cause variable current direction and speed, whereas detached intrusions (in the upper half of the water column) flow northeastward across the shelf at speeds of 0.5 to 1.5 knots (0.3 to 0.8 m/sec), and dissipate near the coast. Subsurface-current "events" have a 10% chance of occurring in the area in March with observed speeds of 0.6 to 1.2 knots (0.3 to 0.6 m/sec). Those events last from 1 to 2 weeks and usually involve flows that are parallel to the (southwest-to-northeast) isobaths. The effects of all currents will be enhanced dispersion and dilution of metabolic fish wastes and modification of dissolved oxygen concentrations within the water column.

Surface water salinities in the SEA TREK operating area are somewhat variable and may at times be influenced by freshwater outflow from Mobile Bay. Mobile Bay waters tend to move southwesterly over the inner shelf (away from the SEA TREK site) when exiting the bay. As a result of wind and wave action the water column in the area is well mixed from surface to bottom during winter. In early spring, high freshwater input causes near-zero salinities near the mouth of Mobile Bay. Near-bottom salinities can reach 36 o/oo. Near-bottom salinities are higher than surface salinities throughout the area and are influenced by Loop Current eddies and intrusions.

Surface water salinities will be also be influenced by horizontal and vertical mixing of low-salinity estuarine outflows and high-salinity shelf waters. The 40-foot diameter of SEA TREK's fish-rearing barrel cages will permit the fishes to select the desired salinity range within the water column.

Surface water temperatures in the SEA TREK operating area are influenced by seasonal meteorological phenomena including

TABLE 6
SURFACE WATER TEMPERATURES IN THE SEA TREK OPERATING AREA

MONTHS	MINIMUM TEMP (°C)	MAXIMUM TEMP (°C)	MAXIMUM TEMP (°C)
January	13.9L	14.2L	16.0L
February	16.6	16.8	17.1
March	22.4	22.2	20.8
April	25.1	24.3	20.6
May	29.5	26.5	24.0
June	29.2	26.9	27.0
July	29.6H	30.0H	29.0H
August	28.9	28.0	27.6
September	25.1	25.4	24.9
October	22.7	22.0	21.8
November	19.5	17.5	22.2
December	16.2	16.2	16.2
MEANS:	**23.2M**	**22.5M**	**22.2M**

(H = High, L = Low, M = Mean)

frontal passages in autumn and winter. Near-bottom water temperatures are more stable but influenced by surface meteorological phenomena, currents (e.g., the Loop Current), and tidal outflow from adjacent Mobile Bay. Table 6 provides minimum, maximum, and mean surface water temperatures for the SEA TREK area off Mobile Bay. Water clarity (i.e., turbidity) in the SEA TREK mariculture area is directly related to the turbulent energy (e.g., currents, internal wave seiches, etc.) at the benthic boundary layer, to the turbidity of riverine outflow through Mobile Bay, and to biological productivity of the nearshore waters (e.g., phytoplankton blooms) (Vittor & Associates, 1985*a* & 1985*b*).

Organic and inorganic input from coastal marshes and sediment loading from riverine discharge and runoff contribute significantly to the turbidity of nearshore Gulf waters, especially during late-winter/spring and late-summer rainy seasons. The resulting highly turbid surface waters may extend from the mouth of Mobile Bay out across the SEA TREK operating area 5.4 nmi (10.2 km) southeast of the western end of Fort Morgan Peninsula (Mobile Point). Water clarity tends to be lower during the warm months of the year when phytoplankton blooms occur and higher in winter when phytoplankton levels are greatly reduced. Light penetration decreases markedly with depth during episodic turbid conditions and may affect subsurface work and observations by divers at the SEA TREK mariculture facility.

The general water quality in the SEA TREK operating area is affected by a number of natural factors including freshwater outflow from Mobile Bay, tidal mixing and transport of surface and subsurface waters over the inner-shelf area, and Loop Current eddies. Artificial or anthropomorphic factors such as ocean discharges from hydrocarbon production facilities may also have a limited impact on the area's water quality. Offshore oil companies are allowed to discharge drilling fluids and wastes, brines, and treated human sewage effluents into the general area; however, dilution, absorption, time, and distance factors mitigate the impacts of those discharges on the quality of water at the approved SEA TREK site or on the finfish species that will be reared.

Dissolved oxygen (D.O.) concentrations in the SEA TREK operating area will be more than adequate to sustain fish culture. Dissolved

oxygen levels will be influenced by vertical mixing of oxygen-rich surface waters, by the potential presence of low-D.O. waters from the Loop Current intrusions, and by elevated levels of Biochemical Oxygen Demands (BODs) from natural nutrient loading in the area including metabolic fish wastes (feces) and deteriorating feed. Desirable D.O. levels will be automatically maintained within the SEA TREK barrel cages via the sparging of atmospheric air or oxygen to prevent the loss of fish stocks.

E. GEOLOGY

The SEA TREK operating area lies within the Mississippi-Alabama sand facies and consists of well-sorted, fine-grained quartz sands, and locally shelly sands (Vittor & Associates, 1985a). Very little sediment erosion and/or deposition occurs in the SEA TREK operating area. Generally, the surface sediments consist of quartz sands with less than 25% carbonates (as molluscan shell debris). No "topographic highs" or outcroppings or pinnacles of "hard bottoms" are known to occur in the 500-acre SEA TREK operating area nor do any charted or "permitted" artificial reef structures (concrete rubble, etc.) exist therein. Side-scan sonar surveys of the 500-acre mariculture area will be conducted as a part of the final site selection process to ensure that no such hard-bottom habitats exist within the approved 5-acre SEA TREK site.

The exact geological nature of the seabed at the SEA TREK mariculture site must be examined and tested prior to selecting the final location and positioning of the SEA TREK platform. The stability and compaction characteristics of the sandy substrates will have a direct impact on the placement of the SEA TREK platform and the anchoring of the barrel-cage fish pens.

The seabed in the area slopes from the shoreline along Fort Morgan Peninsula southeastward past the edge of the Continental Shelf (200 fathoms; 600 ft) where the depths increase drastically across a Continental Slope. The depth along the inner shelf bottom in the mariculture area slopes about 3.7 feet/nautical mile (0.6 m/km) or about 3.2 feet (1 m) from the northern to the southern edge of the 500-acre (5366-ft diameter) circular mariculture area.

Seabed deposits of oil and natural gas occur throughout the vicinity of the SEA TREK operating area. Hydrocarbon exploration and production activities are presently underway in the surrounding area and the approved SEA TREK site is totally within the southwestern part of the Minerals Management Service's OCS Block 827. That block is leased by Exxon Energy Company and Exxon has granted Sea Pride Industries, Inc., a "letter of agreement" to operate its mariculture facility within Block 827 subject to five terms and conditions. Exxon's primary production activities are restricted to the northeastern and southeastern sections of that

block.

The unique, hard-bottom substrates (topographic relief areas) that are a common component of sea floor along the Alabama inner-shelf area are absent from the 500-acre SEA TREK mariculture area (Schroeder, et al., 1988, 1989). *Southeast Banks*, a surficial rock and shell rubble site with at least 13 feet (4 m) of relief, is located at 30°00'54" N and 87°57'06" W or 10.5 nmi (19.4 km) south of the approved SEA TREK site in 70 to 87 feet (21 to 26.5 m) of water. *Southwest Rock*, a moderately sloping reef-like site with rock and rock-rubble outcrop with 5 feet (1.5 m) of relief, is located at 30°06'06" N and 88°12'18" W or 14 nmi (26 km) west-southwest of the SEA TREK site in 66 to 72 feet (20 to 22 m) of water. *Seventeen-fathom Hole*, a surficial reef-like outcropping of small rock rubble and shell hash with up to 7 feet (2 m) of relief, is located at 29°55'36" N and 88°03'24" W or 15.5 nmi (28.7 km) south-southwest of the approved SEA TREK site in 98 to 105 feet (30 to 32 m) of water. The biological importance of these and other unique topographic features will be discussed in a subsequent section (H).

F. ZOOGEOGRAPHICAL FAUNAL PROVINCE

Rehder (1954) classified that portion of the northern Gulf of Mexico that contains the approved SEA TREK operating area as a part of the Carolinian Zoogeographical Faunal Province. The province extends from Cape Hatteras, NC, south to about Cape Canaveral on the eastern Florida coast, and from about Tampa Bay on the western Florida coast north and westward along the Gulf coast to about Corpus Christi Bay, TX. The Carolinian Province is characterized by long stretches of sandy beaches, often along low coastal islands, behind which are bays, sounds, and other estuaries with varying degrees of salinity (Rehder, 1954).

During an earlier geological period, when the sea level was at a higher stand, the Florida Peninsula was submerged and marine and estuarine organisms moved freely along the prehistoric southeastern coastline. During the last glacial period [the Pleistocene Epoch] the sea level fell and the Florida Peninsula rose thereby isolating the northern Gulf of Mexico component of the Carolinian fauna from that along the Atlantic coastline. Since that time, the coastal faunas have remained essentially the same with some speciation taking place (especially among nonmigratory species like some molluscs and crustaceans) and some sharing of genetic material (by highly migratory species that can move around the Florida Peninsula). The bulk of the fauna has remained the same or is very similar such that the southeastern Atlantic and Gulf coastal regions contain many of the same species. Most of those species are estuarine-dependent; that is, they spend parts or all of their life cycles in the estuaries.

G. MACROALGAE

Macroalgae in the approved SEA TREK operating area are dominated by the genus Sargassum or "gulfweed." Sargassum occurs in large floating mats along tidal and current frontal zones in offshore waters from spring through autumn at water temperatures of 64°F (18° C) and above. After being torn loose from coastal areas throughout the Gulf and Caribbean Sea, gulfweeds drift in the open Gulf and can exist in floating masses indefinitely. Sargassum mats can occur year-round but they tend to be larger and more abundant from spring through autumn and/or when brought into the area by northern excursions of the Loop Current and extended periods of southerly winds. Large sargassum mats may become an occasional problem during the warmer months when they may foul the netting of the barrel cages. Floating barriers (e.g., booms) should be installed and maintained around the periphery of the 5-acre SEA TREK mariculture site to prevent sargassum-mat fouling problems.

Drifting mats form unique habitats that are ecologically important as a substrate for the settlement and colonization of numerous sessile invertebrates (e.g., hydroids, bryozoans, barnacles, etc.), motile invertebrates (e.g., molluscs, worms, crabs, shrimp, etc.), and pelagic vertebrates (e.g., fish, sea turtle hatchlings, etc.). Some nonpelagic, motile species attach themselves to the gulfweed and live in the open Gulf as pseudopelagic organisms. Table 7 provides a list of organisms that associate with and/or depend on the floating mats of *Sargassum* was compiled from Friedrich (1969), Fotheringham (1980), and Morris and Mogelberg (1973).

Many pelagic fish species that are listed in Table 9 also associate with floating sargassum mats. Those species include dolphins (*Coryphaena* spp.), jacks, mackerels, driftfishes, and the juveniles of many other pelagic and demersal species.

Oil platforms in the Gulf support a rich and diverse algal assemblage. Sessile algae species will attach to the SEA TREK platform and grow seasonally. Gallaway and Lewbel (1982) reported the colonial green algae species *Enteromorpha flexuosa* (Roth) and *Chaetomorpha* sp. on oil platforms in the northern Gulf of Mexico.

TABLE 7

COMMON *SARGASSUM* ASSOCIATES IN THE NORTHERN GULF OF MEXICO

GROUPS	COMMON NAMES, GENUS & SPECIES
CNIDARIA	
Hydrozoa:	Ostrich-plume hydroid, *Aglaophenia latecarinata* Allman; *Clytia cylindrica* L. Agassiz; *Gonothyraea gracilis* (Sars); *Obelia dichotoma* (Linnaeus); *Plumularia diaphana* (Heller) [Total species = 43]
Anthozoa:	Sargassum anemone, *Anemonia sargassensis* Hargitt
PLATYHELMINTHES	
Turbellaria:	Sargassum flatworms, *Acerotisa notulata* (Bosc), *Amphiscolops sargassi* (Hyman), *Gnesioceros sargassicola* (Graff), *Holoplana grubei* (Graff)
MOLLUSCA	
Gastropoda:	Sargassum nudibranchs, *Scyllaea pelagica* Linne, *Corambella depressa* Balch, *Doto pygmaea* (Bergh), *Spurilla neapolitana* (Chiaje); sargassum snail, *Litiopa melanostoma* Rang
ANNELIDA	
Polychaeta:	Scaleworm, *Harmonthoe aculeata* Andrews; sargassum worm, *Platynereis dumerilii* (Andouin & Milne-Edwards); *Amphinome rostrata* (Pallas); *Spirorbis corrugatus* Montagu; *Dexiospira corrugatus* (Montagu)
ARTHROPODA	
Pycnogonida:	Sea spiders, *Endeis spinosa* (Montagu), *Anoplodactylus petiolatus* (Kroyer), *Tanystylum orbiculaire* Wilson
Cirripedia:	Stalked barnacles, *Lepas anatifera* Linne, *L. anserifera* Linne, *L. fascicularis* Ellis & Solander, *L. hilli* Leach, *L. pectinata* Spengler, *Conchoderma virgatum* (Spengler)
Malacostraca:	
Decapoda:	Sargassum crabs, *Callinectes marginatus* Milne-Edwards, *Portunus sayi* (Gibbes), *P. spinimanus* (Latreille); Sargassum shrimps, *Latreutes fucorum* (Fabricius), *Hippolyte coerulescens* (Fabricius), *Leander tenuicornis* (Say)
Isopoda:	Sea lice, *Bagatus minutus* (Richardson), *Idotea baltica* (Pallas), *Luconacia incerta* Mayer; parasitic sea lice, *Probopyrus latreuticola* Grissler
Amphipoda:	Sea fleas, *Ampithos longimana* Smith, *Biancolina* sp. Fine
BRYOZOA	Erect bryozoan, *Aetea anguina* (Linne); encrusting byrozoans, *Membranipora tuberculata* (Bosc), *Thalamoporella falcifera* (Hincks)
CHORDATA	
Ascidacea:	Sargassum tunicate, *Diplosoma gelatinosoma* (Milne-Edwards)
Osteichthyes:	Sargassum fish, *Histrio histrio* (Linne; Sargassum pipefish, *Syngnathus pelagicus* Linne; Sargassum triggerfish, *Xanthichthys ringens* (Linne)
Reptilia:	Kemp's Ridley Sea Turtle (hatchlings), *Lepidochelys kempi* (Garman)

Bert and Humm (1979) reported 120 species from oil platforms in Louisiana waters. According to Gallaway and Lewbel (1982) the dominant seasonal algae on the upper part of the SEA TREK platform should include:

SUMMER DOMINANTS (intertidal): the green algae *Enteromorpha flexuosa* (Roth) and *Chaetomorpha* sp.; (at 3 m): the red algae *Callithamnion byssoides* and *Polysiphonia subtilissima* and the green alga *Derbesia vaucheriaeformis*; (at 8 m): the red algae *C. byssoides* and *Polysiphonia denudata* and the green alga *Cladophora* sp.

WINTER DOMINANTS (intertidal): the green algae *Enteromorpha flexuosa* (Roth) and *Chaetomorpha* sp.; (at 3 m): the red alga *C. byssoides*, the brown alga *Giffordia mitchelliae*, and the green alga *Bryopsis hypnoides*; (at 8 m): the green alga *Derbesia vaucheriaeformis* and the red alga *C. byssoides*.

No seagrass beds (submerged aquatic vegetation: e.g., manatee grass [*Cymodocea filiforme* Kutzing], shoal grass [*Diplanthera wrightii* (Ascherson)], turtle grass [*Thalassia testudinum* Koenig & Sims], etc.) occur in the 500-acre SEA TREK operating area because of water depths therein (50+ feet). Seagrass beds do occur in adjacent waters of lower Mobile Bay and eastern Mississippi Sound; however, they are too far removed from the operating area to be affected by any activities or ocean discharges therein.

H. MACROINVERTEBRATES

Fotheringham (1980) and Gallaway and Lewbel (1982) documented the macroinvertebrate species that were associated with oil and gas platforms in the northern Gulf of Mexico. The following list (Table 8) was compiled from that publication and is intended to provide an indication of the major fouling organisms and grazers and predators that should colonize the SEA TREK mariculture platform off Mobile Bay. A thorough knowledge of these species is necessary to combat the heavy biofouling that is expected on the SEA TREK barrel cages and nets.

Hundreds of molluscan and crustacean shellfishes and other benthic and sessile invertebrates occur in the nearshore habitats of the northern Gulf of Mexico area covered by this site characterization. Time and space constraints prohibit the inclusion of all of those species in this account. Those species that occur in nearshore waters of the inner shelf and/or those species that are harvested by commercial and recreational fishermen and whose planktonic larval forms occur in the area are included in this account. Forty invertebrate species are associated with floating patches of Sargassum or "gulfweed" and are listed in Table 7 and 340 additional species are listed in Table 8. Table 8 was compiled from many sources including, but not limited to, Minor (1950), Galtsoff (1954), Gosner (1971), Downey (1973), Burke (1975), Williams (1984), Fotheringham (1980), Gallaway & Lewbel (1982), US Army Corps of Engineers (1984), Barry Vittor & Associates (1985a), Kaplan (1988), Miner (1950), and Ruppert and Fox (1988).

The vast majority of marine invertebrates and shellfishes go through planktonic and/or pelagic stages during their development from eggs to adults. Throughout the year and throughout the area the surface waters of the Continental Shelf contain massive numbers of larvae and juveniles of innumerable demersal (near-bottom) and benthic (bottom-dwelling) species. Although the populations of some species may decrease somewhat during winter, others increase in numbers to fill the niche and role as predators and prey.

Crustacean shellfishes such as blue crabs and penaeid shrimps are important as commercial and recreational species. The pelagic cnidarians (e.g., Portuguese men-of-war, jellyfishes, etc.),

TABLE 8
COMMON MACROINVERTEBRATES OF THE APPROVED SEA TREK OPERATING AREA

PHYLUM & CLASS	COMMON NAME	GENUS & SPECIES & AUTHORITY
PORIFERA	Boring Sponge	*Cliona celata* Grant
	Yellow Sponge	*Halichondria bowerbanki* Burton
	Eroded Sponge	*Haliclona loosanoffi* Hartman
	Volcano Sponge	*Haliclona permollis* (Bowerbank)
	Red Sponge	*Haliclona rubens* (Pallas)
	Green Sponge	*Haliclona viridis* (Duchassaing & Michelotti)
	Loggerhead Sponge	*Ircinia strobilina* (Lamarck)
	Red-Beard Sponge	*Microciona prolifera* (Ellis & Solander)
	Glass Sponge	*Scypha barbadensis* (Schuffner)
	Sponge	*Stelletta grubii* Schmidt
	Sponge	*Verongia lacunosa* (Lamarck)
CNIDARIA		
Hydrozoa:	Unbranched Hydroid	*Tubularia crocea* (Agassiz)
	Bushy Hydroid	*Bougainvillia carolinensis* (McCrady)
	Bushy Hydroid	*Bougainvillia frondosa* Mayer
	Bushy Hydroid	*Bougainvillia inaequalis* Fraser
	Bushy Hydroid	*Bougainvillia tennella*
	Branched Hydroid	*Turritopsis nutricula* McCrady
	Branched Hydroid	*Nemopsis bachei* L. Agassiz
	Bushy Hydroid	*Eudendrium carneum* Clarke
	Stalked Hydroid	*Euphysora gracilis* (Brooks)
	Fern Hydroid	*Sertularia turbinata*
	Stalked Hydroid	*Syncorne eximia*
	Hermit-Crab Hydroid	*Hydractinia echinata* Fleming
	Stalked Hydroid	*Amphinema dinema* (Peron & LeSueur)
	Stalked Hydroid	*Laodicea undulata* (Forbes & Goodsir)
	Bushy Hydroid	*Obelia dichotoma* (Linne)
	Unbranched Hydroid	*Clytia cylindrica* L. Agassiz
	Stalked Hydroid	*Eirene pyramidalis* (L. Agassiz)
	Hydromedusa	*Eutima variabilis* McCrady
	Hydromedusa	*Aglaura hemistoma* Perone & LeSueur
	Hydromedusa	*Liriope tetraphylla* (Chamisso & Eysenhardt)
	Hydromedusa	*Persa incolorata* McCrady
	Hydromedusa	*Rhopalonema velatum* Gegenbaur
	Hydromedusa	*Solmundella bitentaculata* (Quoy & Gaimard)
	Hydromedusa	*Cunina octonaria* McCrady
	Hydromedusa	*Proboscidactyla ornata* (McCrady)
	Portuguese Man-of-War	*Physalia physalis* (Linne)
	Siphonophore	*Rhizophysa filiformis* Forskal
	By-the-Wind Sailor	*Velella velella* (Linne)
Scyphozoa:	Purple Jellyfish	*Pelagia noctiluca* (Forskal)
	Sea Nettle	*Chrysaora quinquecirrha* (Desor)
	Lion's Mane Jellyfish	*Cyanea capillata* (Linne)
	Moon Jelly	*Aurelia aurita* (Linne)
	Cabbagehead Jellyfish	*Stomolophus meleagris* L. Agassiz
	Mushroom Cap Jellyfish	*Rhopilema verrilli* (Fewkes)
	Sea Wasp	*Chiropsalmus quadrumanus* (Muller)
	Sea Wasp	*Tamoya haplonema* Muller

