

## **APPENDIX H – Reports on Fisheries and Socio-Cultural Assessments**

The potential impact of the proposed drilling programme on the fishing activities within the Gulf of Paria and the fishing communities along the western shore of Trinidad is a very important aspect of this EIA. As such, it included detailed investigations on the marine resources and fisheries within the Gulf of Paria in addition to a socio-cultural assessment.

The following reports are presented below:

- Report on the Marine Resources & Fisheries of the Gulf of Paria for the Environmental Impact Assessment for Exploratory Drilling Activities in Block 1a & 1b
- Socio-Cultural Assessment for the Environmental Impact Assessments (EIAs) for Block 1a and 1b Drilling Activities

PETRO-CANADA TRINIDAD & TOBAGO LIMITED

Report on the  
Marine Resources & Fisheries of the Gulf of Paria for the  
Environmental Impact Assessments for Exploratory Drilling  
Activities in Block 1a & 1b

Prepared for  
Coastal Dynamics

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## Executive Summary

Petro-Canada of Trinidad and Tobago has applied for a Certificate of Environmental Clearance to carry out exploratory drilling in Blocks 1a and 1b located offshore in the central Gulf of Paria. The northern boundary of Block 1b is located just north of the coastal site of Brickfield and the southern boundary is adjacent to the city of San Fernando. Block 1b is sited just off the west coast and extends westward into the Gulf of Paria. Block 1a adjoins block 1b at its western boundary and covers the area westward to the Trinidad and Tobago/ Venezuela delimitation boundary.

The central Gulf of Paria is an area of intensive fishing activity. The coastal villages have historically been sites of commercially viable artisanal fisheries, and there are 15 major and 20 minor landing sites along the coast. In immediate proximity to the coastal boundary of Block 1b are the major fishing ports/ landing sites of Brickfield, Waterloo, Orange Valley, Carli Bay, Claxton Bay, San Fernando, and Otaheite. Orange Valley is one of the most important fishing ports in the country, providing a base for semi-industrial and some industrial trawl vessels and one of the main wholesale and retail fish markets in the island with an average annual throughput of fish of about 800 tonnes valued at about TT\$12 million . To the north of Block 1b, are the NP Fishing Complex which houses the industrial trawl fleet, and the Port of Spain market at which 36 fishing vessels are located.

The central Gulf of Paria is in addition, a fishing area for vessels from more southern coastal sites such as Bonasse and Fullerton where another 60 artisanal gillnet and line vessels are based.

There are a total of 424 fishing vessels manned by 750 - 800 fishers, of which 25 are industrial trawlers, 10 are semi-industrial trawlers and 328 are artisanal fishing vessels. These vessels fish predominantly in the central Gulf of Paria although there may be some seasonal migration of activity to other areas or coastlines at certain times of the year. The trawl fleet operates throughout the year in the Gulf of Paria and is particularly active in the first half of the year (dry season) when shrimp is most abundant. The larger vessels in the fleet also fish on the south coast and on the north coast (between November and January). The traditional fishing areas of the semi-industrial and industrial trawl fleets in the Gulf of Paria are located within Blocks 1a and 1b.

The artisanal fishing vessels fish throughout the year in the Gulf of Paria using a range of fishing methods including gillnetting and line fishing. The vessels targeting pelagic species are most active in the latter half of the year (rainy season) when carite is abundant. This fleet commonly uses a drifting method to capture carite and other pelagic species, these vessels may migrate temporarily to sites on the south coast during the fishing season.

### Summary Information on Fisheries of the Gulf of Paria

<b>Fisheries Data for PCTT Blocks 1a and 1b in the Gulf of Paria</b>			
<b>Landing sites</b>	10 major sites - Brickfield, Waterloo, Orange Valley, Carli Bay, Claxton Bay, San Fernando, Otaheite, Bonasse/Cedros, Fullerton.		
<b>Number of vessels</b>	328 artisanal	10 semi-industrial trawlers	25 industrial trawlers
<b>Number of Fishers</b>	786 (Estimated)		
<b>Types of fishing gear</b>	Artisanal mono and multifilament gillnets	Pelagic and demersal lines	Trawl nets (artisanal, semi-industrial and industrial)
<b>Fishing methods</b>	Surface drifting net fishing or fixed demersal net fishing.	Surface or demersal line fishing.	Demersal shrimp trawling.
<b>Target species</b>	Carite, Kingfish, Cavalli, Mullet, Snapper, Salmon, Croaker		Shrimp, Salmon, Croaker.
<b>Seasonality</b>	Carite and Kingfish peak in June - December	Shrimp more abundant in November – June	
<b>Fishing times</b>	Vessels fish in the day and at night	Trawlers operate in the day and at night	
<b>Landings (tonnes)</b>	Estimated annual landings (major sites) – 2215 metric tones (Avg. 2000 – 2005)		
<b>Ex-vessel value (TT\$Millions)</b>	Estimated annual value (major sites) – TT\$25 million (Avg. 2000 – 2005)		

An examination of the potential impacts of the exploratory drilling activities in blocks 1a and 1b suggests that the most significant impacts on the fisheries resources and fishing operations would result from:-

1. The obstruction to fishing operations, (in particular trawling and the use of drift nets), by the presence of the drilling rig;
2. Reduction of the fishing area as a result of the creation of a 500 metre safety zone around the drilling rig;
3. Increased mortality in demersal fish species and a general reduction in fish catches in the event of an accidental release of hydrocarbons;

4. Fouling of vessels, engines and gear/ loss of fishing time and earnings in the event of an accidental release of hydrocarbons.

# 1. Introduction

Petro-Canada Trinidad and Tobago (PCTT) is undertaking the drilling of three exploratory wells in Block 1a and one exploratory well in Block 1b in the Gulf of Paria (figure 1). The wells are to be drilled to depths of up to 4500m. A Jack-up rig called the “Rowan Gorilla III” will be used to drill these wells. Drilling is scheduled to start in the period July to December 2007 in Block 1a. The wells will be drilled sequentially, with each well anticipated to take 30 – 45 days for completion. Wells will either be plugged and abandoned or suspended. Suspended wells are temporarily capped if it is thought they may be of future use. Drilling activities are expected to take up to as much as six months to from start to finish. A temporary safety zone will be created around the rig during the period of exploratory drilling. The rig will be supplied by two vessels operating out of a base in La Brea.

# 2. Scope of Work

Coastal Dynamics was engaged by PCTT to provide environmental consultancy services to prepare two (2) Environmental Impact Assessments (EIAs) for their Block 1a and Block 1b drilling programmes in the Gulf of Paria. Given that the activity is primarily marine-based, and located in the central Gulf of Paria, it was anticipated that the major impact would be on stakeholders in the fisheries sector.

Coastal Dynamics in a scope work outlined the requirements of a specific section on the marine fisheries of the Gulf of Paria. This report includes a description of the marine fisheries and fishing operations in the areas demarcated as Petro-Canada’s Block 1a and Block 1b in the Gulf of Paria, and an examination of impacts of energy sector developments in the Gulf of Paria on the fishing industry. Specifically, the report contains a description of the marine fisheries and a listing of commercially important fish species, a description of fishing operations including current information and statistics on vessels numbers and types, fishers, fishing activity and fishing areas, seasonal variations, and trends in catches. The economic importance of the fisheries of the area is also indicated.