TABLE 8 (Continued)

PHYLUM & CLASS	COMMON NAME	GENUS & SPECIES & AUTHORITY
CNIDARIA		
Anthozoa:	Star Coral	*Astrangia asteriformis* Milne-Edwards & Haime
	Stony Coral	*Telesto riisei*
	Ivory Bush Coral	*Oculina diffusa* Lamarck
	Stony Coral	*Phyllangia americana*
	Sea Whip	*Leptogorgia virgulata* (Lamarck)
	Sea Whip	*Lophogorgia hebes*
	Brown Anemone	*Aiptasia pallida* (Verrill)
	Texas Rock Anemone	*Aiptasiomorpha texaenisi* (Carlgren & Hedgpeth)
	Sargassum Anemone	*Anemonia sargassiensis* Hargitt
	Gray Warty Anemone	*Anthopleura carneola* (Verrill)
	Armored Anemone	*Anthopleura krebsi*
	Texas Warty Anemone	*Bunodactis texaensis* Carlgren & Hedgpeth
	American Warty Anemone	*Bunodosoma cavernata* (Bosc)
	Hermit-Crab Anemone	*Calliactis tricolor* (LeSueur)
	Orange-Striped Anemone	*Haliplanella luciae* (Verrill)
	Onion Anemone	*Paranthus rapiformis* (LeSueur)
CTENOPHORA	Beroe's Comb Jelly	*Beroe ovata* Chamisso & Eysenhardt
	Warty Comb Jelly	*Mnemiopsis mccradyi* Mayer
PLATYHELMINTHES		
Turbellaria:	Horseshoe Crab Flatworm	*Bdelloura candida* (Girard)
	Oyster Flatworm	*Stylochus ellipticus* (Girard)
	Oyster Flatworm	*Stylochus frontalis* (Verrill)
	Zebra Flatworm	*Stylochus zebra* (Verrill)
NEMERTEA	Milky Ribbon Worm	*Cerebratulus lacteus* (Leidy)
MOLLUSCA		
Polyplacophoraa:	Beaded Chiton	*Chaetopleura apiculata* (Say)
Gastropoda:	Yucatan Topshell	*Calliostoma yucatecanum* Dall
	Knorr's Worm Snail	*Vermicularia knorrii* Deshayes
	Common Sundial	*Architectonica nobilis* Roding
	Common Purple Sea-Snail	*Janthina janthina* (Linne)
	Wentletraps	*Epitonium* spp.
	Lamarck's Carinaria	*Carinaria lamarcki* Peron & LeSueur
	Atlantic Slipper Shell	*Crepidula fornicata* (Linne)
	Convex Slipper Shell	*Crepidula convexa* Say
	Spotted Slipper Shell	*Crepidula maculosa* Conrad
	White Slipper Shell	*Crepidula plana* Say
	Florida Fighting Conch	*Strombus alatus* Gmelin
	Atlantic Deer Cowrie	*Cypraea cervus* Linne
	Scotch Bonnet	*Phalium granulatum* (Born)
	Atlantic Distorsio	*Distorsio clathrata* (Lamarck)
	Giant Tun	*Tonna galea* (Linne)
	Common Fig Shell	*Ficus communis* Roding
	Apple Murex	*Chicoreus pomum* (Gmelin)
	Giant Atlantic Murex	*Hexaplex fulvescens* (Sowerby)
	Florida Rock Shell	*Thais haemastoma* (Lamarck)
	Lightning Whelk	*Busycon contrarium* (Conrad)
	Pear Whelk	*Busycon spiratum* (Lamarck)
	Sharp-Knobbed Nassa	*Nassarius acutus* (Say)
	Banded Tulip	*Fasciolaria lilium hunteria* (Perry)

TABLE 8 (Continued)

PHYLUM & CLASS	COMMON NAME	GENUS & SPECIES & AUTHORITY
MOLLUSCA		
Gastropoda:	Junonia	*Scaphella junonia johnstoneae* Clench
	Dubious Volute	*Scaphella dubia* (Broderip)
	Julia's Cone	*Conus juliae* Clench
	Sozon's Cone	*Conus delessertii* Recluz
	Arcas Cays Auger	*Terebra arcas* Abbott
	Mottled Seahare	*Aplysia brasiliana* Rang
	Ragged Sea Hare	*Bursatella leachii pleii* Rang
	Sargassum Nudibranch	*Doridella obscura* Verrill
	Sargassum Nudibranch	*Scyllaea pelagica* Linne
	Sargassum Nudibranch	*Spurilla neapolitana* (Chiaje)
	Blue Fiona	*Fiona pinnata* (Eschscholtz)
	Blue Glaucus	*Glaucus atlanticus* Foster
Scaphapoda:	Texas Tusk Shell	*Dentalium texasianum* Philippi
Bivalvia:	Pointed Nut Clam	*Nuculana acuta* (Conrad)
	Concentric Nut Clam	*Nuculana concentrica* (Say)
	Turkey Wing	*Arca zebra* (Swainson)
	Mossy Ark	*Arca imbricata* Bruguiere
	Baughman's Ark	*Anadara baughmani* Hertlein
	Blood Ark	*Anadara ovalis* (Bruguiere)
	Transverse Ark	*Anadara transversa* (Say)
	White-Beared Ark	*Barbatia candida* (Helbling)
	Tulip Mussel	*Modiolus americanus* (Leach)
	Scorched Mussel	*Brachidontes exustus* (Linne)
	Scissor Date Mussel	*Lithophaga aristata* (Dillwyn)
	Mahogany Date Mussel	*Lithophaga bisulcata* (Orbigny)
	Paper Mussel	*Amygdalum papyrium* (Conrad)
	Stiff Pen Shell	*Atrina rigida* (Lightfoot)
	Half-Naked Pen Shell	*Atrina seminuda* (Lamarck)
	Atlantic Wing Oyster	*Pteria colymbus* (Roding)
	Atlantic Pearl Oyster	*Pinctada radiata* (Leach)
	Flat Tree Oyster	*Isognomon alatus* (Gmelin)
	Bicolor Tree Oyster	*Isognomon bicolor* (Adams)
	Rough Scallop	*Aequipecten muscosus* (Wood)
	Calico Scallop	*Argopecten gibbus* (Linne)
	Lion's Paw	*Lyropecten nodosus* (Linne)
	Kitten's Paw	*Plicatula gibbosa* Lamarck
	Atlantic Thorny Oyster	*Spondylus americanus* Hermann
	False Atlantic Jungle	*Pododesmus rudis* (Broderip)
	Rough Lima	*Lima scabra* (Born)
	Crested Oyster	*Ostrea equestris* Say
	American Oyster	*Crassostrea virginica* (Gmelin)
	Coon Oyster	*Lopho frons* (Linne)
	Honeycomb Oyster	*Pyncnodonte hyotis* (Linne)
	Leafy Jewel Box	*Chama macerophylla* Gmelin
	Little Corrugated J. B.	*Chama congregata* Conrad
	Left-Handed Jewel Box	*Pseudochama radians* (Lamarck)
	Spiny Jewel Box	*Arcinella cornuta* Conrad
	Lunate Crassinella	*Crassinella lunulata* (Conrad)
	Prickly Cockle	*Trachycardium egmontianum* (Shuttleworth)
	Giant Atlantic Cockle	*Dinocardium robustum* (Lightfoot)

TABLE 8 (Continued)

PHYLUM & CLASS	COMMON NAME	GENUS & SPECIES & AUTHORITY
MOLLUSCA		
Bivalvia:	Gulf Surf Clam	*Spisula solidissima similis* (Say)
	Dwarf Surf Clam	*Mulinia lateralis* Say
	Lintea Tellin	*Tellina aequistriata* Say
	Alternate Tellin	*Tellina alternata* Say
	Dwarf Shiny Tellin	*Tellina nitens* C.B. Adams
	Eastern Crenulate Tellin	*Tellina squamifera* Deshayes
	DeKay's Tellin	*Tellina versicolor* DeKay
	Common Atlantic Abra	*Abra aequalis* (Say)
	Southern Quahog Clam	*Mercenaria campechiensis* (Gmelin)
	Clench's Venus	*Chione clenchi* Pulley
	Lady-in-Waiting Clam	*Chione intapurpurea* (Conrad)
	Imperial Venus Clam	*Chione latilirata* (Conrad)
	Serene Gould Clam	*Gouldia cerina* (C.B. Adams)
	Texas Venus Clam	*Agriopoma texasiana* (Dall)
	Disk Dosinia Clam	*Dosinia discus* (Reeve)
	Elegant Disk Clam	*Dosinia elegans* Conrad)
	Atlantic Geoduck Clam	*Panopea bitruncata* Conrad
	Campeche Angel Wing	*Pholas campechiensis* Gmelin
	Striate Martesia	*Martesia striata* (Linne)
	Fragile Martesia	*Martesia fragilis* Verrill & Bush
	Wedge-Shaped Martesia	*Martesia cuneiformis* (Say)
	Common Shipworm	*Teredo navalis* Linne
	Bartsch's Shipworm	*Teredo bartschi* Clapp
	Gould's Shipworm	*Bankia gouldi* Bartsch
Cephalopoda:	Long-finned Squid	*Loligo paeleii* LeSueur
	Brief Thumbstall Squid	*Lolliguncula brevis* (Blainville)
	Scale-Skin Squid	*Pholidoteuthis adami* Voss
	Short-Finned Squid	*Illex coindetii* (Verany)
	Common Octopus	*Octopus vulgaris* Cuvier
	Paper Nautilus	*Argonauta argo* Linne
ANNELIDA		
Polychaeta:		
Errantia:	Scaleworm	*Harmothoe aculeata* Andrews
	Fireworm	*Amphinome rostrata* (Pallas)
	Fireworm	*Hermodice carunculata* (Pallas)
	Fireworm	*Paramphioma pulchella* (M. Sars)
	Pelagic Worms	*Tomopteris* spp.
	Pilargid Worm	*Sigambra tentaculata* (Treadwell)
	Sponge Threadworm	*Haplosyllis spongicola* (Grube)
	Sponge Worm	*Trypanosyllis gemmipara* Johnson
	Syllid Worm	*Brania wellfleetensis* Pettibone
	Southern Clam Worm	*Nereis succinea* (Frey & Leuckart)
	Nereid Worm	*Nereis micromma*
	Sargassum Worm	*Platynereis dumerilii* (Audouin & Milne-Edwards
	Shimmy Worm	*Nephtys picta* Ehlers
	Bloodworm	*Glycera americana* Leidy
	Solitary Glycinde	*Glycinde solitaria* (Webster)
	Littoral Goniada	*Goniada littorea* Hartman
	Plumed Worm	*Diopatra cuprea* (Bosc)
	Onuphis Tube Worm	*Onuphis nebulosa* Moore

TABLE 8 (Continued)

PHYLUM & CLASS	COMMON NAME	GENUS & SPECIES & AUTHORITY
ANNELIDA		
Sedentaria:	Tubicolous Worm	*Apoprionospio pygmaea*
	Tubicolous Worm	*Dispio uncinata* Hartman
	Fringe-Gilled Mudworm	*Paraprionospio pinnata* (Ehlers)
	Blister Worm	*Polydora websteri* Hartman
	Bee Spionid Worm	*Spiophanes bombyx* (Claparede)
	Shovel-Headed Worm	*Mageloma* cf. *phyllisae* Jones
	Shovel-Headed Worm	*Mageloma* cf. *riojai* Jones
	Parchment-Tube Worm	*Phyllochaetopterus* sp.
	Unicorn Worm	*Aricidea wassi*
	Cossurid Worm	*Cossura delta* Reish
	Cossurid Worm	*Cossura soyeri*
	Threadworm	*Mediomastus californiensis* Hartman
	Bamboo Worm	*Asychis elongata*
	Bamboo Worm	*Clymnella torquata* (Leidy)
	Shingle Tube Worm	*Owenia fusiformis* Delle Chiaje
	Mason Worm	*Sabellaria floridensis* Hartman
	Mason Worm	*Sabellaria vulgaris* Verrill
	Mason Worm	*Sabellides* sp.
	Serpulid Fan Worm	*Hydroides dianthus* Verrill
	Gulf Fan Worm	*Eupomatus protulicola* (Benedict)
	Serpulid Fan Worm	*Pomatocerus americanus* Day
	Feather-duster Worm	*Spirobranchus giganteus* (Pallas)
	Burrowing Worm	*Myriochele oculata*
ARTHROPODA		
Merostomata:	Horseshoe Crab	*Limulus polyphemus* (Linne)
Pycnogonida:	Sea Spider	*Anoplodactylus petiolatus* (Kroyer)
	Sea Spider	*Endeis spinosa* (Montagu)
	Sea Spider	*Tanystylum orbiculaire* Wilson
Crustacea:		
Cirripedia:	Goose Barnacle	*Lepas anatifera* Linne
	Goose Barnacle	*Lepas anserifera* Linne
	Goose Barnacle	*Lepas pectinata* Spengler
	Striped Barnacle	*Balanus amphitrite amphitrite* Darwin
	Ivory Barnacle	*Balanus eburneus* Gould
	Acorn Barnacle	*Balanus venustus niveus* Darwin
	Bay Barnacle	*Balanus improvisus* Darwin
	Acorn Barnacle	*Balanus reticulatus* Utinomi
	Giant Acorn Barnacle	*Balanus tintinnabulum* (Linne)
	Crab Barnacle	*Chelonibia patula* (Ranzani)
	Turtle Barnacle	*Chelonibia testudinaria* Linnaeus
	Fragile Star Barnacle	*Chthamalus fragilis* Darwin
Malacostraca:	Mantis Shrimp	*Squilla empusa* Say
	Warf Roach	*Ligia exotica* (Roux)
	Brown Shrimp	*Penaeus aztecus* Ives
	Pink Shrimp	*Penaeus duorarum* Burkenroad
	White Shrimp	*Penaeus setiferus* (Linne)
	Sugar Shrimp	*Parapenaeus longirostris* (Lucas)
	Roughneck Shrimp	*Trachypenaeus constrictus* Stimpson
	Penaeid Shrimp	*Trachypenaeus similis* (Smith)
	Seabob Shrimp	*Xiphopenaeus kroyeri* Heller
	Rock Shrimp	*Sicyonia brevirostris* Stimpson
	Rock Shrimp	*Sicyonia dorsalis* Kingsley

TABLE 8 (Continued)

PHYLUM & CLASS	COMMON NAME	GENUS & SPECIES & AUTHORITY
ARTHROPODA		
Crustacea:		
Malacostraca:	Pelagic Shrimp	*Acetes americanus louisianensis* Burkenroad
	Pelagic Shrimp	*Lucifer faxoni* Borradaile
	Banded Coral Shrimp	*Stenopus hispidus* (Olivier)
	Cleaning Shrimp	*Stenopus scutellatus* Rankin
	Cleaning Shrimp	*Periclimenes americanus* (Kingsley)
	Banded Snapping Shrimp	*Alpheus armillatus* H. Milne-Edwards
	Striped Snapping Shrimp	*Alpheus formosus* Gibbes
	Big-Clawed Snapping S.	*Alpheus heterochaelis* Say
	Green Snapping Shrimp	*Alpheus normanni* Kingsley
	Sponge Shrimp	*Synalpheus fritzmuelleri* Coutiere
	Caridean Shrimp	*Exhippolysmata oplophoroides* (Holthius)
	Peppermint Shrimp	*Lysmata wurdemanni* (Gibbes)
	Spanish Lobster	*Scyllarides nodifer* (Stimpson)
	Spanish Lobster	*Scyllarus chacei* Holthius
	Spanish Lobster	*Scyllarus depressus* (Smith)
	Striped Hermit Crab	*Clibanarius vittatus* (Bosc)
	Hermit Crab	*Dardanus ingignis* (Saussure)
	Giant Red Hermit Crab	*Petrochirus diogenes* (Linne)
	Hermit Crab	*Pagurus impressus* (Benedict)
	Flat-Clawed Hermit Crab	*Pagurus pollicaris* Say
	Eroded Porcelain Crab	*Megalobrachium soriatum* (Say)
	Cherry-Striped Porcelain	*Petrolisthes galathinus* (Bosc)
	Say's Porcelain Crab	*Porcellana sayana* (Leach)
	Hairy Sponge Crab	*Dromidia antillensis* Stimpson
	Shellback Crab	*Hypoconcha sabulosa* (Herbst)
	Frog Crab	*Ranilia muricata* H. Milne-Edwards
	Louisiana Frog Crab	*Raninoides louisianensis* Rathbun
	Flamed Box Crab	*Calappa flammea* (Herbst)
	Box Crab	*Calappa sulcata* Rathbun
	Calico Crab	*Hepatus epheliticus* (Linne)
	Purse Crab	*Persephona mediterranea* (Herbst)
	Majid Crab	*Metoporhaphis calcarata* (Say)
	Spider Crab	*Podochela riisei* Stimpson
	Spider Crab	*Podochela sidneyi* Rathbun
	Arrow Crab	*Stenorhynchus seticornis* (Herbst)
	Spider Crab	*Coelocerus spinosus* A. Milne-Edwards
	Southern Spider Crab	*Libinia dubia* H. Milne-Edwards
	Common Spider Crab	*Libinia emarginata* Leach
	Spotted Decorator Crab	*Microphrys bicornutus* (Latreille)
	Rock Spider Crab	*Mithrax forceps* (Milne-Edwards)
	Giant Decorator Crab	*Stenocionops furcata coelata* (A. Milne-Edwards)
	Red Parthenopid Crab	*Parthenope granulata* (Kingsley)
	Purple Parthenopid Crab	*Parthenope pourtalesii* (Stimpson)
	Pentagon Grab	*Heterocrypta granulata* (Gibbes)
	Gulf Lady Crab	*Ovalipes floridanus* Hay & Shore
	Lady Crab	*Ovalipes stephensoni* Williams
	Common Blue Crab	*Callinectes sapidus* Rathbun
	Lesser Blue Crab	*Callinectes similis* Williams
	Red Crab	*Cronius ruber* (Lamarck)
	Iridescent Swimming Crab	*Portunus gibbesii* (Stimpson)
	Swimming Crab	*Portunus ordwayi* (Stimpson)
	Sargassum Crab	*Portunus sayi* (Gibbes)

TABLE 8 (Continued)

PHYLUM & CLASS	COMMON NAME	GENUS & SPECIES & AUTHORITY
ARTHROPODA		
Crustacea:		
Malacostraca:	Spiny-Wrist Crab	*Portunus spinicarpus* (Stimpson)
	Spiny-Handed Crab	*Portunus spinimanus* (Latreille)
	Xanthid Crab	*Pseudomedaeus agassizii* (A. Milne-Edwards)
	Xanthid Crab	*Micropanope nuttingi* (Rathbun)
	Spotted Mud Crab	*Eurypanopeus abbreviatus* (Stimpson)
	Flat Mud Crab	*Eurypanopeus depressus* (Smith)
	Say's Mud Crab	*Neopanope sayi* (Smith)
	Narrow Mud Crab	*Hexapanopeus angustifrons* (Benedict
	Mud Crab	*Hexapanopeus paulensis* Rathbun
	Mangrove Mud Crab	*Eurytium limosum* (Say)
	Gulf Stone Crab	*Menippe adina* Bert
	Brown Hairy Wharf Crab	*Pilumnus dasypodus* Kingsley
	Florida Hairy Wharf Crab	*Pilumnus floridanus* Stimpson
	Hairy Reef Crab	*Pilumnus pannosus* Rathbun
	Hairy Wharf Crab	*Pilumnus sayi* Rathbun
	Pea Crab	*Pinnixa pearsei*
	Pea Crab	*Pinnixa sayana* Stimpson
	Mottled Shore Crab	*Pachygrapsus transversus* (Gibbes)
SIPUNCULA	Peanut Worm	*Golfingia trichocephala*
	Peanut Worm	*Phascolion strombi* (Morgantu)
	Peanut Worm	*Sipunculus nudus* Linne
PHORONIDA	Phoronid Worm	*Phoronis architecta* Andrews
BRACHIOPODA	Lamp Shell	*Glottidia pyramidata* (Stimpson)
BRYOZOA		
Gymnolaemata:	Branching Bryozoan	*Aetea anguina* (Linne)
	Branching Bryozoan	*Aeverilla setigera* (Hincks)
	Branching Bryozoan	*Bugula neritina* (Linne)
	Branching Bryozoan	*Bugula rylandi* Maturo
	Branching Bryozoan	*Crisia eburnea* (Lamarck)
	Branching Bryozoan	*Savingnyella lafonti* (Audouin)
	Encrusting Bryozoan	*Acanthodesia* sp.
	Encrusting Bryozoan	*Membranipora savartii* (Audouin)
	Encrusting Bryozoan	*Membranipora tenuis* Desor
	Encrusting Bryozoan	*Parasmittina spathulata* (Johnson)
	Encrusting Bryozoan	*Schizoporella errata* (Waters)
	Foliaceous Bryozoan	*Thalamoporella floridana* Osburn
ECHINODERMATA		
Asteroidea:	Banded Sea Star	*Luidia clathrata* (Say)
	Netted Sea Star	*Luidia clathrata* (Say)
	Spiny Beaded Sea Star	*Astropecten duplicatus* Gray
	Sea Star	*Thyraster serpentarius* (Mueller & Troschel)
	Brown Spiny Sea Star	*Echinaster spinulosus* Verrill
Echinoidea:	Sand Dollar	*Encope michelini* L. Agassiz
	Purple Sea Urchin	*Arbacia punctulata* (Lamarck)
	Long-spined Sea Urchin	*Diadema antillarium* Philippi
	Short-spined Sea Urchin	*Lytechinus variegatus* (Leske)
	Sea Bisquit	*Clypeaster ravenelli*
	Heart Urchin	*Moira atropos* (Lamarck)

TABLE 8 (Continued)

PHYLUM & CLASS	COMMON NAME	GENUS & SPECIES & AUTHORITY
ECHINODERMATA		
Ophiuroidea:	Brittle Star	*Ophiactis savignyi* (Muller & Troschel)
	Brittle Star	*Ophiolepis elegans* Lutken
	Brittle Star	*Ophiothrix angulata* (Say)
	Brittle Star	*Hemipholis elongata* (Say)
	Brittle Star	*Micropholis atra* (Stimpson)
HEMICHORDATA		
Enteropneusta:	Golden Arrow Worm	*Balanoglossus aurantiacus* A. Agassiz
CHORDATA		
Ascidiacea:	Rough Sea Squirt	*Styela plicata* (LeSueur)
Larvacea:	Larvacean	*Oikopleura* sp.
Thaliacea:	Salp	*Cyclosalpa floridana* Apstein
	Salp	*Salpa confederata* Foskal
	Salp	*Salpa cylindrica* Cuvier
	Common Salp	*Salpa fusiformis* Cuvier
	Horned Salp	*Thalia democratica* Forskal
	Common Doliolid	*Doliolum nationalis* Borgert

ctenophores (e.g., comb jellies or sea walnuts), mollusks (e.g., the janthina snail, the blue glaucus nudibranch, and squid), chaetognaths (arrowworms), and thaliacean chordates (salps) constitute an important group of invertebrates that serve as both predators and prey for each other and other pelagic and planktonic vertebrates and invertebrates.