# 3. Methodology

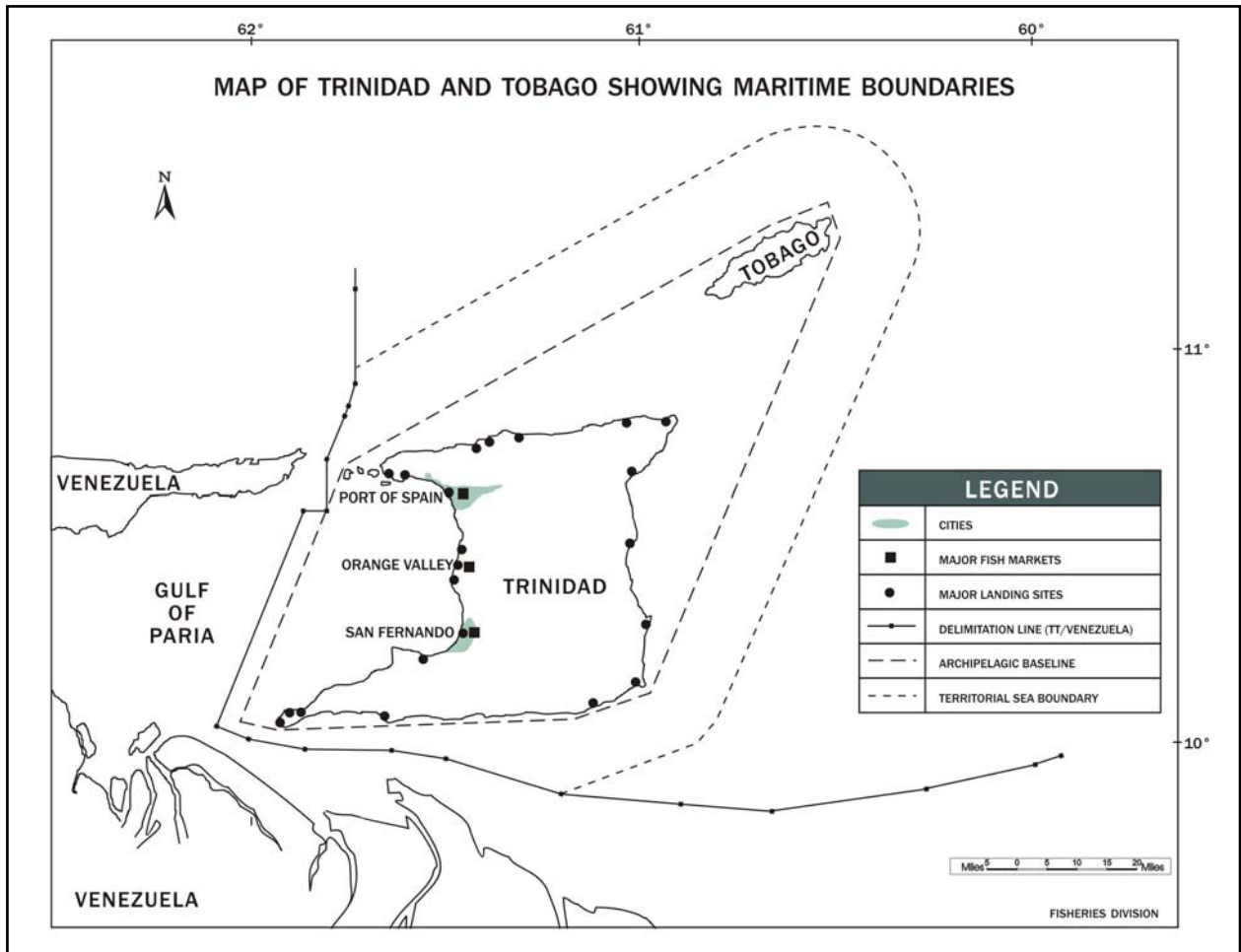


The description of the marine fisheries and fishing operations was generated through a review of existing literature and supplemented by data collected from the Fisheries Division and other sources, to update the existing literature. Data sources for the studies include published papers, internal reports from the Fisheries Division, studies on the local fisheries supported by international funding agencies, reports by independent consultants, and data arising out of field investigations and stakeholder consultations.

Statistical data on fishing vessels, fishing gear, and fish landings and value, was updated to 2005 from the Fisheries Division statistical data collection system and the 2003 census of fishing vessels, and used to examine trends over a 5-6 year period.

#### 4. Maritime Boundaries & Marine Resources of Trinidad & Tobago

In 1986 with the passing of the Archipelagic Waters and Exclusive Economic Zone Act (Act No. 24 of 1986), Trinidad of Tobago declared itself an archipelagic state with a 200 mile Exclusive Economic Zone (EEZ), effectively a marine area almost 15 times the land area (figure 1). The fisheries have however remained predominantly coastal and artisanal and most of the fishing activity is focused on those resources that lie within the territorial boundaries.



**Figure 1:** Archipelagic baselines, limits of the territorial waters, and delimitation boundary with Venezuela (Kuruvilla, 2004).

The marine fisheries resources are characterised by a high diversity of species harvested by a number of gears and fishing fleets, including commercial and recreational components. A number of fish stocks are migratory and common with northern South America and the Caribbean island chain. Studies in the maritime areas around Trinidad and Tobago have identified a total of 1013 finfish species in 474 genera, 170 families and 36 orders (Ramjohn, 1999), of which only a small percentage are caught and landed by commercial fisheries.

Other coastal and marine resources include crustaceans (shrimps, lobsters, crabs) and cephalopods (squid). Fishery independent surveys and on-going research on the commercial fisheries have identified 85 species of crustaceans in 32 families and 13 species of cephalopods in seven families (Fisheries Division, 2007).

The cetaceans found in the waters around Trinidad and Tobago include some 28 species of whales and dolphins in five (5) families, and one (1) species of manatee. Some of these have been designated by the IUCN (International Union for the Conservation of Nature and natural Resources) as threatened, vulnerable, or endangered. There are no fisheries for these resources and they generally do not occur in commercial fishing gear.

There are five (5) species of sea turtles in two (2) families, all of which are considered endangered or critically endangered by the IUCN. Sea turtles are exploited to a limited extent in Tobago and in northeast Trinidad (mostly the green turtle, *Chelonia mydas*, and the hawksbill, *Eretmochelys imbricata*), though many (particularly the leatherback turtle, *Dermochelys coriacea*) are captured incidentally in gillnets. There are few reports of turtles appearing in fishing gear in the Gulf of Paria, however, fisheries regulations (Fisheries (Conservation of Marine Turtles) Regulations, 1994) require the fitting of turtle excluder devices (TEDs) to commercial trawl gear.

Estimated total annual landings (metric tonnes) from the marine capture fisheries of Trinidad and Tobago for the period 2000 to 2004 are indicated in Table 1.

**Table 1:** Estimated total annual landings for Trinidad and Tobago.

	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>
<b>Landings(mt)</b>	15,345	17,196	19,201	14,772	14,918

(Fisheries Division, 2007)

The commercial fishing fleet accounts for 90% of the total landings for the country, while the recreational fleet landed just about 6 – 9% of the total each year. With regard to the commercial landings for Trinidad and Tobago, landings from Trinidad account for about 80% of which a significant proportion (80%) is landed by the artisanal fishing vessels.

Imports of fresh, chilled and frozen fish have been rising steadily. In 2004, imports stood at 8,300 tonnes valued at TT\$86 million. Exports of fish have declined slightly, and in 2004, exports were down to 3000 tonnes valued at TT\$42 million, 1000 tonnes less than in the previous year.

## 5. The Marine Resources of the Gulf of Paria

In the Gulf of Paria, the coastal wetlands provide ideal habitats for the support of a wide variety of marine and brackish-water species. The nutrient-rich and sediment-laden waters from the Orinoco and other smaller South American rivers which empty directly

into the Gulf contribute considerably to the general high productivity within the whole of the Gulf of Paria. In a study by Lequay (1984) it was noted that values obtained from nutrients, chlorophyll and primary production exceeded those available for adjacent Caribbean islands. The high sediment load and consequent sedimentation rate fosters a soft bottom environment which provides a suitable habitat for a wide range of benthic organisms, which support diverse crustacean and finfish species.

Analysis of commercial catches indicate that there are at least 66 species of finfish belonging to 17 families (Maharaj 1989; Amos 1990; Fisheries Division unpublished Fisheries Statistics 1996, 2000), five (5) species of shrimp (Family Penaeidae), crabs (Family Callinectes), squid, and conch.