Barry Vittor & Associates (1985a) reviewed the major components of the macrofaunal benthos off the Alabama coast. The 5-acre SEA TREK mariculture site lies within the inner-shelf habitat (4 to 20 m [13 to 65 ft]) wherein sandy substrates predominate. The predominant macrofaunal assemblage within the actual SEA TREK site has yet to be determined; however, Table 9 lists the major characteristic macroinfaunal species and assemblages that are expected to occur therein based on the percentage of sand in the bottom substrate and previous inner-shelf faunal surveys by BLM-MAFLA (1978), Continental Shelf Assoc. (1982), Shaw et al. (1982), Racal-Decca (1982), Vittor & Assoc. (1984, 1985). Polychaete worms should predominate (23 species) in the bottom substrates at the SEA TREK site followed by molluscs (7 species) and crustaceans (6 species). Preoperational sampling of the SEA TREK site will delineate the actual macroinfaunal species that occur therein.

Large numbers of attached (sessile) benthic invertebrates will colonize the solid substrates of the SEA TREK platform including sponges, hydroids, stony and horny corals, anemones, sedentary polychaete worms, acorn barnacles, bivalve molluscs, bryozoans, tunicates, etc. Large numbers of mobile (vagile) benthic species will also colonize the SEA TREK platform including snails, nudibranchs, crabs, bulldozer lobsters, shrimp, sea stars, brittle, sea urchins, etc. These species will form a large part of the food chain that should attract demersal and pelagic fishes to the mariculture site. In addition, many of those species will seek escaping feed pellets and/or the saprophytic organisms that feed on any metabolic fish wastes that build up on the bottom. Many invertebrate species are capable of inflicting painful, venomous stings and bites and should be avoided by SEA TREK personnel (see Table 13). Fotheringham (1980) gave an excellent review of the macroinvertebrates of artificial reef habitats including oil and gas platforms in the Gulf of Mexico.

TABLE 9
MACROINFAUNAL ASSEMBLAGES AND SPECIES THAT MAY OCCUR IN THE SEA TREK OPERATING AREA

MUD (<20% Sand)	SANDY MUD (20-50% Sand)	MUDDY SAND (50-90% Sand)	SAND (>90% Sand)
Balanoglossus cf. *aurantiacus* (H)	*Hemipholis elongata* (E)		*Nephtys picta* (P)
Paramphinome sp. B (P)	*Micropholis atra* (E)		*Disoio uncinata* (P)
Utriculastra canaliculata (M)	*Nuculana concentrica* (M)		*Onuphis nebulosa* (P)
Nassarius acutus (M)	*Pinnixa pearsei* (C)		*Magelona* cf. *riojai* (P)
			Aricidea wassi (P)
			Apoprionospio pygmaea (P)
			Brania wellfleetensis (P)
			Crassinella lunulata (M)*
			Acanthohaustorius sp. A (C)*
			Protohaustorius sp. A (C)
			Branchistoma caribaeum (Ce)*
			Polygordius spp. (A)*
			Lepidactylus sp. A (C)*
Glycinde solitaria (P)	*Nereis micromma* (P)		*Armandia maculatta* (P)
Sabellides sp. A (P)	*Tellina versicolor* (M)		*Spiophanes bombyx* (P)
Sigambra tentaculata (P)	*Cerebratulus lacteus* (N)		*Goniada littorea* (P)
Cossura delta (P)	*Phascolion strombi* (S)		*Xenanthura brevitelson* (C)
Cossura soyeri (P)	*Phoronis* sp. A (Ph)		*Glottidia pyramidata* (B)
Oxyurostylis smithi (C)			
	Diopatra cuprea (P)		
	Magelona cf. *phyllisae* (P)		
	Paraprionospio pinnata (P)		
	Asychis elongata (P)		
	Mulinia lateralis (M)		
	Abra aequalis (M)		
		Golfingia trichocephala (S)	
		Owenia fusiformis (P)	
		Mediomastus californiensis (P)	
		Myriochele oculata (P)	

B = Brachiopod; C = Crustacean; Ce = Cephalochordate; E = Echinoderm; H = Hemichordate; M = Mollusc; N = Nemertean; P = Polychaete; Ph = Phoronid; S = Sipunculid

*(Characteristic of tidal inlet habitats on coarse sand or shell substrates) (Adapted from Barry Vittor & Associates, 1985)

Marine biofouling on the permanently submerged parts of the SEA TREK mariculture platform will be moderately heavy. Maximum growth rates of the sessile organisms will occur during summer, but will remain relatively high throughout the year. The maximum biofouling rates (accumulation of organisms per year) in the approved SEA TREK operating area of the nearshore Gulf of Mexico may range from a dry weight of 10 $kg/m^2/yr$ (= 2.0 $lb/ft^2/yr$) at the surface (intertidal zone) to 8.5 $kg/m^2/yr$ (= 1.7 $lb/ft^2/yr$) at the bottom at 50 to 60 foot depth. Biofouling accretion rates may reach 10 cm/yr (4 in./yr) on permanently submerged structures (US Navy, 1988).

The predominant biofoulers include attached algae, sponges, hydroids, soft and stony corals, anemones, sedentary polychaete tube worms, oysters and mussels, barnacles, bryozoans, and tunicates. After a moderate accumulation of biofouling organisms has formed on the submerged platform, numerous motile macroinvertebrates (Table 8) and demersal finfishes (Table 10) are attracted to and become associated with the fouled surfaces.

The presence of moderate-to-heavy amounts of biofouling organisms on permanently submerged parts (e.g., legs, base, etc.) of the SEA TREK platform will not affect mariculture operations; however, biofouling can have a detrimental affect on the six barrel-cage, fish-rearing systems that will be employed on SEA TREK. The upper surface of the rotatable cages (e.g., ballast tanks, nets, etc.) will be exposed to the air and sunlight on a scheduled basis to help reduce biofouling problems. Some high-pressure water sprays, scrubbing, and scraping may be required to reduce unacceptable biofouling growth that restricts ambient water flow through the cages. Only EPA-approved antifouling paints or other similar additives will be used to prevent marine biofouling; some non-EPA approved paints may potentially affect the cultured finfishes.

The presence of biofouling organisms on the submerged SEA TREK platform will foster the development of a very diverse, "artificial reef" community that will certainly attract and support a large number of invertebrate prey and fish predators. That community will increase the productivity in the immediate platform area. Feed pellets that escape from the cages and saprophytic organisms that consume the fish wastes will also increase the productivity in the 5-acre SEA TREK mariculture area. Juveniles (fingerlings) of

many of the colonizing finfishes will enter the nets and, if not consumed by the cultured species, will take advantage of the food and protection offered within the barrel cages.

No coral reefs or atolls occur in the approved, 500-acre, SEA TREK operating area in the Gulf of Mexico off Mobile Bay, AL; however, small stony and soft coral colonies grow on solid substrates (oil and gas platforms, artificial reefs, fish havens, etc.) in the general area. Three hard-bottom topographic features occur south (offshore) of the approved SEA TREK operating area including *Southeast Banks, Southwest Rock* and *17-Fathom Hole* (Schroeder, et al., 1988, 1989). Hard bottoms are low-relief, seafloor features or deposits hard or indurated surfaces that may consist of lithogenous, biogenous, or hydrogenous materials including sandstone slabs, rock rubble, and reef-like outcrops. Hard-bottom areas are usually covered with encrusting epifauna and the remains of molluscan shells (shell-hash). The biological assemblages of these shallow, inner-shelf habitats are dominated by the soft corals, *Leptogorgia virgulata* and *Lophogorgia hebes*.

Southeast Banks is located approximately 10.5 nmi (19.4 km) south of the approved SEA TREK operating site in water depths of 69 to 87 feet (21 to 26.5 m). *Southwest Rock* is located approximately 14 nmi (29 km) west-southwest of the approved SEA TREK operating site in water depths of 66 to 72 feet (20 to 22 m). The *17-Fathom Hole* is located approximately 15.5 nmi (28.7 km) south-southwest of the approved SEA TREK operating site in water depths of 98 to 105 feet (30 to 32 m). The mariculture activities at SEA TREK and the aqueous fecal discharges from the cultured finfishes are not expected to affect the biological communities on these hard-bottom areas because of distance and dilution factors. On the other hand, finfishes and motile and epifaunal invertebrates that inhabit the hard-bottom areas are expected to associate with and/or colonize the hard substrates of the SEA TREK platform once it is in place.

I. FISHES

At least 255 species of small-to-large pelagic and demersal fishes are known to occur within the general SEA TREK operating area in the northern Gulf of Mexico (Table 10) (Walls, 1975; Hoese & Moore, 1977; Gallaway & Lewbel, 1982; Shipp, 1986). Most of these fishes are temperate and subtropical species, but some are transient Caribbean fishes; they all exhibit seasonal distribution and abundance fluctuations that are strongly related to ambient oceanographic conditions in the SEA TREK operating area. Tropical fish species will enter the area with incursions of the Loop Current and/or those subtropical species will undergo semiannual onshore and offshore migrations in the SEA TREK site at different times of the year.

The physical presence of the mariculture platform and escaping feed pellets will attract a significant population of pelagic and demersal fishes in the immediate vicinity of SEA TREK. The sharks, herrings, basses, bluefish, cobia, jacks, snapper, porgies, croakers and drum, spadefish, mackerels, and triggerfish will be more abundant in the vicinity of the approved SEA TREK site because the platform will provide solid substrates for colonization of prey species in an otherwise featureless benthonic habitat. Sessile animals on the platform base (and escaping feed pellets) will support and attract reef-dwelling fishes and artificial reef development. Pelagic fishes will also be attracted to the facility by baitfishes and other food sources (escaping feed). Those species will attract predatory sharks, dolphins, sea birds, etc. (and sportsfishermen). Some of those predatory species may attempt to enter the fish cages and/or damage the outer netting when seeking prey. Juveniles of some species may also enter the cages and serve as prey or competitors for the cultured fishes.

TABLE 10
FISHES THAT MAY OCCUR IN THE APPROVED SEA TREK OPERATING AREA

GROUP/FAMILY	COMMON NAME	GENUS & SPECIES & AUTHORITY
SHARKS		
Orectolobidae:	Nurse Shark	*Ginglymostosma cirratum* (Bonnaterre)
Rhinocodontidae:	Whale Shark	*Rhincodon typus* Smith
Odontaspididae:	Sand Tiger Shark	*Odontaspis taurus* (Rafinesque)
Carcharhinidae:	Tiger Shark	*Galeocerdo cuvieri* (Peron & Leseur)
	Lemon Shark	*Negaprion brevirostris* (Poey)
	Atlantic Sharpnose Shark	*Rhizoprionodon terraenovae* (Richardson)
	Bull Shark	*Carcharhinus leucas* (Valenciennes)
	Blacktip Shark	*Carcharhinus limbatus* (Valenciennes)
	Spinner Shark	*Carcharhinus maculipinnis* (Poey)
	Sandbar Shark	*Carcharhinus milberti* (Valenciennes)
	Dusky, Sand Shark	*Carcharhinus obscurus* (Lesueur)
Sphyrinidae:	Scalloped Hammerhead	*Sphyrna lewini* (Griffin & Smith)
	Great Hammerhead Shark	*Sphyrna mokarran* (Ruppell)
	Bonnethead Shark	*Sphyrna tiburo* (Linnaeus)
SAWFISH		
Pristidae:	Smalltooth Sawfish	*Pristis pectinata* Latham
GUITARFISH		
Rhinobatidae:	Atlantic Guitarfish	*Rhinobatos lentiginosus* (Garman)
RAYS & SKATES		
Torpedinidae:	Lesser Electric Ray	*Narcine brasiliensis* (Olfers)
Rajidae:	Clearnose Skate	*Raja eglanteria* Bosc
	Roundel Skate	*Raja texana* Chandler
Dasyatidae:	Southern Stingray	*Dasyatis americana* Hildebrand & Schroeder
	Roughtail Stingray	*Dasyatis centroura* (Mitchill)
	Atlantic Stingray	*Dasyatis sabina* (Lesueur)
	Bluntnose Stingray	*Dasyatis sayi* (Lesueur)
Gymnuridae:	Smooth Butterfly Ray	*Gymnura micrura* (Schneider)
Myliobatidae:	Spotted Eagle Ray	*Aetobatus narinari* (Euphrasen)
	Cownose Ray	*Rhinoptera bonasus* (Mitchill)
Mobulidae:	Atlantic Manta Ray	*Manta birostris* (Walbaum)
STURGEON		
Acipenseridae:	Gulf Sturgeon*	*Acipenser oxyrhynchus desotoi* Vladykov
TARPONS		
Elopidae:	Tarpon	*Megalops atlantica* Valenciennes
	Ladyfish	*Elops saurus* Linnaeus

*(Threatened species)

TABLE 10 (Continued)

GROUP/FAMILY	COMMON NAME	GENUS & SPECIES & AUTHORITY
EELS		
Anguillidae:	American Eel	*Anguilla rostrata* (Lesueur)
Muraenidae:	Spotted Moray Eel	*Gymnothorax moringa* (Cuvier)
	Blackedge Moray Eel	*Gymnothorax nigromarginatus* (Girard)
	Ocellated Moray Eel	*Gymnothorax ocellatus* Agassiz
Muraenesocidae:	Bandtooth Conger Eel	*Ariosoma impressa* (Poey)
	Silver Conger Eel	*Hoplunnis macrurus* Ginsburg
Congridae:	Yellow Conger Eel	*Congrina flava* (Goode & Bean)
Ophichthidae:	Key Worm Eel	*Ahlia egmontis* (Jordan)
	Whip Eel	*Bascanichthys scuticaris* (Goode & Bean)
	Spotted Spoon-nose Eel	*Echiophis intertinctus* (Richardson)
	Snapper Eel	*Echiophis mordax* (Poey)
	Stippled Spoon-nose Eel	*Echiophis punctifer* (Kaup)
	Shrimp Eel	*Ophichthus gomesi* (Castelnau)
	Palespotted Eel	*Ophichthus ocellatus* (LeSueur)
HERRINGS		
Clupeidae:	Finescale Menhaden	*Brevoortia gunteri* Hildebrand
	Gulf Menhaden	*Brevoortia patronus* Goode
	Round Herring	*Etrumeus teres* (DeKay)
	Scaled Sardine	*Harengula pensacolae* Goode & Bean
	Atlantic Thread Herring	*Opisthonema oglinum* (Lesueur)
	Spanish Sardine	*Sardinella anchovia* Valenciennes
ANCHOVIES		
Engraulidae:	Striped Anchovy	*Anchoa hepsetus* (Linnaeus)
	Bay Anchovy	*Anchoa mitchilli* (Valenciennes)
LIZARDFISH		
Synodontidae:	Inshore Lizardfish	*Synodus foetens* (Linnaeus)
SEA CATFISHES		
Ariidae:	Sea Catfish (Hardhead)	*Arius felis* (Linnaeus)
	Gafftopsail Catfish	*Bagre marinus* (Mitchill)
TOADFISHES		
Batrachoidae:	Gulf Toadfish	*Opsanus beta* (Goode & Bean)
	Leopard Toadfish	*Opsanus pardus* (Goode & Bean)
	Atlantic Midshipman	*Porichthys porosissimus* (Valenciennes)
FROGFISHES		
Antennariidae:	Singlespot Frogfish	*Antennarius radiosus* Garman
	Sargassumfish	*Histrio histrio* (Linnaeus)
BATFISHES		
Ogcocephalidae:	Roughback Batfish	*Ogcocephalus parvus* Longley & Hildebrand
	Polka-Dot Batish	*Ogcocephalus radiatus* (Mitchill)
HAKE		
Gadidae:	Southern Hake	*Urophycis floridanus* (Bean & Dresel)

TABLE 10 (Continued)

GROUP/FAMILY	COMMON NAME	GENUS & SPECIES & AUTHORITY
CUSK-EELS		
Ophidiidae:	Bearded Brotula	*Brotula barbata* (Bloch & Schneider)
	Blackedge Cusk-Eel	*Lepophidium graellsi* (Poey)
	Mottled Cusk-Eel	*Lepophidium jeannae* Fowler
	Blotched Cusk-Eel	*Ophidion grayi* (Fowler)
	Bank Cusk-Eel	*Ophidion holbrooki* (Putnam)
	Crested Cusk-Eel	*Ophidion welshi* (Nichols & Breder)
HALFBEAKS & FLYINGFISHES		
Exocoetidae:	Ballyhoo	*Hemiramphus brasiliensis* (Linnaeus)
	Halfbeak	*Hyporhamphus unifasciatus* (Ranzani)
	Margined Flyingfish	*Cypselurus cyanopterus* (Valenciennes)
	Blackwing Flyingfish	*Hirundichthys rondeleti* (Valenciennes)
NEEDLEFISHES		
Belonidae:	Atlantic Needlefish	*Strongylura marina* (Walbaum)
	Houndfish	*Tylosurus crocodilus* (Peron & Lesueur)
SQUIRRELFISHES		
Holocentridae:	Squirrelfish	*Holocentrus ascensionis* (Osbeck)
	Lonspine Squirrelfish	*Holocentrus rufus* (Walbaum)
	Dusky Squirrelfish	*Holocentrus vexillarius* (Poey)
	Blackbar Soldierfish	*Myripristis jocobus* Cuvier
BASSES & GROUPERS		
Percichthyidae:	Striped Bass*	*Morone saxatilis* (Walbaum)
Serranidae:	Rock Sea Bass	*Centropristis philadelphica* (Linnaeus)
	Bank Sea Bass	*Centropristis ocyura* (Jordan & Evermann)
	Gulf Black Sea Bass	*Centropristis striata* (Linnaeus)
	Dwarf Sand Perch	*Diplectrum bivittatum* (Valiencienne)
	Sand Perch	*Diplectrum formosum* (Linnaeus)
	Rock Hind	*Epinephelus adscensionis* (Osbeck)
	Graysby	*Epinephelus cruentatus* (Lacepede)
	Speckled Hind	*Epinephelus drummondhayi* Goode & Bean
	Jewfish	*Epinephelus itajara* (Lichtenstein)
	Red Grouper	*Epinephelus morio* (Valenciennes)
	Warsaw Grouper*	*Epinephelus nigritus* (Holbrook)
	Snowy Grouper	*Epinephelus niveatus* (Valienciennes)
	Nassau Grouper*	*Epinephelus striatus* (Bloch)
	Black Grouper	*Mycteroperca bonaci* (Poey)
	Gag*	*Mycteroperca microlepis* (Goode & Bean)
	Scamp*	*Mycteroperca phenax* Jordan & Swain
	Comb Grouper	*Mycteroperca rubra* (Bloch)
	Belted Sand Bass	*Serranus subligarius* (Cope)