The major commercial fisheries are the demersal fishery for shrimp and groundfish and the coastal pelagic fishery for mid-water and surface species.

The shrimp and groundfish fishery targets penaeid shrimp, of which the main species in this grouping are *Farfantepenaeus brasiliensis* (pink-spotted shrimp, hoppers), *F. subtilis* (brown shrimp) *F. notialis* (pink shrimp), *Litopenaeus schmitti* (white/cork shrimp), and *Xiphopenaeus kroyeri* (honey/jinga shrimp), and groundfish belonging to the Sciaenidae (salmon and croaker), Gerridae (blinch), Haemulidae (grunts), Lutjanidae (snappers) and Ariidae (catfish). The species within this grouping are common to the region referred to as the Guianas – Brazil continental shelf.

Shrimp are harvested predominantly by the trawl fleet which is made up of artisanal, semi-industrial and industrial vessels. Groundfish are caught as bycatch to the shrimp trawl fishery, and are also targeted by artisanal gill nets, bank lines and demersal longlines. Landings of groundfish from gillnets, lines (banking, palangue, a-la-vive), beach-seine and fishpots were dominated by six main species groups of major commercial importance. These were croaker (*Micropogonias furnieri*), salmon (comprising several species of *Cynoscion*; *Macrodon ancylodon*), blinch (*Diapterus spp.*), redfish/snapper (primarily *Lutjanus synagris*), grunts (several species of *Haemulon* and *Orthopristis*; *Genyatremus luteus*) and catfish (several species of *Bagre* and *Arius*). The main target species for the coastal pelagic fishery are the carite or Serra Spanish mackerel (*Scomberomorus brasiliensis*), King mackerel (*Scomberomorus cavalla*) and several species of sharks (*Sphyrna tudes*, *Rhizoprionodon lalandii*, *Carcharhinus porosus*, *C. limbatus*). Associated species include Cavalli (*Caranx hippos*) and other

carangids and there are limited or specific fisheries for other commercially important species such as the gillnet fishery for mullet (*Mugil spp.*) operating out of Claxton Bay.

The coastal pelagic fishery is exploited by the artisanal multi-gear fleet using gill nets and lines. Fishing is mainly commercial, however recreational fishing occurs on a part-time basis. (Mike, 1993). Some coastal pelagics are captured in the by-catch of the trawl fleets. To a lesser extent, species in the coastal pelagic fishery are also caught using beach/land seines which are deployed from artisanal vessels. The catch comprises mainly herrings and sardines (*Opisthonema oglinum*, *Harengula jaguana*, *Sardinella aurita*) and juveniles of other pelagic species.

Table 2 lists the major marine fish and shrimp species exploited commercially in the Gulf of Paria (Fisheries and Aquaculture Statistics for Trinidad and Tobago, Fisheries Division, 2007)

**Table 2:** Major marine fish and shrimp species in the Gulf of Paria (Fisheries Division, 2007).

Family	Common Name (# Species Present in the maritime area)	Main Species Exploited in the Gulf of Paria
Ariidae	Catfish (15)	<i>Arius spp.</i> , <i>Bagre spp.</i>
Carangidae	Cavalli (33)	<i>Caranx spp.</i> , <i>Trachinotus spp.</i> , <i>Seriola spp.</i> , <i>Decapterus spp.</i> , <i>Selene spp.</i>
Carcharhinidae	Shark (19)	<i>Charcharhinus spp.</i> , <i>Rhizoprionodon spp.</i>
Centropomidae	Snook, brochet (6)	<i>Centropomus spp.</i>
Clupeidae	Herring (18)	<i>Opisthonema oglinum</i> , <i>Harengula spp.</i> , <i>Sardinella spp.</i>
Gerreidae	Blinch (12)	<i>Diapterus spp.</i>
Haemulidae	Grunt (27)	<i>Haemulon spp.</i> , <i>Anisotremus spp.</i> , <i>Genyatremus luteus</i> .
Lutjanidae	Snapper (19)	<i>Lutjanus spp.</i> , <i>Rhomboplites aurorubens</i>
Mugilidae	Mullet (9)	<i>Mugil spp.</i>
Penaeidae	Shrimp (13)	<i>Farfantepenaeus subtilis</i> , <i>F. notialis</i> , <i>Litopenaeus schmitti</i> , <i>Xiphopenaeus kroyeri</i> .
Pomatomidae	Ancho (1)	<i>Pomatomus saltater</i>
Sciaenidae	Salmon (45)	<i>Cynoscion spp.</i> , <i>Macrodon ancylodon</i> , <i>Micropogonias furnieri</i> .
Scombridae	Mackerel, tuna (15)	<i>Scomberomorus brasiliensis</i> , <i>S. cavalla</i> , <i>Thunnus spp.</i>
Serranidae	Grouper (57)	<i>Epinephelus spp.</i> , <i>Mycteroperca spp.</i>
Sphyraenidae	Barracuda (4)	<i>Shyraena spp</i>
Sphyrnidae	Shark (5)	<i>Sphyrna spp.</i>
Trichiuridae	Cutlassfish (3)	<i>Trichiurus lepturus</i>

## 6. Fishing Operations

## 6.1 Numbers & Types of Fishing Vessels

The commercial harvesting of fish in Trinidad and Tobago is largely artisanal, typified by manual operations and daily fishing trips. Of the 1,153 fishing vessels in the national fleet, there are 737 vessels operating out of sites on the west coast or, 64% of the entire fleet. The vessels fall into the following categories based on vessel size and degree of mechanization (Fisheries Division 2007).

**Table 3:** Categories of fishing vessels in the national fleet (Fisheries Division, 2007).

Fleet Category	Gear Used	Fishing Vessel Characteristics
<b>Commercial</b>		
Artisanal	Gillnets (monofilament & multifilament nets); Artisanal trawl net (set and retrieved manually); Pelagic lines (a-la-vive, trolling, towing, switchering); Demersal lines (banking, palangue); Fishpot; Seines (beach, bait, Italian);	Wooden, fiberglass or fiberglass-coated open vessel (pirogues); Length: 7 – 11.6m; Two outboard engines usually 45 – 75 Hp each In the case of many artisanal trawlers) 90 – 150 Hp inboard diesel engine.
Semi-industrial Trawl	Single semi-industrial trawl net operated from the stern with a hydraulic winch.	Length: 9.3 – 12.2m; 165 – 275 Hp inboard diesel engine. Ice hold, GPS, depth sounder
Semi-industrial Multi-gear	Fishpot; Demersal lines (banking, palangue); Pelagic lines (a-la-vive).	Length: 14m; 75 – 335 Hp inboard diesel engine.
Semi-industrial Longline	Longlines (surface lines)	Length: 14 – 23m; 160 – 400 Hp inboard diesel engines; Tonnage: 60 GRT Semi-industrial Multi-gear
Industrial Trawl	Two industrial trawl nets operated with hydraulic double-drum winch.	Length: 10.9 – 23.6m; 325 – 425 Hp inboard diesel engine; Tonnage: 30 – 96 GRT (Double –rigged Gulf of Mexico type vessel). Ice hold, GPS, depth sounder
<b>Recreational</b>		
Recreational	Pelagic lines (a-la-vive, trolling, switchering); Demersal lines (banking, palangue);	Pirogues: 9 – 11m Cabin Cruisers: 10 – 11m; Power Boats: 6 – 8m

## 6.2 Vessel Distribution & Landing Sites

The artisanal pirogue fleet consists of almost 500 vessels that land at about 30 sites on the west coast. The landing sites range from beaches with simple structures for storage of

equipment to large permanent buildings with areas for maintenance and repair of gear and engines, storage of equipment, parking of vehicles and market facilities.

There are about 200 vessels based at predominantly recreational sites in the north- west peninsula, including Power Boats Mutual Facility, Island Property Owners Association and Alcan Bay. Some of these vessels may participate in part- time / weekend fishing. There is a mix of commercial fishing vessels and recreational vessels at Alcan Bay. A 1993 survey of the recreational fishery of the north west peninsula of Trinidad estimated a total of 307 vessels, of which a significant proportion were registered as fishing vessels (Mike and Cowx, 1996).