* (Potential mariculture species)

TABLE 10 (Continued)

GROUP/FAMILY	COMMON NAME	GENUS & SPECIES & AUTHORITY
SOAPFISHES		
Grammistidae:	Whitespotted Soapfish	*Rypticus maculatus* Holbrook
	Greater Soapfish	*Rypticus saponaceus* (Bloch & Schneider)
BIGEYES		
Priacanthidae:	Bigeye	*Priacanthus arenatue* Cuvier
	Short Bigeye	*Pseudopriacanthus altus* (Gill)
CARDINALFISHES		
Apogonidae:	Flamefish	*Apogon maculatus* (Poey)
	Twospot Cardinalfish	*Apogon pseudomaculatus* Longley
BLUEFISH		
Pomatomidae:	Bluefish	*Pomatomus saltatrix* (Linnaeus)
COBIA		
Rachycentridae:	Cobia (Lemonfish)	*Rachycentron canadum* (Linnaeus)
SHARKSUCKERS		
Echeneidae:	Sharksucker	*Echeneis naucrates* Linnaeus
	Remora	*Remora remora* (Linnaeus)
JACKS		
Carangidae:	Yellow Jack	*Caranx bartholomaei* Cuvier
	Blue Runner (Hardtail)	*Caranx crysos* (Mitchill)
	Crevalle Jack	*Caranx hippos* (Linnaeus)
	Horse-Eye Jack	*Caranx latus* Agassiz
	Atlantic Bumper	*Chloroscombrus chrysurus* (Linnaeus)
	Round Scad (Cigarfish)	*Decapterus punctatus* (Agassiz)
	Rainbow Runner	*Elagatis bipinnulata* (Quoy & Gaimard)
	Bigeye Scad	*Selar crumenophthalmus* (Bloch)
	Lookdown	*Selene vomer* (Linnaeus)
	Greater Amberjack	*Seriola dumerili* (Risso)
	Lesser Amberjack	*Seriola fasciata* (Bloch)
	Almaco Jack	*Seriola rivoliana* Valenciennes
	Banded Rudderfish	*Seriola zonata* (Mitchill)
	Permit	*Trachinotus falcatus* (Linnaeus)
	Palometa	*Trachinotus goodei* Jordan & Evermann
	Rough Scad	*Trachurus lathami* Nichols
	Leatherjacket	*Oligoplites saurus* (Bloch & Schneider)
	Atlantic Moonfish	*Vomer setapinnis* (Mitchill)
DOLPHINS		
Coryphaenidae:	Pompano Dolphin	*Coryphaena equisetis* Linnaeus
	Dolphin*	*Coryphaena hippurus* Linnaeus
SNAPPERS		
Lutjanidae:	Mutton Snapper	*Lutjanus analis* (Cuvier)
	Red Snapper*	*Lutjanus campechanus* (Poey)
	Gray Snapper*	*Lutjanus griseus* (Linnaeus)
	Lane Snapper	*Lutjanus synagris* (Linnaeus)
	Yellowtail Snapper	*Ocyurus chrysurus* (Bloch)
	Wenchman	*Pristipomoides aquilonaris* (Goode & Bean)
	Vermilion Snapper	*Rhomboplites aurorubens* (Cuvier)

* (Potential mariculture species)

TABLE 10 (Continued)

GROUP/FAMILY	COMMON NAME	GENUS & SPECIES & AUTHORITY
TRIPLETAIL		
Lobotidae:	Tripletail (Blackfish)	*Lobotes surinamensis* (Bloch)
MOJARRAS		
Gerreidae:	Irish Pompano	*Diapterus olisthostomus* (Goode & Bean)
	Spotfin Mojarra	*Eucinostomus argenteus* Baird & Girard
	Silver Jenny	*Eucinostomus gula* (Quoy & Gaimard)
GRUNTS		
Pomadasyidae:	Tomtate	*Haemulon aurolineatum* Cuvier
	Pigfish	*Orthopristis chrysoptera* (Linnaeus)
PORGIES		
Sparidae:	Sheepshead	*Archosargus probatocephalus* (Walbaum)
	Whitebone Porgy	*Calamus leucosteus* Jordan & Gilbert
	Knobbed Porgy	*Calamus nodosus* Randall & Caldwell
	Spottail Pinfish	*Diplodus holbrooki* (Bean)
	Pinfish	*Lagodon rhomboides* (Linnaeus)
	Red Porgy	*Pagrus sedecim* Ginsburg
	Longspined Porgy	*Stenotomus caprinus* Bean
CROAKERS & DRUMS		
Sciaenidae:	Silver Perch	*Bairdiella chrysura* (Lacepede)
	Sand Seatrout	*Cynoscion arenarius* Ginsburg
	Spotted Seatrout	*Cynoscion nebulosus* (Cuvier)
	Silver Seatrout	*Cynoscion nothus* (Holbrook)
	Cubbyu	*Equetus umbrosus* Jordan & Eigenmann
	Banded Drum	*Larimus fasciatus* Holbrook
	Spot	*Leiostomus xanthurus* Lacepede
	Southern Kingfish	*Menticirrhus americanus* (Linnaeus)
	King Whiting	*Menticirrhus saxatilis* (Bloch & Schneider)
	Atlantic Croaker	*Micropogonias undulatus* (Linnaeus)
	Black Drum	*Pogonias cromis* (Linnaeus)
	Red Drum (Redfish)*	*Sciaenops ocellata* (Linnaeus)
	Star Drum	*Stellifer lanceolatus* (Holbrook)
CHUBS		
Kyphosidae:	Yellow Chub	*Kyphosus incisor* (Cuvier)
	Bermuda Chub	*Kyphosus sectatrix* (Linnaeus)
SPADEFISH		
Ephippidae:	Atlantic Spadefish	*Chaetodipterus faber* (Broussonet)
ANGELFISHES		
Pomacanthidae:	Blue Angelfish	*Holacanthus bermudensis* Goode
	Queen Angelfish	*Holacanthus ciliaris* (Linnaeus)
	Rock Beauty	*Holacanthus tricolor* (Bloch)
	Gray Angelfish	*Pomacanthus arcuatus* (Linnaeus)
	French Angelfish	*Pomacanthus paru* (Bloch)

* (Potential mariculture species)

TABLE 10 (Continued)

GROUP/FAMILY	COMMON NAME	GENUS & SPECIES & AUTHORITY
BUTTERFLYFISHES		
Chaetodontidae:	Foureye Butterflyfish	*Chaetodon capistratus* Linnaeus
	Spotfin Butterflyfish	*Chaetodon ocellatus* Bloch
	Reef Butterflyfish	*Chaetodon sedentarius* Poey
DAMSELFISHES		
Pomacentridae:	Sargeant Major	*Abudefduf saxatilis* (Linnaeus)
	Yellow Reeffish	*Chromis enchrysura* Jordan & Gilbert
	Brown Chromis	*Chromis multilineatus* (Guichenot)
	Purple Reeffish	*Chromis scotti* Emery
	Bicolor Damselfish	*Pomacentrus partitus* Poey
	Cocoa Damselfish	*Pomacentrus variabilis* (Castelnau)
HAWKFISH		
Cirrhitidae:	Redspotted Hawkfish	*Amblycirrhitus pinos* (Mowbray)
WRASSES		
Labridae:	Spotfin Hogfish	*Bodianus pulchellus* (Poey)
	Spanish Hogfish	*Bodianus rufus* (Linnaeus)
	Puddingwife	*Halichoeres radiatus* (Linnaeus)
	Slippery Dick	*Halichoeres bivittatus* (Bloch)
	Yellowhead Wrasse	*Halichoeres garnoti* (Valenciennes)
	Pearly Razorfish	*Hemipteronotus novacula* (Linnaeus)
	Bluehead Wrasse	*Thalassoma bifasciatum* (Bloch)
PARROTFISH		
Scaridae:	Bucktooth Parrotfish	*Sparisoma radians* (Valenciennes)
MULLETS		
Mugilidae:	Striped Mullet	*Mugil cephalus* Linnaeus
	White Mullet	*Mugil curema* Valenciennes
BARRACUDAS		
Sphyraenidae:	Great Barracuda	*Sphyraena barracuda* (Walbaum)
	Northern Sennet	*Sphyraena borealis* DeKay
	Guaguanche	*Sphyraena gauchancho* Cuvier
THREADFIN		
Polynemidae:	Atlantic Threadfin	*Polydactylus octonemus* (Giarard)
STARGAZER		
Uranoscopidae:	Southern Stargazer	*Astroscopus y-graecum* (Cuvier)
BLENNIES		
Clinidae:	Hairy Blenny	*Labrisomus nuchipinnis* (Quoy & Gaimard)
Blenniidae:	Molly Miller	*Blennius cristatus* Linnaeus
	Seaweed Blenny	*Blennius marmoreus* Poey
	Florida Blenny	*Chasmodes saburrae* Jordan & Gilbert
	Barred Blenny	*Hypleurochilus bermudensis* Beebe & Tee-Van
	Crested Blenny	*Hypleurochilus geminatus* (Wood)
	Feather Blenny	*Hypsoblennius hentzi* (LeSueur)

TABLE 10 (Continued)

GROUP/FAMILY	COMMON NAME	GENUS & SPECIES & AUTHORITY
GOBBIES		
Gobiidae:	Spotted Goby	*Coryphopterus punctipectophorus* Springer
	Violet Goby	*Gobioides broussonneti* Lacepede
	Sharptail Goby	*Gobionellus hastatus* Girard
	Twoscale Goby	*Gobiosoma longipala* Ginsburg
	Seminole Goby	*Microgobius carri* Fowler
SURGEONFISHES		
Acanthuridae:	Ocean Surgeon	*Acanthurus bahianus* Castelnau
	Doctorfish	*Acanthurus chirurgus* (Bloch)
	Blue Tang	*Acanthurus coeruleus* Bloch & Schneider
CUTLASSFISH		
Trichiuridae:	Atlantic Cutlassfish	*Trichiurus lepturus* Linnaeus
MACKERELS		
Scombridae:	Wahoo	*Acanthocybium solanderi* (Cuvier)
	Frigate Mackerel	*Auxis thazard* (Lacepede)
	Little Tuna	*Euthynnus alletteratus* (Rafinesque)
	King Mackerel	*Scomberomorus cavalla* (Cuvier)
	Spanish Mackerel	*Scomberomorus maculatus* (Mitchill)
	Cero	*Scomberomorus regalis* (Bloch)
BUTTERFISHES		
Stromateidae:	Gulf Butterfish	*Peprilus burti* Fowler
	Harvestfish	*Peprilus paru* (Linnaeus)
DRIFTFISH		
Nomeidae:	Man-of-War Fish	*Nomeus gronovii* (Gmelin)
SCORPIONFISHES		
Scorpaenidae:	Barbfish	*Scorpaena brasiliensis* Cuvier
	Smoothhead Scorpionfish	*Scorpaena calcarata* Goode & Bean
	Spotted Scorpionfish	*Scorpaena plumieri* Bloch
SEA ROBINS		
Triglidae:	Blackwing Sea Robin	*Prinotus salmonicolor* Fowler
	Leopard Sea Robin	*Prinotus scitulus* Jordan & Gilbert
	Bighead Sea Robin	*Prionotus tribulus* Cuvier
FLOUNDERS		
Bothidae:	Ocellated Flounder	*Ancylopsetta quadrocellata* Gill
	Mexican Flounder	*Cyclopsetta chittendeni* Bean
	Fringed Flounder	*Etropus crossotus* Jordan & Gilbert
	Smallmouth Flounder	*Etropus microstomus* (Gill)
	Gray Flounder	*Etropus rimosus* Goode & Bean
	Gulf Flounder	*Paralichthys albigutta* Jordan & Gilbert
	Southern Flounder	*Paralichthys lethostigma* Jordan & Gilbert
	Shoal Flounder	*Syacium gunteri* Ginsburg
	Dusky Flounder	*Syacium papillosum* (Linnaeus)
	Spotted Whiff	*Citharichthys macrops* Dresel
	Bay Whiff	*Citharichthys spilopterus* Gunther

TABLE 10 (Continued)

GROUP/FAMILY	COMMON NAME	GENUS & SPECIES & AUTHORITY
TONGUEFISHES		
Cynoglossidae:	Offshore Tonguefish	*Symphurus civitatus* Ginsburg
	Spottedfin Tonguefish	*Symphurus diomedianus* (Goode & Bean)
TRIGGERFISHES & FILEFISHES		
Balistidae:	Gray Triggerfish	*Balistes capriscus* Gmelin
	Ocean Triggerfish	*Canthidermis sufflamen* (Mitchill)
	Sargassum Triggerfish	*Xanthichthys ringens* (Linnaeus)
	Orange Filefish	*Aluterus schoepfi* (Walbaum)
	Whitespotted Filefish	*Cantherhines macrocerus* (Hollard)
	Orangespotted Filefish	*Cantherhines pullus* (Ranzani)
	Planehead Filefish	*Monacanthus hispidus* (Linnaeus)
	Pygmy Filefish	*Monacanthus setifer* Bennett
TRUNKFISHES		
Ostraciidae:	Scrawled Cowfish	*Acanthostracion quadricornis* (Linnaeus)
	Smooth Trunkfish	*Lactophrys triqueter* (Linnaeus)
PUFFERS		
Tetraodontidae:	Smooth Puffer	*Lagocephalus laevigatus* (Linnaeus)
	Southern Puffer	*Sphoeroides nephelus* (Goode & Bean)
	Bandtail Puffer	*Sphoeroides spengleri* (Bloch)
PORCUPINEFISHES		
Diodontidae:	Striped Burrfish	*Chilomycterus schoepfi* (Walbaum)
	Porcupinefish	*Diodon hystrix* Linnaeus
	Balloonfish	*Diodon holocanthus* Linnaeus
OCEAN SUNFISH		
Molidae:	Ocean Sunfish	*Mola mola* (Linnaeus)

J. BIRDS

The avifauna of the SEA TREK operating area consists of four groups of birds: pelagic, resident, over-wintering, and transient migrants. Pelagic or seabirds generally include species that spend the majority of their lives at sea, usually coming to shore only to reproduce, rest, or avoid severe environmental conditions. Resident and over-wintering coastal birds include species that forage over coastal and Continental Shelf waters. Table 11 lists 23 species of marine birds that may occur within the general SEA TREK area (Toups and Jackson, 1987). Three of those species are on the US Endangered Species List: the Brown Pelican, Bald Eagle, and Peregrine Falcon.

Transient birds, especially passerine species, move through the area during vernal (spring) and autumnal (fall) migrations from and to, respectively, Central and South America. None of the passerine birds is threatened or endangered; however, because of a variety of environmental factors such as pollution, habitat fragmentation, and tropical deforestation, these songbirds are declining in numbers (Morton and Greenberg, 1989). Table 12 lists these and other migratory bird species that may occur in the SEA TREK area. Table 11 also provides relative arrival and departure dates for those species that may migrate through the general SEA TREK operating area in the Gulf (Toups and Jackson, 1987).

Migratory birds can be expected to move through the approved SEA TREK operating area during their vernal and autumnal migrations. The peak arrival and departure times for neotropical birds that spend their spring-through-summers in the United States are mid-March through mid-May and September through mid-November, respectively and inclusively. In general, most of the migrants move through the general SEA TREK area in April and October and fewer numbers of birds migrate in March and November when most ship testing is scheduled. The principal departure and arrival times for temperate birds that spend their winters along the northern Gulf of Mexico coastline are September through October and April through May, respectively and inclusively. The siting and operation of the SEA TREK OCEAN FARMING SYSTEM offshore of Fort Morgan Peninsula will have no negative impact on the migration of these neotropical birds. Arriving (spring) migrants may "fall out"

TABLE 11
MARINE BIRDS THAT MAY OCCUR IN THE SEA TREK OPERATING AREA

COMMON NAME	GENUS & SPECIES	OCCURRENCE
LOONS		
Common Loon	*Gavia immer*	Sep - May; common
Red-Throated Loon	*Gavia stellata*	Nov - Apr; rare
FRIGATEBIRD		
Magnificent Frigatebird	*Fregata magnificens*	All but Feb; rare
PELICANS		
American White Pelican	*Pelecanus erythrorhynchos*	Year-round; uncommon
Brown Pelican	*Pelecanus occidentalis*	Year-round; uncommon
GANNET		
Northern Gannet	*Sula bassanus*	Sep - May; rare - common
CORMORANT		
Double-Crested Cormorant	*Phalacrocorax auritus*	Sep - May; common
JAEGERS		
Pomarine Jaeger	*Stercorarius pomarinus* (Temminck)	Winters in Gulf; rare
Parasitic Jaeger	*Stercorarius parasiticus* (Linnaeus)	Winters in Gulf; rare
GULLS		
Laughing Gull	*Larus atricilla* Linnaeus	Year-round; abundant
Franklin's Gull	*Larus pipixcan*	Oct - Feb; rare
Bonaparte's Gull	*Larus philadelphia* (Ord)	Nov - May; common
Ring-Billed Gull	*Larus delawarensis* Ord	Year-round; common
Herring Gull	*Larus argentatus* Pontoppidan	Year-round; common
Lesser Black-backed Gull	*Larus fuscus* Reinhardt	Oct - Mar; extrem rare
Glaucous Gull	*Larus hyperboreus* Gunnerus	Dec - Jan; extreme rare
Black-Legged Kittiwake	*Rissa tridactyla* (Linnaeus)	Winters in Gulf; rare

TABLE 11 (Continued)

COMMON NAME	GENUS & SPECIES	OCCURRENCE
TERNS		
Common Tern	*Sterna hirundo* Linnaeus	Year-round; rare
Forster's Tern	*Sterna forsteri* Nuttall	Year-round; common
Least Tern	*Sterna antillarum* (Lesson)	Apr - Sep; abundant
Gull-Billed Tern	*Sterna nilotica* (Linnaeus)	Feb - Dec; rare
Sandwich Tern	*Sterna sandvicensis*	Mar - Dec; rare
Sooty Tern	*Sterna fuscata* Linnaeus	Jul - Oct; extrem rare
Royal Tern	*Sterna maxima* Boddaert	Year-round; common
Caspian Tern	*Sterna caspia* Pallas	Year-round; uncommon
Black Tern	*Chlidonias nigra* (Gmelin)	Feb - Nov common
Brown Noddy	*Anous stolidus* (Linnaeus)	Aug; extrem. rare
ACCIPTERS		
Bald Eagle	*Haliaeetus leucocephalus*	Sep - May; rare*
Osprey	*Pandion haliaetus*	Year-round; uncommon**
Peregrine Falcon	*Falco peregrinus*	Sep - May; rare

* (Reintroduced to Horn Island, MS)
** (Stable population on adjacent coastal barriers)

TABLE 12
ARRIVAL AND DEPARTURE DATES FOR REPRESENTATIVE MIGRATORY BIRDS ALONG THE CENTRAL GULF COAST

COMMON NAME	GENUS & SPECIES	ARRIVAL-DEPARTURE
Lesser Scaup*	*Aythya affinis*	Sep-Oct Mar-Apr
Wilson's Plover	*Charadrius wilsonia*	Mar Sep-Nov
Semipalmated Sandpiper	*Charadrius semipalmatus*	Mar-Apr Oct
Piping Plover	*Charadrius melodus*	Sep Apr
Black-Bellied Plover	*Pluvialis squatarola*	Aug-Sep Mar-Apr
American Oystercatcher	*Haematopus palliatus*	Sep May
Marbled Godwit	*Limosa fedora*	Jul May
Short-Billed Dowitcher	*Limnodromus griseus*	Jul-Aug Apr-May
Long-Billed Dowitcher	*Limnodromus scolopaceus*	Aug May
Ruddy Turnstone	*Arenaria interpres*	Aug May
Sanderling*	*Calidris alba*	Aug-Sep Apr-May
Red Knot	*Calidris canutus*	Nov Feb
Dunlin*	*Calidris alpina*	Sep Apr-May
Stilt Sandpiper	*Calidris himantopus*	Mar-Apr Oct-Dec
Pectoral Sandpiper	*Calidris melanotos*	Mar Oct-Nov
Black Tern*	*Chlidonias niger*	Mar-Apr Oct-Nov
Chimney Swift*	*Chaetura pelagica*	Mar Oct-Nov
Ruby-Throat. Hummingbird	*Archilochus colubris*	Mar Oct
Eastern Kingbird*	*Tyrannus tyrannus*	Mar-Apr Oct
Great-Crested Flycatcher	*Myiarchus crinitus*	Mar-Apr Aug-Oct
Eastern Wood-Pewee	*Contopusy virens*	Mar Oct-Nov
Purple Martin*	*Progne subis*	Jan-Mar Sep-Oct

* (Migrates through proposed SEA TREK area in large flocks)

TABLE 12(Continued)

COMMON NAME	GENUS & SPECIES	ARRIVAL-DEPARTURE
Bank Swallow*	*Riparia riparia*	Mar-Apr Oct-Nov
N. Rough-Winged Swallow*	*Stelgidopteryx serripennis*	Mar Oct-Nov
Cliff Swallow*	*Hirundo pyrrhonata*	Mar Oct
Vireos (All species)*	*Vireo* spp.	Mar Oct-Nov
Warblers (All Species)*	*Vermivora, Parula, Dendroica*	Mar-Apr Oct-Nov
Yellow-Breasted Chat*	*Icteria virens*	Apr Sep
Rose-breasted Grosbeak*	*Pheucticus ludovicianus*	Apr Oct-Nov
Blue Grosbeak*	*Guiraca caerulea*	Mar-Apr Oct-Nov
Indigo Bunting*	*Passerina cyanea*	Mar-Apr Nov
Painted Bunting*	*Passerina ciris*	Apr Oct-Nov
Orchard Oriole*	*Icterus spurius*	Mar-Apr Sep-Nov
Scarlet Tanager*	*Piranga olivacea*	Apr Oct-Nov
Summer Tanager*	*Piranga rubra*	Mar-Apr Oct

* (Migrates through proposed SEA TREK area in large flocks)

on the mariculture platform when approaching the peninsula, especially during periods of inclement weather and/or strong head winds. After a short resting period, they will continue their northward migration.

Large, multispecies flocks of marine birds including Common Loons, Northern Gannets, American White Pelicans, Brown Pelicans, Double-crested Cormorants, Greater and Lesser Scaups (ducks), Bonaparte's, Ring-Billed, and Herring Gulls, Forster's and Royal Terns, and Black Skimmers will occur in the general SEA TREK operating area. Several species of protected birds including the endangered Brown Pelican, Bald Eagle, Peregrine Falcon, and Piping and Snowy Plovers may pass through the SEA TREK area during foraging and/or local movements, but they will not remain in the area. The critically-endangered, Mississippi Sandhill Crane, a nonmigratory resident of west Jackson County, MS (north of Gautier and Ocean Springs), is far from the approved SEA TREK site. The Fontainebleau Unit of the Mississippi Sandhill Crane National Wildlife Refuge (NWR) is at least 48 nmi (89 km) west-northwestern of the approved SEA TREK site. The previously-used Bald Eagle hacking tower on Horn Island (Gulf Islands National Seashore [GINS]) is at least 42 nmi (78 km) west-northwest of the SEA TREK mariculture site.

The netting materials that cover the SEA TREK barrel cages will be of sufficient size to retain the cultured finfishes and exclude marine birds that may attempt to acquire the finfishes via diving and/or swimming. The U.S. Fish and Wildlife Service has requested that net-mesh sizes of no larger than 0.5-inch knot-to-knot or 0.5-inch bar be used on the barrel cages to prevent the entrance and/or entrapment of these diving and swimming birds. The U.S. Army Corps of Engineers (1993) has included that mesh-size criterion as a condition of Sea Pride's Section-10 Permit (Number AL93-01004-M).

K. MARINE MAMMALS

The following information was compiled from a number of sources including Final Environmental Impact Statement for oil and gas lease sales in the Gulf of Mexico (MMS, 1987), from publications by Stephen Leatherwood and his associates (Leatherwood and Reeves, 1988; Leatherwood et al., 1976), and from Fritts et al. (1983).

At least 25 species of marine cetaceans are known to occur in the northern Gulf of Mexico and may occur in the general area of the SEA TREK mariculture site off Mobile Bay, Alabama (Table 13). Two other marine mammals, West Indian manatees and feral California sea lions, occur so infrequently and always in coastal waters that they will not be considered in this section. Dolphins will occur most frequently because of their Continental Shelf distributions and large populations; the larger baleen (whalebone) and toothed whales will occur less frequently for the opposite reasons.

Twenty of the 28 species listed in Table 13 inhabit the Gulf of Mexico year-round and/or enter the Gulf to over-winter. The remaining eight species are tropical or subtropical species that probably retreat into the Caribbean Sea during winter and will not be present in the SEA TREK operating area.

All marine mammals are protected under the US Marine Mammal Protection Act of 1972 (16 U.S.C. 1361 *et seq.*), as amended, and the National Marine Fisheries Service is responsible for monitoring the status of those mammals and for enforcing the regulation as a result of that act. The nearest NMFS Laboratory is located in Pascagoula, MS.

Eight of those 28 species were observed during aerial surveys of the northern Gulf of Mexico during 1980-81 (Fritts et al., 1983). The Atlantic bottlenose dolphin was the most common marine mammal sighted, followed in order of abundance by the striped, spotted, and spinner dolphins; short-finned pilot; pygmy killer whales; Risso's dolphin (or grampus); and beaked whales of the genus *Mesoplodon*. These eight species have ubiquitous distributions in the northern Gulf, but only the dolphins are expected to occur regularly in the SEA TREK operating area.

TABLE 13
MARINE MAMMALS THAT MAY OCCUR IN THE SEA TREK OPERATING AREA

COMMON NAME	GENUS & SPECIES	MAX SIZE	POD SIZE	OCCUR*
BALEEN WHALES:				
Northern Right**	*Eubalaena gracilis* (Muller)	55.8 ft	1 - 12	RARE
Blue**	*Balaenoptera musculus (Linnaeus)*	100.0 ft	1 - 2	RARE
Fin**	*Balaenoptera physalus* (Linnaeus)	78.7 ft	3 - 7	UNCOM.
Sei**	*Balaenoptera borealis* Lesson	68.9 ft	2 - 5	UNCOM.
Bryde's**	*Balaenoptera edeni* Anderson	45.9 ft	1 - 3	RARE
Minke**	*Balaenoptera acutorostrata* Lacepede	35.1 ft	2 - 3	UNCOM.
Humpback**	*Megaptera novaeangliae* (Borowski)	52.5 ft	1 - 15	N/A
TOOTHED WHALES:				
Sperm**	*Physeter catodon* Linnaeus	59.0 ft	Up to 50	COMMON
Pygmy Sperm***	*Kogia breviceps* (de Blainville)	11.2 ft	Up to 7	COMMON
Dwarf Sperm***	*Kogia simus* Owen	8.9 ft	Up to 10	RARE
Beaked Whales:				
Cuvier's**	*Ziphius cavirostris* G. Cuvier	24.6 ft	Up to 25	UNCOM.
Blainville's***	*Mesoplodon densirostris* (de Blain.)	15.4 ft	Up to 9	N/A
Gervais'***	*Mesoplodon europaeus* Gervais	16.4 ft	(N/A)	RARE
Melon-headed***	*Peponocephala electra* (Gray)	8.9 ft	150-1500	RARE
Pygmy Killer***	*Feresa attenuta* Gray	8.9 ft	<50-100s	RARE
False Killer**	*Pseudorca crassidens* (Owen)	20.2 ft	Up to 100s	UNCOM.
Killer**	*Orcinus orca* (Linnaeus)	31.2 ft	Up to 30	UNCOM.
Short-Finned Pilot***	*Globicephala macrorhynchus* (Gray)	17.7 ft	Few-100s	COMMON
DOLPHINS:				
Rough-Toothed***	*Steno bredanensis* (Lesson)	9.2 ft	<50>200	RARE
Fraser's***	*Lagenodelphis hosei* Fraser	8.7 ft	100s-1000s	RARE
Common**	*Delphinus delphis* Linnaeus	8.2 ft	100s-1000s	UNCOM.
Atlantic Bottlenose*	*Tursiops truncatus* (Montagu)	12.8 ft	<10-25	COMMON
Risso's (Grampus)**	*Grampus griseus* (G. Cuvier)	13.1 ft	25-100s	RARE
Bridled**	*Stenella frontalis* (G. Cuvier)	7.2 ft	100s-1000s	RARE
Atlantic Spotted**	*Stenella plagiodon* (Cope)	7.2 ft	100s-1000s	COMMON
Striped**	*Stenella coeruleoalba* (Meyen)	8.9 ft	100s-1000s	COMMON
Spinner:				
Long-Snouted**	*Stenella longirostris* (Gray)	7.2 ft	200>1000	UNCOM.
Short-Snouted**	*Stenella clymene* (Gray)	6.2 ft	200>1000	RARE

* (Rare, 1-3 strandings or sightings; uncommon, 4-6 strandings or sightings; common, 7+ strandings or sightings.)
** (Present year-round or over-winters in Gulf of Mexico.)
***(Warm-water tropical or subtropical species; may not occur in northern Gulf of Mexico in winter.)

The majority of the bottlenose-dolphin sightings occur at depths of less than 27 fathoms (164 ft); water depths apparently influence dolphin distributions. Thus, many bottle-nose dolphins will occur in the SEA TREK area. Aerial surveys of the Louisiana-Mississippi coastal waters indicate a resident population of 2,000 to 6,000 bottlenose dolphins (Leatherwood and Platter, 1975). Aerial surveys offshore of Marsh Island, LA (west of the approved SEA TREK operating area), showed a mean abundance of about 1 dolphin per 1.1 nmi^2 (Fritts et al., 1983). Bottlenose dolphins are particularly abundant near ship channels and seasonally near natural channels or passes between coastal barriers where their preferred schooling fish such as menhaden and mullet congregate during their on- and offshore migrations. Bottlenose dolphins usually occur in pods of 3 to 7 animals, but large herds of 200 to 600 have been observed. The herd size may vary substantially in relation to water depth, habitat complexity, and food supplies, with larger herds usually present in more open-water areas (Wells et al., 1980). In some parts of their range, dolphins populations form relatively permanent social units ("families") that are closely associated with definite home ranges (Shane et al., 1986).

Long- and short-snouted spinner, spotted, and striped dolphins are smaller than bottlenose dolphins and are widely distributed in Continental Shelf waters. (Maximum sizes: long-snouted spinner, 7.2 feet [2.2 m]; short-snouted spinner, 6.2 feet [1.9 m]; spotted, 7.2 feet [2.2 m]; striped, 8.9 feet [2.7 m] vs. bottlenose, 12.8 feet [3.9 m].) These offshore dolphins occur in herds of a few hundred to several thousand depending on the species encountered. They tend to move closer to the coastline during autumn and winter, perhaps in response to migrations of their favored prey species (fish and squid). All four of these species may associate with each other to form large, mixed-species herds, and they associate with various species of tunas. All four species are animated and acrobatic, often jumping clear of the water and spinning (spinner dolphins). These acts may be repeated many times in a short period of apparent exuberance (Leatherwood and Reeves, 1983).

Solitary individuals and/or small pods of the larger, baleen and toothed whales may occur in the general SEA TREK operating area. Six of the great whales (>25 feet [>7.5 m]) listed in Table 13 occur year-round or over-winter in the Gulf of Mexico.

Coastal and pelagic dolphins will be the most frequently encountered cetaceans in the SEA TREK area. Coastal populations of Atlantic bottlenose dolphins and offshore population of pelagic species of the genus *Stenella* move into Continental Shelf waters in autumn and winter in response to the migrations of their finfish and squid prey species into the same areas.

L. DANGEROUS MARINE ANIMALS

Numerous species of venomous, poisonous, or otherwise dangerous vertebrates and invertebrates occur throughout the SEA TREK mariculture area in nearshore Gulf of Mexico waters. Many are commonly associated with artificial reefs and may be encountered while SCUBA diving. Most are dangerous when mishandled, but a few such as large sharks may attack the unwary diver without warning. Table 14 lists the most prominent dangerous marine animals found in the SEA TREK area along with pertinent facts, their dangerous characteristics, and their effects on humans (from Halstead, 1965, 1967, 1970, 1980, 1988.)

Avoidance of dangerous marine animals is the best way to prevent injury, especially by SCUBA divers who may be in harm's way while working on the SEA TREK platform or barrel cages. Careless handling or other contact with most venomous species must be avoided. Proper shielding with neoprene wetsuits, gloves, hoods, etc., will prevent most injuries, especially when seas and currents cause divers to contact submerged structures. Buddy-system diving should be conducted at all times except during severe emergencies. SEA TREK divers will be required to have adequate knowledge of potentially dangerous marine animals and reference texts will be available for rapid identification of those animals.

On-scene first aid should be rendered as soon as possible to victims of dangerous marine animals. The SEA TREK platform will have advanced first-aid equipment and supplies and all on-board staff will be trained in advanced first aid techniques including Cardio-Pulmonary Resuscitation (CPR). Reference texts will be available on first-aid treatment of wounds to SCUBA divers. The SEA TREK platform will be equipped with a helicopter landing pad for removal of victims to onshore medical facilities in case of life-threatening injuries.

TABLE 14

DANGEROUS & HAZARDOUS MARINE ANIMALS THAT MAY OCCUR IN THE SEA TREK OPERATING AREA

NAME	RELATIVE SIZE	DISTRIBUTION or HABITATS	DANGEROUS CHARACTERISTICS	EFFECT ON MAN
Jellyfishes: sea nettle, sea wasp, Portuguese man-of-war, moon jelly, etc.	Bell diameter: <12 to >15 inches; man-of-war tentacles up to 65 feet in length.	Drift with currents throughout area at various depths, more common in summer & autumn.	Tentacles with numerous stinging cells (nematocysts).	From mild stings & burning (moon jelly) to sharp burning, redness, & swelling (sea nettles). Sea wasp & man-of-war most serious, causing muscle spasms, respiratory distress, & possible death.
Sea anemones: solitary & colonial	Small individuals (1 inch tall) to large, 12-inch wide colonies.	Sessile, attached to firm substrates on platform, year-round.	Numerous stinging cells (nematocysts) on numerous oral tentacles.	Mild stinging with rash, swelling, redness, & pain lasting up to one week.
Stony corals.	Small colonies to 6 inches in diameter & height.	Sessile, attached to firm substrates on platform, year-round.	Numerous stinging cells (nematocysts) on minute tentacles; razor-sharp projections.	Mild stinging followed by swelling, redness; abrasions & lacerations are slow to heal; possible secondary infections.
Polychaetes: bristle worm & sea mouse.	Length to 4 inches.	Benthonic, from shallow to deep water; on firm substrates throughout area year-round.	Numerous short, pungent, bristlelike setae or spines.	Inflammation, intense itching, swelling, redness, numbness, & burning that persist for several days; possible secondary infection, gangrene & tissue loss.
Cone shells	Shell length to 2 inches	Benthonic, from shallow water to 15 fathoms on sand and mud bottoms.	Venomous, barblike tooth.	Puncture wound; localized red or blue discoloration; numbness & tingling may spread rapidly to entire body, especially around lips and mouth; paralysis & coma in severe cases; death may result from cardiac arrest.
Common octopus.	Body and longest arm to 3.5 feet long.	Benthonic; hides in holes & crevices during day; active from dusk to dawn; in solid structures at all depths year round.	Pair of sharp, parrotlike beaks or jaws in center of arms; venomous salivary glands.	One to two small puncture wounds with envenomation; localized burning pain radiating to entire limb; profuse bleeding with retarded clotting; swelling; redness, heat around wound; possible respiratory distress, ocular paralysis, dizziness, speech and swallowing difficulty, loss of equilibrium, muscular weakness, loss of consciousness, & complete paralysis; death may result from respiratory arrest.
Crabs: numerous species	Shell width to 6 inches.	Benthonic; common, all habitats & depths throughout area year round.	Sharp claws; may be aggressive especially when handled.	Lacerations, pain, blood loss; possible tissue damage or loss & secondary infection.
Spiny sea urchins: purple & long-spined.	Body (test) 2 inches (p) to 4 inches (l-s) in diameter; spines 1 inch (p) to 16 inches (l-s) long.	Sessile on solid substrates at all depths, throughout area year round.	Needle-sharp, brittle, venomous spines; can puncture & break off in tissues when touched. Venomous pedicellariae (stalked appendages) among spines with toxic fluids.	Numerous small puncture wounds with intense, throbbing pain, followed by redness, swelling, & aching; protracted nausea & vomiting; numbness & partial paralysis of limb; secondary infection possible. Stings from pedicellariae may produce immediate, intense, radiating pain, faintness, numbness, generalized muscular paralysis, loss of speech, respiratory distress, & death in severe cases.

TABLE 14 (Continued)

NAME	RELATIVE SIZE	DISTRIBUTION or HABITATS	DANGEROUS CHARACTERISTICS	EFFECT ON MAN
Sharks: blacktip, bull, dusky, hammerheads, mako, tiger, etc.	Length: 5 to 18 feet.	Throughout area year round; most active at dawn & dusk; mostly solitary but form schools when feeding & mating.	Numerous strong, sharp teeth set in powerful jaws.	Moderate to severe lacerations with pain, swelling, severe bleeding, possible tissue damage or loss, & shock; death may occur from severe trauma.
Sawfishes: large- & small-tooth.	Length to 18 feet; saw teeth 1 to 3 inches long.	Uncommon, but may be encountered throughout area over mud & sand bottoms year round.	Snout with a long, flat (5-ft long) blade (saw) with one row of numerous, stout teeth along each side; swung from side-to-side when feeding.	Severe lacerations with broken bones & loss of blood, shock, & possible death.
Stingrays: & eagle rays: several species.	Width of body: 2 to 7 feet.	Benthonic, from shallow to deep water; on sand & mud bottoms where they are often buried while feeding; throughout area year-round.	One or more long, sharp, serrated, venomous spines at base of whiplike tail; spines with venomous sheath & tissues.	Lacerated puncture wound with toxic venom; intense local pain & loss of blood; nausea, diarrhea, sweating, arrythmia, paralysis, tissue damage, & secondary infection; death may result from chest wound.
Electric or torpedo rays: Atlantic & lesser.	Length: 1.5 to 6 feet.	Benthonic in shallow to deep water on sand & mud bottoms throughout area year round.	Two electric organs on head region can deliver successive series of decreasing shocks of 8 to 220 volts if mishandled.	Electric shock, muscular paralysis, unconsciousness, collapse, respiratory failure, & possible drowning.
Moray eels: several species including green & spotted.	Length to 5 feet.	Benthonic in all habitats spring through autumn; commonly lurks in holes & crevices, especially in reefs & on submerged structures.	Strong, sharp, fang-like teeth set in powerful jaws; particularly dangerous during summer breeding season.	Moderate to severe, painful lacerations with blood loss & possible nerve, muscle, & tendon damage; secondary infection possible.
Flying halfbeaks & needle fishes: several species.	Length to 2 feet.	Common in coastal & offshore surface waters swimming near submerged structures; throughout area year round; attracted to lights at night.	Long, sharp, pointed snout & jaw with numerous, sharp teeth; snout can penetrate victim when fish attempts rapid escape maneuvers & out-of-water jumps.	Jumping fish can inflict severe, painful, puncture wounds with loss of blood; death is possible from wounds & trauma involving victim's head, neck, heart, or lungs.
Great barracuda.	Length to 6 feet.	Throughout area at all depths spring through autumn; especially near submerged structures; mostly solitary but occasionally forms schools.	Rapid swimmer with large jaws with many sharp, canine teeth; will fiercely strike brightly colored objects & wounded fishes.	Moderate to severe, painful bite wounds & lacerations; tissue damage with profuse bleeding; shock & secondary infection possible.