Semi-industrial and industrial vessels generally operate out of a few major sites on the west coast of Trinidad. The semi-industrial fleet consists of 10 trawl vessels based at Orange Valley, a fleet of about 16 longline vessels based at a few sites in the northwest and at the NP Fishing Complex in Sea Lots (personal communication Fisheries Division).

The industrial trawl fleet consists of 25 Gulf of Mexico type trawlers based at the N.P. Fishing Complex in Sea Lots.

The west coast landing sites can be considered as major or minor depending on the facilities available at the site and the number of vessels based there. Where available, information has been provided on the main fishing gear used at each of the major sites. The Fisheries Division has on-site data collectors based at ten major sites. The catches by vessels landing at major sites are recorded in relation to the individual vessel and the fishing gear used.

Table 4 outlines the distribution of vessels by home port, the facilities present at each site and the predominant fishing gear used. For ease of reference the west coast ports have been grouped into three areas, northern, central and southern Gulf of Paria and the traditional fishing areas have been indicated. The main sites of importance to the commercial fisheries in the central Gulf of Paria (and the project study area) have been highlighted in blue.

**Table 4:** Fishing Vessel Home Ports and Landing Sites on the West Coast of Trinidad (data from Fisheries Division, 2003 Census of Fishing Vessels).

(FD denotes a site where catch and effort data is collected by the Fisheries Division)

Home Ports	No. of Vessels	Primary Gear	Type of Site	Fishing Areas
<b>Northern Gulf of Paria</b>				
Monos	7			
Island Property Owners Ass.	19	Line	Recreational	Northern Gulf of Paria and north coast
Power Boats Mutual Facility	60	Line	Recreational	Northern Gulf of Paria and north coast
Tardieu Marine	3	Surface longline	Yachting and commercial semi-industrial longlines	EEZ
Tropical Marine	4	Surface longline	Yachting and commercial semi-industrial longlines	EEZ
Alcan Bay	107	Line	Commercial (semi industrial /artisanal, recreational FD	Northern Gulf of Paria, north coast, and east coast.
L'Anse Mitan	27	Gillnet, line		Northern Gulf of Paria and north coast
Carenage	26	Line, fishpot	Fishing centre and retail market	Northern Gulf of Paria and north coast
Pt. Cumana	2			
Yacht Club	6		Recreational	
Cocorite Fishing Centre	40	Line	Fishing centre and retail market FD	Northern Gulf of Paria and north coast
N.P. Fishing Complex (Port of Spain)	25	Trawl	Home Port for Industrial Trawlers FD	Zone demarcated for industrial trawlers within the Gulf of Paria
P.O.S. Wholesale Fish Market	36	Gillnet	Wholesale fish market FD	Gulf of Paria and north coast
<b>Central Gulf of Paria</b>				
Cacandee	7	Line and Trawl		
Brickfield	25	Longline/ Palangue, line	Fishing centre FD	Gulf of Paria
Waterloo	6	Line, net		
Orange Valley	21	Trawl	Fishing centre, wholesale and retail market. Home port for semi-industrial trawlers. Fishing Assoc. FD	Zone in Gulf of Paria demarcated for semi-industrial trawlers. Other vessels operate in the Gulf of Paria
Carli Bay	20	Gillnet		Gulf of Paria
Claxton Bay	24	Gillnet	Fishing centre and retail market FD	Gulf of Paria
St Margarets	2			
Regents Park	2			
Marabella	6			
San Fernando	45	Gillnet, line, trawl	Wholesale fish market Fishing Assoc. FD	Gulf of Paria and south coast
Otaheite	38	Trawl, line	Fishing centre and retail market FD	Zone demarcated for artisanal trawlers Other vessels operate in