TABLE 14 (Continued)

NAME	RELATIVE SIZE	DISTRIBUTION or HABITATS	DANGEROUS CHARACTERISTICS	EFFECT ON MAN
Sea catfishes: two species.	Length to 2 feet.	Demersal schooling fishes found throughout area year round over sand, mud, & grass bottoms.	Three long, sharp, serrated, venomous spines in dorsal (1) & pectoral (2) fins; spines sheathed in venomous tissues.	Careless handling may result in lacerate, venomous, puncture wounds with sharp, hot, throbbing pain that may radiate up affected limb & last for 48 hours; wound area may progress from pale blue to red & becomes swollen, inflamed, & numb; possible shock, respiratory distress, secondary infection, & death.
Scorpionfishes: several species.	Length to 12 inches.	Benthonic in all habitats year round; usually well camouflaged while hiding in holes & crevices, especially in reefs & on submerged structures.	Seventeen (17) long, sharp, & stout venomous dorsal (12), anal (3), and pelvic (2) fin spines with associated venom glands.	Careless handling or other contact may result in venomous puncture wounds with intense, throbbing, & radiating pain lasting for hours; nausea, diarrhea, loss of consciousness, & possible drowning.
Toadfishes: two species.	Length to 15 inches.	Benthonic in coastal & offshore waters throughout area year round; well camouflaged while hiding in holes and crevices on reefs & submerged structures; often buried under an inch or so of sand or mud.	Tow dorsal fin spines & two gill-cover spines with associated venom glands.	Careless handling or other contact may result in venomous puncture wounds with rapid, intense, radiating pain followed by swelling, redness, & heat.
Star-gazers: two species.	Length: 10 to 17 inches.	Benthonic in coastal & offshore waters throughout area year round; well camouflaged; spend large part of time buries in mud or sand with only eyes & mouth protruding.	Two sharp, conical, venomous shoulder spines, one on either side, each protruding through a sheath of skin & each with venom gland. Electric organs on either side of head; can deliver mild shocks.	Careless handling or other contact may result in venomous puncture wounds with intense, throbbing, & radiating pain lasting for hours; nausea, diarrhea, loss of consciousness, & possible drowning.
Surgeonfishes: several species.	Length to 12 inches.	Schools near reefs and other submerged structures throughout area spring through autumn.	Some species may have 16 long, venomous spines on dorsal, anal, & pelvic fins. All species possess one sharp, lancelike, movable caudal spine on each side, at base of tail fin; caudal spines are extended at right angles to body while tail is lashing.	Careless handling or other contact may result in deep & painful puncture wounds with immediate, intense, stinging or throbbing pain radiating to entire appendage followed by severe swelling; acute pain may last for 12 hours with some pain lasting for a week; laceration wounds from caudal spines may cause blood loss & secondary infection.
Porcupine & balloon fishes.	Length: 1 foot (b-f) to 2 feet (p-f).	Pelagic fishes that associate with reefs & other submerged structures at all depths throughout area, spring through autumn.	Sharp, beaklike jaws; body covered with numerous, sharp, $\leq$1-inch spines; spines become erect when fish inflates with water (or air).	Careless handling or other contact may result bite wounds & numerous puncture wounds with pain, tissue damage or loss, & possible secondary infection.

M. ENDANGERED, THREATENED, & OTHERWISE-PROTECTED SPECIES

Twenty-one species of endangered, threatened, or otherwise-protected animals that inhabit the general SEA TREK operating area or occur in adjacent upland habitats are listed in Table 15. Nine of those species (sturgeons, red drum, sea turtles, and brown pelican) may be encountered infrequently in the approved SEA TREK operating area during part or all of the year; seven species either inhabit adjacent coastal and upland areas (alligator, Mississippi Sandhill Crane, Osprey, and beach mice) or are present in the adjacent coastal zone only during warmer months (Least Tern and West Indian manatee); and two species were recently reared and released from Horn Island, MS (Southern Bald Eagle and red wolf).

The endangered Atlantic sturgeon and its undescribed, but otherwise-protected relative, the Alabama shovelnose sturgeon, are bottom dwelling, anadromous fishes that live at sea and migrate into fresh and brackish water to spawn. Over harvesting and habitat destruction have reduced their numbers.

The red drum (*Sciaenops ocellata*), the red snapper (*Lutjanus campechanus*), the king mackerel (*Scomberomorous cavalla*), and several large shark species occur throughout the general SEA TREK area year-round and are protected via formal, rigidly-enforced conservation and management efforts by Federal and state fishery management agencies (National Marine Fisheries Service, Alabama Department of Conservation and Natural Resources, US Coast Guard, etc.). Adult stocks of the red drum or redfish have declined precipitously in recent years because of heavy fishing pressure for offshore stocks as a result of the popularity of Cajun "blackened redfish" that has spread across the nation. Adult brood fish occur throughout the general SEA TREK operating area, especially during their late-summer/ early-autumn spawning activities.

None of these commercially-important finfish species will be adversely impacted by the siting and/or operation of the SEA TREK OCEAN FARMING SYSTEM. The red drum and red snapper should benefit because the red drum and red snapper that are eventually cultured in the SEA TREK facility should relieve some of the commercial pressure on those wild stocks in the northern Gulf of Mexico. All three of these "managed" species have the potential to benefit from

TABLE 15
ENDANGERED, THREATENED, OR OTHERWISE-PROTECTED
SPECIES THAT MAY OCCUR IN THE SEA TREK OPERATING AREA

COMMON NAME & STATUS*	GENUS & SPECIES	HABITAT
FISHES:		
Gulf Sturgeon Threatened	*Acipenser oxyrhynchus desotoi* Vladykov	Coastal & ICS**
Ala. Shovelnose Sturgeon Otherwise	*Acipenser* sp.	Coastal & ICS**
Red Drum or Redfish Otherwise	*Sciaenops ocellatus* (Linnaeus)	Coastal & ICS**
Red Snapper Otherwise	*Lutjanus campechanus* (Poey)	Coastal & ICS**
King Mackerel Otherwise	*Scomberomorus cavalla* (Cuvier)	Coastal & ICS**
Sharks Otherwise	All species	Coastal & ICS**
REPTILES:		
Loggerhead Sea Turtle Threatened	*Caretta caretta* (Linnaeus)	Coastal & ICS**
Green Sea Turtle Endangered	*Chelonia mydas* (Linnaeus)	ICS**
Hawksbill Sea Turtle Endangered	*Eretmochelys imbricata* (Linnaeus)	ICS**
Kemp's Ridley Sea Turtle Endangered	*Lepidochelys kempi* (Garman)	Coastal & CS*
Leatherback Sea Turtle Endangered	*Dermochelys coriacea* (Vandelli)	ICS**
American Alligator E(AL, MS) T(LA, FL)	*Alligator mississippiensis* (Daudin)	Coastal

* (Otherwise = State species of special concern; proposed as threatened)
**(ICS = Inner Continental Shelf)

TABLE 15 (Continued)

COMMON NAME STATUS*	GENUS & SPECIES	HABITAT
BIRDS:		
Eastern Brown Pelican E(LA & MS) T(AL & FL)	*Pelecanus occidentalis carolinensis*	Coastal
Miss. Sandhill Crane Endangered	*Grus canadensis pulla*	Jackson Cty, MS
Piping Plover Endangered	*Charadrius melodus*	Beaches
Snowy Plover Otherwise	*Charadrius alexandrinus*	Beaches
Least Tern Otherwise	*Sterna antillarum*	Coastal
Southern Bald Eagle Endangered	*Haliaeetus leucocephalus*	Horn Isl
Osprey Otherwise	*Pandion haliaetus*	Coastal
Peregrine Falcon Endangered	*Falco peregrinus*	Coastal
MAMMALS:		
West Indian Manatee Endangered	*Trichechus manatus*	Coastal
Red Wolf Endangered	*Canis rufus*	Horn Isl
Ala. Beach Mouse Endangered	*Peromyscus polionotus ammobates*	Ft. Morgan Gulf Shores
Perdido Key Beach Mouse Endangered	*Peromyscus polionotus trissyllepsis*	Perdido Key

*(Otherwise = State species of special concern; proposed as threatened)

the SEA TREK operation by the unintended release of feed pellets and the attraction of and/or production of baitfishes and invertebrate food species for those carnivorous, migratory species.

Five species of endangered and threatened sea turtles occur throughout the general SEA TREK operating area and may be present at any time throughout the year (Fish and Wildlife Service, 1980*b,c,d,e,*) (Table 15). Loggerhead turtles occasionally nest on the Chandeleur Islands, LA, and on Horn and Ship Islands, MS. Loggerhead and Kemp's ridley turtles forage throughout the SEA TREK operating area. Data from 1985 strandings include 29 loggerhead, 89 ridley, 1 green, 3 leatherback, and 1 hawksbill turtles from Louisiana; 7 loggerhead and 1 each ridley, green, leatherback, and hawksbill from Mississippi; and none from Alabama (National Marine Fisheries Service, 1987).

Sea turtles spend considerable time resting and respiring at the surface. Hatchlings and juveniles of the critically-endangered Kemp's (or Atlantic) ridley turtle move through the SEA TREK operating area on their eastward migration across the northern Gulf of Mexico. Small sea turtles are known to occupy floating mats of Sargassum weed (Table 7).

The American alligator has been reclassified from endangered to threatened in coastal areas of Florida and Louisiana; however, it is still endangered in Mississippi and Alabama. Alligators occur in coastal waters including ponds and lagoons in Bon Secour National Wildlife Refuge on Fort Morgan Peninsula. The approved SEA TREK site is about 4.5 nmi (8.3 km) south of that wildlife refuge unit.

Eight species of protected coastal and marine birds occur in the general area but only one, the Eastern Brown Pelican, may forage in the immediate vicinity of SEA TREK. Brown Pelicans nest and rest on a spoil island in central Mobile Bay. During their foraging flights, they can be expected to occur throughout the SEA TREK operating area year-round. The endangered Piping Plover and the threatened Snowy Plover occur year-round in small numbers on coastal and island beaches.

Two birds of prey, the endangered Southern Bald Eagle and the "threatened" Osprey, inhabit and/or forage over the waters surrounding the area's barrier islands. Juvenile Bald Eagles are reared and released ("hacked") on Horn Island (at least 42 nmi [78 km] northwest of the SEA TREK mariculture site with an eventual goal of starting a breeding colony in coastal Mississippi. Returning eagles are expected to forage over the nearshore Gulf and coastal waters. Ospreys are year-round residents of coastal barriers and forage over large areas of the entire coastal zone including the nearshore Gulf waters. Small numbers of endangered Peregrine Falcons forage for small sea birds along the Gulf coast during their September-through-May migrations. They are not known to forage over the SEA TREK operating area.

The Mississippi Sandhill Crane occurs only on the Mississippi Sandhill Crane National Wildlife Refuge near Ocean Springs and Gautier, MS. Its nearest coastal habitat is in the Fontainebleau Unit of the Refuge immediately east of Ocean Springs and at least 48 nmi (89 km) west-northwest of the approved SEA TREK site. Least terns nest on the mainland and barrier beaches during spring and summer, and migrate to warmer areas of the Gulf and Caribbean during autumn and winter. The operation of the SEA TREK OCEAN FARMING SYSTEM should neither impact nor be impacted by the presence of those six species of birds.

Four species of protected mammals occur along the area's coastline but are far enough from the approved SEA TREK operating site so as not to pose a problem for either the mammals or mariculture operations. The endangered West Indian manatee rarely enters the Mississippi-Alabama coastal area in the summer from its west Florida population center. Manatees cannot survive winter water temperatures.

Two species of endangered beach mice occur only in the shoreline, sand dune habitats from Ft. Morgan Peninsula to Perdido Bay (Alabama beach mouse) and on Perdido Key (Perdido Key beach mouse). The minimum distances between the habitats of those two species and the approved SEA TREK site are 4.5 nmi (8.3 km; Ft. Morgan Peninsula) and 37 nmi (69 km; eastern Perdido Key).

Critically-endangered red wolves were maintained and reared on Horn Island, MS, in a recent (1989 to 1992) experimental rear-and-release program that was sponsored by the Fish and Wildlife Service and supported by the National Park Service. Juvenile wolves that were born on the island were released in other habitats in the southeastern US. Electronic tracking devices are used on the wolves (as well as with the "hacked" juvenile eagles). The wolves were permitted to roam the island until capture and shipment elsewhere. The "ranger station" pen site on Horn Island is a minimum of 42 nmi (78 km) from the approved SEA TREK site. That red wolf rearing program ended in 1992, but if it is resumed in the future, the operation of SEA TREK will have no adverse impact on the wolves (or bald eagles).

Many of these protected species can suffer from marine debris that is discharged from offshore vessels, etc. Plastic lines, ropes, netting, and 6-pack rings can entangle the feet, heads, and/or wings of diving (and swimming) birds such as pelicans (and cormorants and loons) causing entrapment and/or strangulation. Plastic bags, sheeting, and styrofoam can be ingested, causing internal organ blockage that results in starvation to sea turtles (Centaur Associates, Inc., and Center for Marine Education, 1986). The dumping of such marine debris is now prohibited by Annex Five of the Marine Pollution Treaty (MARPOL) and the operators of SEA TREK (Sea Pride, Inc.) as well as its supply and service vessel and personnel will abide by the marine litter prohibitions of that treaty. Sea Pride is very aware of its responsibilities under the MARPOL Treaty, the Endangered Species Act, and the Marine Mammal Protection Act to protect the Gulf of Mexico and its inhabitants.

N. PROTECTED AREAS

The majority of the coastline adjacent to the approved SEA TREK operating area consists of five units the National Park Service's Gulf Islands National Seashore, parts of three Fish and Wildlife Service's National Wildlife Refuges (NWRs), and one state park unit. One existing and one proposed NWR exist near the mainland shore of Mississippi and Alabama and one proposed National Marine Sanctuary unit exists in Louisiana. Table 16 provides the minimum distances (nmi) between those state and US Department of the Interior facilities and the approved operating site of SEA TREK.

Gulf Islands National Seashore consists of all or parts of five barrier islands along the Mississippi and Florida coastline: West and East Ship, Horn, and Petit Bois Islands, MS, and Perdido Key and Santa Rosa Island, FL. Two of those islands, Horn and Petit Bois are protected as wilderness in the US Wilderness Protection System. Horn and Petit Bois are located closest to the approved SEA TREK operating sites (Table 16). Three pre- and Civil-War era forts exist on West Ship Island (Fort Massachusetts), at Pensacola (Fort Barrancas), and on Santa Rosa Island (Fort Pickens; it also served as a World-War II fortification), respectively. Two additional Civil War-era forts exist on Fort Morgan Peninsula (Fort Morgan) and Dauphin Island (Fort Gaines). Gulf Islands National Seashore is one of the most visited and utilized National Park Service facilities in the United States (Jerry Eubanks, Superintendent, GINS; personal communication). That usage is centered in the Gulf beach areas along either side of the entrance to Pensacola Bay, FL. The entrance to Pensacola Bay is a minimum of 41 nmi (76 km) from the approved SEA TREK operating area.

Gulf State Park, a heavily-used unit of the Alabama State Park system is located immediately east of Gulf Shores, AL. The shoreline of that park is located 20 nmi (37 km) east-northeast of the approved SEA TREK operating site (Table 15).

Two upland refuges including one proposed along the Mississippi-Alabama state line are located near the mainland shoreline of Mississippi. The Dauphin Island and Perdido Units of the Bon Secour NWR on Mobile Bay, AL, serves as a refuge for waterfowl and other birds and wildlife. These refuge units are 9.0 nmi (16.7 km)

TABLE 16
FEDERAL & STATE PARKS, SEASHORES, WILDLIFE REFUGES, & MARINE SANCTUARIES IN THE VICINITY OF THE APPROVED SEA TREK OPERATING AREA

NATIONAL PARK, REFUGE, OR SEASHORE UNIT	APPROXIMATE DISTANCE FROM SEA TREK SITE
Gulf Islands National Seashore:	
Santa Rosa Isl., FL (Ft. Pickens)	42 nmi (ENE)
Perdido Key, FL (nearest part)	37 nmi (ENE)
Petit Bois Isl.* MS (eastern end)	26 nmi (WNW)
Horn Island* MS (eastern end)	36 nmi (WNW)
Horn Island, MS (Ranger Station)	42 nmi (WNW)
East Ship Isl., MS (eastern end)	54 nmi (W)
West Ship Isl., MS (Ft. Massachusetts)	60 nmi (W)
Gulf State Park (east of Gulf Shores, AL)	20 nmi (ENE)
Bon Secour National Wildlife Refuge, AL:	
Dauphin Island Unit (shoreline)	9.0 nmi (NW)
Perdido Unit (shoreline)	7.5 nmi (NE)
Grand Bay National Wildlife Refuge**, AL & MS:	28 nmi (NW)
Mississippi Sandhill Crane National Wildlife Refuge	
Fontainebleau Unit, Gautier, MS	48 nmi (WNW)
Breton National Wildlife Refuge, LA:	
Breton Island Unit	81 nmi (SW)
Chandeleur Islands Unit*	52 nmi (WSW)
Shoalwater Bay--Chandeleur Sound**, LA:	
Proposed National Marine Sanctuary	57 nmi (WSW)
Delta National Wildlife Refuge, LA:	
Mississippi River North Pass Area	85 nmi (SW)
* (Designated Wilderness Areas)	(1 nautical mile = 1.852 km)
**(Proposed; under study 1988-1993)	

northwest and 7.5 nmi (14 km) northeast, respectively, of the approved SEA TREK operating site (Table 16).

The Mississippi Sandhill Crane NWR, is located north of Interstate Highway 10 in west Jackson County near Ocean Springs and Gautier; however, the small Fontainebleau Unit is located east of Ocean Springs near the Mississippi Sound shoreline. The Fontainebleau Unit is at least 48 nmi (89 km) west-northwest of the approved SEA TREK site (Table 16). The refuge protects approximately 80 to 100 critically-endangered, Mississippi Sandhill Cranes and part of their critical habitat.

The proposed Grand Bay NWR is being studied (1988-93) by the Fish and Wildlife Service and various other state and Federal agencies. That refuge will be located along both sides of the Alabama-Mississippi state line and will extend from the Mississippi Sound shoreline (approximately 28 nmi [52 km] northwest of the approved SEA TREK site) northward to Interstate Highway 10. That proposed refuge contains some of the only remaining and relatively undisturbed pitcher-plant bogs in the Gulf Coastal Plain. It may also serve as potential habitat for an additional flock of the critically endangered, Mississippi Sandhill Crane.

The entire southeastern Louisiana coastline west of the approved SEA TREK operating area is comprised of parts of two National Wildlife Refuges: Delta NWR, which surrounds the passes of the Mississippi River, and Breton NWR, which includes Breton, Curlew, and Chandeleur Islands, a 50-nautical-mile-long, north-south chain of islands that are remnants of the prehistoric St. Bernard Delta of the Mississippi River. The Chandeleur Islands unit is also protected as a part of the US Wilderness Protection System. The Delta and Breton NWRs serve as major breeding, foraging, resting, roosting, staging, and over-wintering areas for waterfowl (duck, geese, etc.), coastal wading birds (egrets, herons, ibises, spoonbills, etc.), shorebirds (dowitchers, plovers, sanderlings, sandpipers, willets, etc.), coastal/pelagic birds (cormorants, gulls, pelicans, terns, etc.), and birds of prey (bald eagles, hawks, ospreys, etc.) (see Tables 11 & 12). Those Louisiana refuges (and the Mississippi seashore units) also serve as major arrival and departure areas for vernal and autumnal, respectively, migrations of numerous upland birds of North America.

No designated or proposed National Marine Sanctuaries (NMS) exist in the immediate vicinity of the approved SEA TREK operating area. The Shoalwater Bay/Chandeleur Sound (LA) area is being studied for possible designation as an NMS; however, its eastern shoreline is at least 57 nmi (106 km) west-southwest of the approved SEA TREK site along the western side of the Chandeleur Islands.

The placement and operation of the SEA TREK OCEAN FARMING SYSTEM in the nearshore Gulf of Mexico off Mobile Point, Alabama, will have no adverse impact on any of the state or national parks, seashores, or wildlife refuges listed in Table 16 because of distance and dilution factors (for aqueous fish wastes) over and within the intervening Gulf of Mexico, respectively. The SEA TREK platform will not be visible from any of the designated wilderness areas (Gulf Islands National Seashore, MS; Breton National Wildlife Refuge, LA). Offshore oil and gas exploration and production platform already exist in the vicinity of the approved SEA TREK site and are generally accepted by coastal Alabama residents as "a price of energy progress."

O. AVIATION

Information in this section was excerpted from the Draft Environmental Impact Statement (for the) Gulf of Mexico Sales 113/115/116: Central and Western Planning Areas (MMS, 1997), and aeronautical charts provided by the National Ocean Survey ([NOS], 1987, 1989a, 1989b).

The air space above and surface waters of the SEA TREK operating area are used extensively by the Department of Defense (specifically the Navy and Air National Guard) for conducting various air-to-air and air-to-surface missions as provided for in 32 CFR 252. Military Warning Areas are established through the Federal Aviation Administration (FAA) Handbook 7400.2B, Part 5, Chapter 15, that sets aside air space areas by the FAA for use by the military. The military is not, however, given a first use or a priority use of any area. The warning areas are set aside for FAA to direct air traffic over and around. For all warning areas, the user agency, boundaries, and times of use are published by the Defense Mapping Agency in a semiannual DOD Flight Information Publication, *Special Use Airspace, North and South America*.

The approved SEA TREK mariculture site is located within Military Use/Airspace Warning Areas W-155A. Area W-155A is controlled by the Navy's Fleet Area Control & Surveillance Facility (FACSFAC), Naval Air Station, Pensacola, FL. Navy air operations within areas W-155A consist primarily of carrier operations and carrier pilot training.

The approved SEA TREK area is also located within a zone of active helicopter usage that is associated with the offshore oil and gas industry. The SEA TREK platform will include a helicopter landing pad to take advantage of that form or air travel especially during emergency evacuation or medical emergencies.

P. COMMERCIAL SHIPPING

1. SAFETY FAIRWAYS (SHIPPING LANES):

Three shipping safety fairways crisscross the general SEA TREK operating area. Figure 1 illustrates these fairways with respect to the approved SEA TREK operating area. The Gulf-to-Mobile Bay fairway begins offshore at the 100-fathom (600-ft) isobath (at the edge of the Continental Shelf) and extend northwestward towards the Mobile Bay entrance. The Louisiana-to-Mobile fairway connects the Mississippi River Passes and the Mississippi River-Gulf Outlet to Mobile Bay. The nearshore Gulf fairway parallels the coastline and connects the ports of Pensacola (FL), Mobile (AL), Pascagoula (MA, and Gulfport (MS).

The approved SEA TREK mariculture site is located 4.5 nmi (8.3 km) northeast of the center of the junction of the Gulf-to-Mobile and nearshore Gulf fairways. At its closest point the approved SEA TREK site is 2.5 nmi (4.6 km) east of the Gulf-to-Mobile fairway and 1 nmi (1.9 km) north of the nearshore Gulf fairway. Coast Guard-approved warning lights and sonic devices will alert commercial vessels to the presence of the adjacent SEA TREK platform. Several other oil and gas platforms exist throughout the same general area off of the mouth of Mobile Bay.

2. ANCHORING AND LIGHTERING OPERATIONS

Chevron Shipping Company of Pascagoula, MS, utilizes a large area of the Gulf of Mexico south of Petit Bois (Island) Pass approximately 28 nmi (52 km) southwest of the approved SEA TREK site for anchoring and off-loading (lightering) Very Large Crude [oil] Carriers (VLCCs) in support of its Pascagoula/Bayou Cassotte Refinery (John Bernardo, Port Superintendent, Chevron Shipping Company; personal communication). The VLCCs may be anchored in any of six, 7-nmi^2, 1.5-nmi-radius, circles that are adjacent to the intersection of the Mississippi River-to-Mobile Bay and Gulf-to-Horn Island Pass safety fairways (Figure 1). The center of that intersection is approximately 19 nmi (35 km) south of Petit Bois Pass.

3. PORT AREA IMPORT AND EXPORT CARGOS

Import and export cargos and tonnages that pass moved through the Port of Mobile (AL) and perhaps through the SEA TREK operating area in 1992 are provided in Table 17. The total tonnage for 1992 was about 35,000,000 tons; the largest volume of that tonnage is represented coal and coke (11,753,577 tons; 33.7%) followed closely by petroleum and petroleum by-products (10,360,383 tons, 29.7%). Much of those materials is shipped through the area but adjacent to the proposed. 500-acre, SEA TREK operating areas via designated shipping lanes. Because of the regional climatology, the ports and cargo vessels operate year-round so that cargo vessels can be expected to move through adjacent safety fairways throughout the year (and around the clock).

TABLE 17
IMPORT/EXPORT TONNAGES THAT PASSED THROUGH THE PORT OF MOBILE IN 1992

COMMODITY DESCRIPTION	TONNAGE
GENERAL CARGO (State Docks)	
Container Freight	119,816
Cross Ties & Poles	7,700
Iron & Steel	449,210
Linerboard & Paper	389,952
Lumber	382,822
Manufacture & Misc.	43,274
Metals & Alloys	55,772
Plywood & Veneer	203,928
Rubber & Rub. Products	1,295
Shells	34,932
Woodpulp	1,391,915
TOTAL GENERAL CARGO:	3,080,686

BULK MATERIALS (Plant)	TONNAGE
Coal	84,071
Coke	71,787
Gypsum Rock	39,631
Ilmenite Ore	224,624
Iron Ore	1,633,389
Manganese	35,742
Miscellaneous	63,373
Potash	1,437
Rutile Ore	32,203
TOTAL BULK PLANT CARGO:	2,186,257

COAL TERMINAL (McDuffie Isl)	TONNAGE
Coal	6,968,842

GRAINS (Grain Elevator)	TONNAGE
Barley Malt	36,199
Corn	288,309
Peanut Meal	5,949
Soybeans	71,359
Wheat	78,684
TOTAL GRAIN CARGO	480,500

COMMODITY DESCRIPTION	TONNAGE
BULK MATERIALS (Industry)	
Gravel	188,014
Limestone	209,321
Logs	1,602
Miscellaneous	40,784
Molasses	24,700
Petroleum	1,083,197
Sand	4,942
Shell	66,887
TOTAL INDUSTRY BULK CARGO:	1,619,447

BULK MATERIALS (Terminals)	TONNAGE
Chemicals	43,696
Clinker/Cement	767,840
Coal/Coke	4,628,877
Iron Ore	1,139,074
Limestone	1,818,239
Miscellaneous	220,493
Petroleum Products	9,277,186
Scrap Iron & Steel	151,049
Woodchips & Logs	2,489,101
TOTAL TERMINAL BULK CARGO:	22,535,555

TOTALS:	TONNAGE
ALL CARGO:	34,872,287
COAL & COKE:	11,753,577
PETROLEUM PRODUCTS:	10,360,383
WOOD PRODUCTS:	4,477,138
IRON ORE, IRON, STEEL:	3,372,722
LIMESTONE & SHELLS:	2,129,379

Q. OIL & GAS EXPLORATION & PRODUCTION

The proposed SEA TREK mariculture facility will be located within the Minerals Management Service's Central Gulf Planning Area (MMS, 1993). Specifically, SEA TREK will be permitted to operate within OCS Block 827 which is under lease to Exxon Company, U.S.A. of New Orleans, LA (Letter of Agreement, signed 29 September 1993). That general OCS area contains salt domes directly east of the Mississippi River Passes and is diagonally bisected by the prehistoric (northwest-through-southeast) Comanchean (Cretaceous) Shelf Edge. Those geological features have, or are believed to have extensive deposits of crude oil and natural gas. Active hydrocarbon leases exist throughout the area immediately south of Mobile Bay.

As oil exploration and recovery technologies have advanced in the last several decades, petroleum companies have extended their activities farther out onto the Outer Continental Shelf and into deeper Gulf of Mexico waters. Stationary drilling and production platforms that are connected via seafloor pipelines to the mainland produce millions of gallons of oil and trillions of cubic feet of natural gas. Petroleum production platforms occur within the general area.

Oil and gas exploration is being actively pursued in nearby OCS mineral lease blocks south of Mobile Bay and Dauphin Island, AL. All but 3 of the 33 MMS OCS blocks (9%) within 10 nmi (18.5 km) of the approved mariculture site in Block 827 were under active leased for hydrocarbon exploration as of September 1993 (MMS, 1993). Numerous hydrocarbon exploration and production platforms can be seen from the approved SEA TREK mariculture site offshore of Mobile Point. The natural gas field in the vicinity of the approved mariculture area is currently being developed (production platforms and pipelines installed, etc.) and two Exxon platforms exist in the northeastern and southeastern corners of OCS Lease Block 827. At present no crude oil production is occurring within the general area and the only potential source of spilled oil would be from the VLCCs that anchor south of Petit Bois Island, MS (at least 29 nmi southwest of the approved SEA TREK site) and barged oil products that use the Gulf Intracoastal Waterway across lower Mobile Bay and eastern Mississippi Sound.

Marine geophysical or seismic surveys are conducted in the general area from time to time in connection with exploration for subseafloor deposits of oil and natural gas. Geophysical operations involve the use of artificially-generated seismic (acoustic) waves that travel through the water into the subsurface and return to hydrophone receivers after being reflected and/or refracted by either unconsolidated sediments or rock layers below the seafloor. The acoustic waves are generated by air guns, electric sparkers, sleeve exploders, electomechanical devices, and rarely explosives. A frame with an array of air guns is most commonly used. Air guns release a charge of high-pressure air onto the water column; sparkers create acoustic pulses by generating a powerful electric spark between submerged electrodes; sleeve exploders ignite a bubble of gas (e.g., propane) in a manifold (sleeve); and high-resolution seismic operations frequently generate acoustic pulses by electrically causing two confined metal plates to separate rapidly (MMS, 1987). In order to record the returning, seismic signals from the subseafloor areas, geophysical surveyors tow long, floating arrays of hydrophones that are connected to on-board recorders and analytic computers.

Geophysical vessel operators and crews must remain clear of the approved 5-acre SEA TREK site to prevent physical damage to the mariculture facilities and to prevent acoustic or concussion damage to the finfishes that will be reared within the barrel cages. Seismic surveys have caused concern among commercial fishing and environmental groups. Those groups believe that the surveys are lethal, damaging, or disturbing to fish and other marine life; that they destroy commercial fishing gear such as crab pots, etc.; and that they conflict physically and spatially with commercial and recreational fishing (MMS, 1987).

R. COMMERCIAL FISHING

The general SEA TREK operating area is an important commercial fishing area for the following groups of species: pelagic fishes (e.g., menhaden, mackerels, tunas, mullet, etc. [see Table 10]), bottom fishes (e.g., butterfish, croakers, spot, sea trouts, etc. [see Table 10]), and hard-bottom/reef fishes (e.g., snappers, drum, amberjacks, etc. [see Table 10]). Fishery methods include bottom trawling for brown, pink, and white penaeid shrimps, and bottom fishes for human consumption (butterfish) and petfood (numerous bottom-dwelling species of fish); purse seining for, menhaden, mackerels, and red drum; gill netting for mullet and surf-zone fishes; and hook-and-line bottom fishing for snappers and groupers. Bottom trawling occurs from the coastal barriers out across the Continental Shelf to about 85 nmi (157 km) offshore; and bottom fishing for demersal, hard-bottom species occurs over rock outcroppings, artificial reefs, and coral-covered pinnacles.

Commercial fisheries are active year-round with peaks in summer and early autumn. Depending on winter weather and concomitant sea conditions in the SEA TREK mariculture area, about 10% of commercial fishing activities may occur between November and March (Larry Simpson, Gulf States Marine Fisheries Commission, Ocean Springs, MS; personal communication). Commercial fishing vessels will also transit the general SEA TREK operating area when motoring to and from the area's ports and other fishing grounds outside of the operating area.

The inner-shelf waters off Alabama serve the commercial estuarine fauna as spawning areas (e.g., penaeid shrimps, blue crabs, striped mullet, sciaenid fishes, etc.) as migratory pathways for the adults and juveniles of those estuarine-dependent species. The offshore Gulf waters do not serve as nursery or forage areas for those species, per se, as most of their lives are spent within the coastal estuaries inshore of the SEA TREK operating area. The SEA TREK operating area is within the high-salinity, offshore spawning grounds of those estuarine-dependent shellfishes and finfishes; however, the mariculture activities and resulting nutrient enrichment that occur therein are expected to have a positive impact on the species that utilize that general offshore area of the Gulf of Mexico.

The inner-shelf waters off Alabama also serve as nursery and forage areas for numerous marine finfishes that are pursued by commercial and recreational fishermen (e.g., butterfishes, groupers, mackerels, sharks, snappers, etc.). Those species use a large area of the inner continental shelf and the presence and operation of the SEA TREK mariculture platform on a 5-acre site therein will have no negative impact on the large shelf area and its abundant marine fauna. The local marine species should benefit because of the general nutrient enrichment that will occur from the release of metabolic fish wastes, the escape of fish feeds from the barrel cages, the prey species that settle and grow on the submerged walls and pylons of the SEA TREK platform, the microhabitats that develop on the submerged platform structures, and the discarded fouling organisms that are removed from the barrel cages.

S. RECREATIONAL FISHING

1. Methods and Seasons

As with commercial fisheries (see section R), the general SEA TREK operating area is an important recreational fisheries area. Most of that activity involves rod-and-reel/hook-and-line trolling for pelagic species (mackerels, tunas, red drum, etc.) and/or bottom or still fishing over fish havens and hard-bottoms such as reefs and petroleum platforms for demersal and mid-water species (snappers, groupers, cobia, amber jacks, sharks, etc.).

Recreational fishing occurs year-round with activity peaks from spring through autumn. Depending on ambient weather and sea conditions, most of that activity will occur over or near the fish havens described and discussed in the following text and away from the approved SEA TREK mariculture site. Some spear fishing by SCUBA divers occurs on and in the immediate vicinity of the fish havens and petroleum platforms but that activity is restricted to the spring through autumn period (Ron Lukens, Gulf States Marine Fisheries Commission, Ocean Springs, MS; personal communication).

2. FISH HAVENS

The fish-haven data contained herein were provided by Ron Lukens (Gulf States Marine Fisheries Commission, Ocean Springs, MS; personal communication), Rick Wallace (Alabama Sea Grant Marine Extension Service, Mobile, AL; personal communication), and the Minerals Management Service (MMS, 1987).

Numerous fish havens or artificial fishing reefs exist in an east-west band from south of East Ship Island, MS, to south of Perdido Bay (entrance), AL (Figure 1); they range from 5 to 17 nmi (9.3 to 31.5 km) from the nearest shoreline. Most of the fish havens are inshore of the 10-fathom (60-ft; 18.3-m) contour; however, deeper fish havens occur offshore of Alabama. Table 18 provides data on the approximate location, size, minimum depth clearance, and minimum distances (from the approved SEA TREK operating site) of major fish havens along the Alabama coastline. The southwestern corner of the Northern Permitted Reef-Building Area is only 1 nmi (1.9 km) north of the approved SEA TREK operating site.

TABLE 18
PERMITTED FISH HAVENS IN THE GULF OF MEXICO OFFSHORE OF ALABAMA

FISH HAVEN NAME	N-LATITUDE W-LONGITUDE	APPROX. DISTANCE FROM SEA TREK SITE
Northern Permitted Reef-Building area (NPRBA)	N/A	1 nmi (N) (to SW corner)
Northeastern Permitted Reef-Building Area (NEPRBA)	N/A	15 nmi (SE) (to NW corner)
Drydock & Dauphin Island Bridge Rubble	30°01'00" (to) 30°03'15" 88°07'00"	11 nmi (SW)
Liberty Ship *ANDERSON*	30°01'15" 88°05'00"	12 nmi (SW)
Liberty Ship *EDWARDS*	29°57'00" 88°06'15"	15 nmi (SW)
Liberty Ship *SPARKMAN*	30°00'30" 87°46'10"	16 nmi (SE)
Liberty Ship *WALLACE*	30°05'17" 87°35'16"	24 nmi (ESE)
Liberty Ship *ALLEN*	30°07'24" 87°32'00"	26 nmi (ESE)
Platform Reef (abandoned)	29°27'00" 87°39'50"	53 nmi (SSE)
Military Ordnance Disposal Area	N/A	15 nmi (WSW) (to NE corner)

The placement and operation of the SEA TREK mariculture platform off Fort Morgan Peninsula will have no adverse impact on the biotic assemblages that are associated with fish havens throughout the Alabama inner-shelf area because of distance and dilution factors. The SEA TREK platform will have a positive impact on the total biotic potential of artificial-reef inhabitants and associates because it will attract and nourish those same organisms as they migrate to, settle on, and otherwise associate with the submerged substrates (concrete walls and pylons, etc.) of SEA TREK. Since recreational hook-and-line fishing will not be permitted within the restricted 5-acre mariculture site, SEA TREK will serve as a reservoir of finfishes, shellfishes, and other organisms that will migrate to and colonize other nearby fish havens.

The northwestern edge of the 80-nmi^2 Northern Permitted Reef-Building Area (NPRBA) is located about 11 nmi (20.4 km) south of the western end of the Ft. Morgan Peninsula and about 7 nmi (13 km) south of the approved SEA TREK mariculture site. The western edge of the Northeastern Permitted Reef-Building Area (NEPRBA) is about 15 nmi (27.8 km) southeast of the approved SEA TREK site.

The charted fish (Table 18) havens are constructed of scrapped and scuttled Liberty Ship hulls, barges, railroad box cars, automobiles, concrete pilings, pipes, and rubble, old tires, and oyster shells and are permitted by the US Army Corps of Engineers, Mobile, AL, District. The fauna and flora attached to or associated with those structures provide food for fish and invertebrates that, in turn, attract desirable sport and commercial fish and fishermen. Most of the fish havens are actively fished by recreational anglers from spring through autumn; however, larger vessels (charter boats) occasionally fish the artificial reefs during the winter. The fish havens serve as fishing "hot spots."

Most of the petroleum production platforms in the general SEA TREK area also serve as artificial reefs or unofficial fish havens and "hot spots." None of the fish havens or petroleum platforms is located within the 500-acre SEA TREK operating area.

T. BIBLIOGRAPHY & LITERATURE CITED

Abbott, R.T. 1974. *American Seashells: The marine Mollusca of the Atlantic and Pacific Coasts of North America (2nd. ed.)*. New York, NY: Van Nostrand Reinhold Company. 663 pp.

Alabama Department of Environmental Management (ADEM). 1988 (rev.). Water Division - Coastal Program: Review Process for Federal Licenses and Permits. Montgomery, AL: ADEM Administrative Code R. 335-8-1-.24.

Alabama Department of Environmental Management (ADEM). 1993. Water Division - Water Quality Program: Water-Use Classifications for Interstate and Intrastate Waters. Montgomery, AL: ADEM Administrative Code R. 335-6-11-.02.

Alexander, J.E., T.T. White, K.W. Turgeon, & A.W. Blizzard. 1977. Baseline monitoring studies, Mississippi, Alabama, Florida, outer continental shelf, 1975-1976. Volume 3: Results. Washington, DC: U.S. Department of the Interior, Bureau of Land Management. BLM/ST-78/32:484 pp.

Amos. W.H., & S.H. Amos. 1985. *The Audubon Society nature guides. Atlantic and Gulf coasts*. New York, NY: Alfred A. Knopf. 670 pp.

Barnes, R.D. 1980. *Invertebrate Zoology*. Philadelphia, PA: Saunders College. 1,089 pp.

Bert, T.M., & H.J. Humm. 1979. Checklist of the maine algae on the offshore oil platforms of Louisiana. Pages 437-446 *in* Ward, C.H., M.E. Bender, & D.J. Reish, eds. *The Offshore Ecology Investigation: Effects of oil drilling and production in a coastal environment*. Houston, TX: Rice University Studies. 65(4 & 5).

Brooks, J.M., & C.P. Giammona, eds. 1990a. Mississippi-Alabama marine ecosystem study annual report: Year 2. Volume I: Technical Narrative. OCS Study/MMS 89-0095. New Orleans, LA: U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Regional Office. 348 pp.

Brooks, J.M., & C.P. Giammona, eds. 1990*b*. Mississippi-Alabama marine ecosystem study annual report: Year 2. Volume II: Appendices. OCS Study/MMS 89-0096. New Orleans, LA: U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Regional Office. 470 pp.

Burke, W.D. 1975. Pelagic Cnidaria of Mississippi Sound and adjacent waters. *Gulf Research Reports* 5(1):23-38.

Continental Shelf Associates. 1981. Pre-drilling, site-specific, benthic survey within State of Alabama oil and gas lease tract 112. Tequesta, FL: Continental Shelf Associates, Inc. 51 pp.

Day, J.H. 1973. New Polychaeta from Beaufort, with a key to all species recorded from North Carolina. *NOAA Technical Report NMFS Circular* 375:140 pp.

De Laubenfels, M.W. 1953. Sponges from the Gulf of Mexico. *Bulletin of Marine Science of the Gulf and Caribbean* 2(3):511-557.

Downey, M.E. 1973. Starfishes from the Caribbean and the Gulf of Mexico. *Smithsonian Contributions to Zoology 126:158 pp.*

Esher, R.J., C. Levenson, & T.D. Drummer. 1992. Aerial surveys of endangered and protected species in the EMPRESS II ship trial operating area in the Gulf of Mexico. Stennis Space Center, MS: Naval Research Laboratory NRL/MR/7174--92-7002: 53 pp.

Felder, D.L. 1973. An annotated key to crabs and lobsters (Decapoda, Reptantia) from coastal waters of the northwestern Gulf of Mexico. Baton Rouge, LA: Louisiana State University, Center for Wetland Resources. Publication No. LSU-SG-73-02:103 pp.

Fotheringham, Nick. 1977. Effects of offshore oil field structures on their biotic environment: benthos and plankton. Pages 487-549 *in* Jackson, W.B., ed. Environmental Assessment of an Active Oil Filed in the Northwestern Gulf of Mexico, 1976-1977. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Annual Report to U.S. Environmental Protection Agency. Springfield, VA: National Technical Information Service. NTIS Accession No. PB283890.

Fotheringham, Nick. 1980. *Beachcomber's guide to Gulf Coast marine life*. Houston, TX: Gulf Publishing Co. 124 pp.

Fotheringham, Nick. 1977. Effects of offshore oil field structures on their biotic environment: platform fouling community. Pages 179-208 *in* Middleditch, B.S., ed. Environmental Effects of Offshore Oil Production: The Buccaneer Gas and Oil Field Study. *Marine Science*. New York, NY: Plenum Press. Vol. 14.

Fritts, T.H., A.B. Irvine, R.D. Jennings, L.A. Collum, W. Hoffman, & M.A. McGehee. 1983. Turtles, birds, and mammals in the northern Gulf of Mexico and nearby Atlantic waters. U.S. Fish and Wildlife Service, Division of Biological Services, Washington, D.C. FWS/OBS-82/65: 455 pp.

Gallaway, B.J., & G.S. Lewbel. 1982. The ecology of petroleum platforms in the northwestern Gulf of Mexico: A community profile. U.S. Fish and Wildlife Service, Office of Biological Services, Washington, D.C. FWS/OBS-82/27: 92 pp.

Gallaway, B.J., L.R. Martin, R.L. Howard, G.S. Boland, & G.D. Dennis. 1981. Effects on artificial reef and demersal fish and macrocrustacean communities. Pages 237-293 *in* Middleditch, B.S., ed. Environmental Effects of Offshore Oil Production: The Buccaneer Gas and Oil Field Study. *Marine Science*. New York, NY: Plenum Press. Vol. 14.

Galtsoff, P.S. (ed.). 1954. Gulf of Mexico: Its origin, waters, and marine life. U.S. Fish & Wildlife Service *Fishery Bulletin* 55(89):604 pp.

George, R.Y., & P.J. Thomas. 1979. Biofouling community dynamics in Louisiana shelf oil platforms in the Gulf of Mexico. Pages 553-574 *in* Ward, C.H., M.E. Bender, & D.J. Reish, eds. *The Offshore Ecology Investigation: Effects of oil drilling and production in a coastal environment*. Houston, TX: Rice University Studies. 65(4 & 5).

Gosner, K.L. 1971. *Guide to identification of marine and estuarine invertebrates*. New York, NY: Wiley-Interscience. 693 pp.

Gunter, Gordon, & R.A. Geyer. 1955. Studies on fouling organisms of the northwestern Gulf of Mexico. *Publications of the Institute of Marine Science* (University of Texas) 4(1):37-67.

Gray, I.E., M.E. Downey, & M.J. Cerame-Vivas. 1968. Sea-stars of North Carolina. *Fishery Bulletin* 67(1):127-163.

Halstead, B.W. 1965. *Poisonous and venomous marine animals of the world. Volume one---Invertebrates*. Washington, D.C.: U.S. Government Printing Office. 994 pp.

Halstead, B.W. 1967. *Poisonous and venomous marine animals of the world. Volume two---Vertebrates*. Washington, D.C.: U.S. Government Printing Office. 1070 pp.

Halstead, B.W. 1970. *Poisonous and venomous marine animals of the world. Volume three---Vertebrates (continued)*. Washington, D.C.: U.S. Government Printing Office. 1006 pp.

Halstead, B.W. 1988. *Poisonous and venomous marine animals of the world*. (Second Revised Edition) Princeton, NJ: Darwin Press. 1456 pp.

Halstead, B.W. 1980. *Dangerous marine animals that bite, sting, shock, are nonedible*. Centreville, MD: Cornell Maritime Press. 208 pp.

Hedgpeth, J.W. (ed.) 1966. Treatise on marine ecology and paleoecology. Volume 1: Ecology. The Geological Society of America. Memoir 67:1,296 pp.

Hoese, H.D., & R.H. Moore. 1977. *Fishes of the Gulf of Mexico: Texas, Louisiana, and adjacent waters*. College Station, TX: Texas A & M University Press. 327 pp.

Kaplan, E.H. 1988. *A Field Guide to Southeastern and Caribbean Seashores (Cape Hatteras to the Gulf Coast, Florida, and the Caribbean)*. Peterson Field Guide Series. Boston, MS: Houghton Mifflin Co. 325 pp.

Leatherwood, Stephen, D.K. Caldwell, & H.E. Winn. 1976. Whales, dolphins, and porpoises of the western North Atlantic: A guide to their identification. Seattle, WA: *NOAA Technical Report NMFS CIRC-396:* 176 pp.

Leatherwood, Stephen, & M.F. Platter. 1979. Aerial assessment of bottlenose dolphins off Alabama, Mississippi, and Louisiana. Pages 49-86 *in* Odell, D.K., D.B. Siniff, & G.H. Waring, eds. *Tursiops truncatus* Assessment Workshop. Springfield, VA: National Technical Information Service. NTIS Publication No. PB291161.

Leatherwood, Stephen, & R.R. Reeves. 1983. *The Sierra Club handbook of whales and dolphins*. San Francisco, CA: Sierra Club Books. 302 pp.

Little, F.J., Jr. 1963. The sponge fauna of the St. George's Sound, Apalachee Bay, and Panama City regions of the Florida Gulf coast. *Tulane Studies in Zoology* 11(2):71 pp.

Lowery, G.H., Jr., & R.J. Newman. 1954. The birds of the Gulf of Mexico. *IN* Galtsoff, P.S. (Coordinator), *Gulf of Mexico: Its origin, waters, and marine life*. U.S. Department of the Interior, Fish & Wildlife Service. *Fishery Bulletin* 55(89): 519-540.

Loyacano, H.A., & J.P. Smith (eds.). 1979. *Symposium on the natural resources of the Mobile Estuary, Alabama*. Ocean Springs, MS: Mississippi--Alabama Sea Grant Consortium. MASGP-80-022:290 pp.

Middleditch, B.S. (ed.). 1981. Environmental Effects of Offshore Oil Production: The Buccaneer Gas and Oil Field Study. *Marine Science*. New York, NY: Plenum Press. Vol. 14.

Minor, R.W. 1950. *Field book of seashore life*. New York, NY: G.P. Putnam's Sons. 888 pp.

Schroeder, W.W., A.W. Shultz, M.R. Dardeau, & P. Fleischer. 1989. Hardbottom features on the inner-continental shelf off Alabama and northwestern Florida. *Proceedings: Ninth Annual Gulf of Mexico Information Transfer Meeting*. New Orleans, LA, 25-27 October 1988. U.S. Minerals Management Service, OCS Study/MMS 89-0060: 283-287.

Schroeder, W.W., A.W. Shultz, & J.J. Dindo. 1988. Inner-shelf hardbottom areas, northeastern Gulf of Mexico. *Transactions--Gulf Coast Association of Geological Societies* 38:535-541.

Schroeder, W.W., S.R. Gittings, M.R. Dardeau, P. Fleischer, W.W. Sager, A.W. Shultz, and R. Rezak. 1989. Topographic features of the L'MAFLA Shelf, northern Gulf of Mexico. *Proceedings of the Oceans '89 Conference*. Washington, DC: 18 September 1989. pp. 54-58.

Shane, S.H., R.S. Wells, & B. Wursig. 1986. Ecology, behavior, and social organization of the bottlenose dolphin: a review. *Marine Mammal Science*. 2(1):34-63.

Shaw, J.K., P.G. Johnson, R.M. Ewing, C.E. Comiskey, C.C. Brandt, & T.A. Farmer. Benthic macroinfauna community characterization in Mississippi Sound and adjacent waters. Mobile, AL: U.S. Army Corps of Engineers, Mobile District. 442 pp.

Shipp, R.L. 1986. *Guide to fishes of the Gulf of Mexico*. Mobile, AL: KME Seabooks. 256 pp.

Smith, R.I. (ed.). 1964. Keys to marine invertebrates of the Woods Hole region. Woods Hole, MA: Marine Biological Laboratory. Contribution No. 11:208 pp.

Sonnier, F., J. Teerling, & H.D. Hoese. 1976. Observation on the offshore reef and platform fish fauna of Louisiana. *Copeia* 1976:105-111.

Toups, J.A., & J.A. Jackson. 1987. *Birds and birding on the Mississippi Coast*. Jackson, MS: University Press of Mississippi. 303 pp.

U.S. Army Corps of Engineers. 1979. Mississippi Sound and adjacent areas. Reconnaissance report. Appendix A: Resource Inventory. Mobile, AL: Corps of Engineers. 273 pp.

U.S. Army Corps of Engineers. 1984. Mississippi Sound and adjacent areas. Dredged material disposal study. Volume I. Main report. Mobile, AL: Corps of Engineers. 290 pp. + 16 charts.

U.S. Army Corps of Engineers. 1984. Mississippi Sound and adjacent areas. Dredged material disposal study. Volume II. Numerical modeling. Mobile, AL: Corps of Engineers. 31 pp. + 279 plates.

U.S. Army Corps of Engineers. 1984. Mississippi Sound and adjacent areas. Dredged material disposal study. Volume III. Resource inventory. Mobile, AL: Corps of Engineers. 174 pp. + 60 plates.

U.S. Fish and Wildlife Service. 1980*a*. Selected vertebrate endangered species of the seacoast of the United States: Leatherback Sea Turtle. Washington, DC: U.S. Department of the Interior, Fish & Wildlife Service, Biological Services Program. FWS/OBS-80-01.13: 11 pp. [?]

U.S. Fish and Wildlife Service. 1980*b*. Selected vertebrate endangered species of the seacoast of the United States: Green Sea Turtle. Washington, DC: U.S. Department of the Interior, Fish & Wildlife Service, Biological Services Program. FWS/OBS-80-01.13: 11 pp. [?]

U.S. Fish and Wildlife Service. 1980*c*. Selected vertebrate endangered species of the seacoast of the United States: Hawksbill Sea Turtle. Washington, DC: U.S. Department of the Interior, Fish & Wildlife Service, Biological Services Program. FWS/OBS-80-01.22: 8 pp.

U.S. Fish and Wildlife Service. 1980*d*. Selected vertebrate endangered species of the seacoast of the United States: Kemp's (Atlantic) Ridley Sea Turtle. Washington, DC: U.S. Department of the Interior, Fish & Wildlife Service, Biological Services Program. FWS/OBS-80-01.30:8 pp.

U.S. Fish and Wildlife Service. 1980e. Selected vertebrate endangered species of the seacoast of the United States: West Indian Manatee. Washington, DC: U.S. Department of the Interior, Fish & Wildlife Service, Biological Services Program. FWS/OBS-80-01.35:11 pp.

U.S. Fish and Wildlife Service. 1980*f*. Selected vertebrate endangered species of the seacoast of the United States: Brown Pelican, Eastern and California Subspecies. Washington, DC: U.S. Department of the Interior, Fish & Wildlife Service, Biological Services Program. FWS/OBS-80-01.40:18 pp.

U.S. Fish and Wildlife Service. 1980*g*. Selected vertebrate endangered species of the seacoast of the United States: Mississippi Sandhill Crane. Washington, DC: U.S. Department of the Interior, Fish & Wildlife Service, Biological Services Program. FWS/OBS-80-01.52:10 pp.

U.S. Minerals Management Service, Gulf of Mexico Region. 1987. Proposed oil and gas Lease Sales 113/115/116: Gulf of Mexico OCS Region. Final Environmental Impact Statement. New Orleans, LA: U.S. Minerals Management Service Document OCS/EIS/MMS 87-0077: 745 pp.

U.S. Minerals Management Service, Gulf of Mexico Region. 1990. Gulf of Mexico Sales 131, 135, and 137: Central, Western, and Eastern Planning Areas. Draft Environmental Impact Statement. New Orleans, LA: U.S. Minerals Management Service Document OCS/EIS/EA 90-0003: 870 pp.

U.S. Minerals Management Service, Gulf of Mexico Region. 1993*a*. Gulf of Mexico Sales 147 and 150: Central and Western Planning Areas. Draft Environmental Impact Statement. Volume I: Sections I through IV.C. New Orleans, LA: U.S. Minerals Management Service. 305 pp.

U.S. Minerals Management Service, Gulf of Mexico Region. 1993*b*. Gulf of Mexico Sales 147 and 150: Central and Western Planning Areas. Draft Environmental Impact Statement. Volume II: Sections IV.D. through IX. New Orleans, LA: U.S. Minerals Management Service. 631 pp.

U.S. National Data Buoy Center. 1973. Environmental conditions within specified geographical regions: Offshore east and west coasts of the U.S. and in the Gulf of Mexico. Washington, DC: Department of Commerce, National Oceanic and Atmospheric Administration, Environmental Data Service. 735 pp.

U.S. National Ocean Service. 1989*a*. Enroute Low Altitude-US (Aeronautical Chart). Riverdale, MD: National Ocean Service. Flight Information Publication L-17/L-18.

U.S. National Ocean Service. 1989*b*. IFR Enroute High Altitude-US (Aeronautical Chart). Riverdale, MD: National Ocean Service. Flight Information Publication H-5.

U.S. National Ocean Service. 1992. U.S. Gulf Coast: Cape St. George to Mississippi Passes. Washington, DC: National Ocean Service. Nautical Chart No. 11360 (33rd ed.).

U.S. Navy. 1988. Mine Warfare Pilot: Mobile, AL/Pensacola, FL, and approaches (U). Stennis Space Center, MS: Naval Oceanographic Office. SP 1015:62 pp. CONFIDENTIAL.

U.S. Navy. 1990. Draft environmental impact statement for the proposed operation of the Navy Electromagnetic Pulse Radiation Environment Simulator for Ships (EMPRESS II) in the Gulf of Mexico. Washington, DC: Naval Sea Systems Command (PMS-423). 303 pp.

Vittor & Associates. 1982. Benthic macroinfaunal community characterizations in Mississippi Sound and adjacent waters. Final Report submitted to U.S. Army Corps of Engineers, Mobile (AL) District. 442 pp.

Vittor & Associates. 1984. Macroinfaunal and sediment analysis of the Pensacola, Florida, ocean dredged material disposal site survey. Final Report submitted to JRB Associates, McLean, VA. 34 pp.

Vittor & Associates, Inc. 1985*a*. Tuscaloosa Trend Regional Data Search and Synthesis (Volume I - Synthesis Report). New Orleans, LA: U.S. Minerals Management Service. Final Report Contract No. 14-12-0001-30048. 477 pp.

Vittor & Associates, Inc. 1985*b*. Tuscaloosa Trend Regional Data Search and Synthesis (Volume II - Supplemental Reports). New Orleans, LA: U.S. Minerals Management Service. Final Report Contract No. 14-12-0001-30048. 349 pp.

Voss, G.L. 1976. *Seashore life of Florida and the Caribbean*. Miami, FL: Banyan Books. 199 pp.

Walls, J.G. 1975. *Fishes of the northern Gulf of Mexico*. Hong Kong: T.F.H. Publications. 432 pp.

Wells, R.S., A.B. Irvine, & M.D. Scott. 1980. The social ecology of inshore odontocetes. Pages 263-317 *in* Herman, L.M., (ed.), *Cetacean Behavior: Mechanisms and Functions*. New York, NY: John Wiley & Sons.

Williams, A.B. 1984. *Shrimps, lobsters, and crabs of the Atlantic coast of the eastern United States, Maine to Florida*. Washington, DC: Smithsonian Institution Press. 550 pp.

Wolfson, A.g., V. Blaricom, N. Davis, & G.S. Lewbel. 1979. The marine life on an offshore oil platform. *Marine Ecological Progress Series* 1:81-89.

Center for Marine Conservation

April 8, 1993

Mr. Edwin Cake
2510 Ridgewood Rd.
Ocean Springs, MS 39564

Dear Mr. Cake:

This is your personal invitation to attend what I think is a very important environmental gathering. Enclosed is a preliminary announcement of a marine fish conservation workshop we are organizing in St. Petersburg Florida on June 4, 5, and 6, 1993. You are one of about fifty environmental advocates who we hope will be interested in learning more about how to improve the conservation and management of marine fish and fisheries in the waters off the South Atlantic coast and the Gulf of Mexico.

Our oceans are in a state of crisis. Well over half of all commercial fish stocks off the coasts of the United States are over-exploited or are at least fully utilized. Marine birds and animals are literally starving in some areas of the oceans and entire ecosystems are being disrupted by intentional and careless overfishing. Some species of marine fishes are even in danger of becoming extinct from the cumulative effects of habitat degradation and overfishing. The management system is failing and the ocean ecosystem in some areas is stressed to the breaking point.

We are inviting you to join us at this workshop to increase your knowledge and understanding of the problem of overfishing and fishery mismanagement and to share with us and the participants your ideas about ways to address the problems. We'll also share with you some approaches that have worked for us and some of our brother and sister organizations.

Our presentations will provide you with information and practical tools which you will be able to use immediately to begin to change the decisions of federal fisheries managers in the Southeastern US and in Congress. If you decide to work on this issue, we will provide you with print and audio-visual materials to help you educate your personal, professional, and environmental friends, associates and organizations.

The Center for Marine Conservation is reaching out to you because of the seriousness of the impending crisis in the oceans. We are a national group of 100,000 members who focus exclusively on ocean issues. Our staff has attended Regional Fishery Management Council meetings regularly for more than a year, learning how the Magnuson Fisheries Conservation and Management Act is supposed to work, and how it has failed. Now we need your help to make the necessary changes in the law and in the process. We can, if we work quickly and effectively, keep the shark, the snapper, the grouper, and the bonefish from the fate suffered by the wolf, woodland caribou, passenger pigeon, and California Condor.

1725 DeSales Street, NW, Ste. 500 Washington, D.C. 20036 (202) 429-5609 Telefax (202) 872-0619

Aquaculture is "an important priority" of Clinton administration–Rominger

Washington—Deputy U.S. Agriculture Secretary Richard Rominger told the Joint Subcommittee on Aquaculture a major opportunity exists to develop an internationally competitive aquaculture industry serving national needs and the global marketplace.

Rominger, the highest-ranking USDA official ever to attend a JSA meeting, said during his June 30 address that Agriculture Secretary Mike Espy had asked him to emphasize that "aquaculture is an important priority of this administration."

The JSA is the federal inter-agency aquaculture coordinating group that reports to the Federal Coordinating Council on Science, Engineering, and Technology in the White House Office of Science and Technology Policy.

The JSA is made up of representatives of 12 federal departments and agencies. The permanent chairman is the Secretary of Agriculture.

Rominger conceded to the JSA that the federal government needs to do a better job of fostering the growth of the aquaculture industry.

"Industry leaders are telling us United States aquaculture could be promoted with better coordination between our government authorities and an improved regulatory environment," he said.

Rominger listed three policy areas that demonstrate the USDA's "strongly supportive" position on aquaculture:

—Espy and the USDA believe that development of a globally competitive U.S. aquaculture industry should be supported.

—Since taking office in January, Espy has included, for the first time, the Regional Aquaculture Centers in the administration budget proposal to President Clinton.

—Espy supports development of a draft USDA strategic plan for aquaculture that would foster a unified, crosscutting departmental aquaculture program.

"Building a globally competitive aquaculture industry will require strong federal leadership and collaboration among the federal agencies and programs," Rominger said. "We believe the efforts of the Joint Subcommittee on Aquaculture will be vital in achieving the teamwork we need.

"Moreover, Secretary Espy encourages teamwork to devise and implement action plans that will foster the development of U.S. aquaculture.

"The United States built the most successful terrestrial agriculture system on earth," Rominger said. "We should develop a successful aquatic farming system as well."

Describing aquaculture as "a major new agricultural growth industry of the 21st century," Rominger noted the U.S. remains the world's second-largest importer of seafood products, more than $9 billion during 1990.

Importing more than 60 percent of fish and shellfish resulted in an annual U.S. trade deficit of $4.9 billion in 1990 for all fisheries products.

"Fisheries imports are the largest contributor to the U.S. trade deficit among agricultural products," he said. "To offset this deficit, we cannot place more pressure on natural fish stocks."

But aquaculture can be both an important component of long-term economic development and integrally linked to a healthy environment, he said.

Rominger said the administration views aquaculture as "an incredible success story waiting to happen."

Global seafood demand is expected to increase 70 percent in the next 35 years during a period when harvests from capture fisheries already are stable or declining.

"Aquaculture will need to supply the shortfall," Rominger said. "To meet world seafood demand, aquaculture production will have to increase seven-fold to 77 million metric tons annually by the year 2025."

The USDA is determined to lead a cooperative effort to improve the nation's aquaculture industry, he said.

"Beyond the departmental initiatives, Secretary Espy is committed to providing strong leadership in support of inter-agency collaboration and cooperation," Rominger said.

"Programs and facilities in the National Marine Fisheries Service, the National Sea Grant College Program and the U.S. Fish and Wildlife Service provide vital support to private and public aquaculture."

Other federal agencies named by Rominger with important roles to play in support of aquaculture were the Environmental Protection Agency, Army Corps of Engineers, Small Business Administration, Agency for International Development, Tennessee Valley Authority, National Science Foundation and Farm Credit Administration.

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