Home Ports	No. of Vessels	Primary Gear	Type of Site	Fishing Areas
				the Gulf of Paria and south coast
Southern Gulf of Paria				
Coffee Beach	6	Line		
La Brea	5	Line		
Vessigny	5			
Fanny Village	1			
Cap de Ville	5			
Granville	4			
Bamboo	8	Line (Trolling)		
Ste. Marie	12			
Bonasse/ (Cedros)	32	Line and gillnet Fishpot	Fishing centre Fishing Assoc FD	Gulf of Paria
Fullerton	28	Gillnet	FD	Gulf of Paria
Columbus Bay	2			
Icacos	61	Gillnet, trawl, line	FD	Artisanal trawlers operate in Orinoco Delta (Venezuela). Other vessels fish in central and southern Gulf of Paria and south coast.
<b>Total Fishing Vessels</b>	<b>727</b>			
<b>Fishing Vessels operating in Central Gulf of Paria</b>	<b>424 (NP Fishing Complex to Icacos)</b>			

Tables 5 and 6 present total landings and values of fish catches at major sites on the west coast. The most important sites in terms of landings and value are Orange Valley, Port of Spain, and Icacos. Orange Valley is a base for a significant number of trawlers and also functions as a landing site and market facility for shrimp and associated species. Port of Spain is an important landing site for artisanal gillnet boats and Icacos has a large fleet of artisanal vessels employed in trawling, gillnetting and line fishing. Landings range from about 2500 to 3300 tonnes per year for all sites. (Non-availability of data at some sites affect the total estimates).

**Table 5:** Fisheries landings at selected sites.

Home Port/ Landing Site	Annual Fish Landings (Metric Tonnes)					
	2000	2001	2002	2003	2004	2005
Cocorite	n/a	107	326	226	n/a	n/a
P.O.S.	285	423	540	514	517	460
Brickfield	n/a	n/a	16	35	46	26
Claxton Bay	n/a	n/a	132	76	169	105
Orange Valley	531	827	961	865	728	779
San Fernando	320	430	201	194	139	69*

Otaheite	178	214	209	167	162	181
Bonasse/ Cedros	307	287	297	217	250	302
Fullerton	127	184	197	218	207	195
Icacos	426	289	464	316	308	193
<b>Total</b>	<b>2174</b>	<b>2761</b>	<b>3343</b>	<b>2828</b>	<b>2526</b>	<b>2310</b>

(Fisheries Division, 2006)

\* *Personal communication with the Fisheries Division indicates that the low figure for San Fernando is a result of a drop in fishing activity. It was suggested that fishermen from San Fernando are now taking on other forms of employment such as short term construction.*

**Table 6:** Values of fisheries catches at selected sites.

Home Port/ Landing Site	Annual Ex-vessel values (\$TT millions)					
	2000	2001	2002	2003	2004	2005
Cocorite	n/a	1.9	6.7	4.7	n/a	n/a
P.O.S.	2.7	4.2	4.7	5.1	6.5	1.9
Brickfield	n/a	n/a	0.1	0.3	0.4	0.4
Claxton Bay	n/a	n/a	0.4	0.3	0.5	0.4
Orange Valley	6.7	12.5	13	10.9	9.4	9.8
San Fernando	2.5	3	1.7	1.6	1.4	0.7
Otaheite	2.5	3.2	2.8	2.7	2.5	3.3
Bonasse/Cedros	3.2	3	3.8	2.3	3.6	5
Fullerton	1.4	1.8	2.1	2.5	3.1	4.1
Icacos	4.3	3	4.4	3.1	3.6	3.1
<b>Total</b>	<b>23.3</b>	<b>32.6</b>	<b>39.7</b>	<b>33.5</b>	<b>31</b>	<b>28.7</b>

(Fisheries Division, 2006)

### 6.3 Numbers of Fishers

The Fisheries Division has a non-mandatory programme of registration, and registration is valid for a three year period. This option is taken up to greater extent by boat owners who benefit from vat and duty free concessions on vessels, engines, and equipment. It is likely therefore, that these figures underestimate the numbers actually operating in the sector. The number of fishermen registered (both first time applications and renewals) over the period 2001 to 2005 in Trinidad and Tobago is given in Table 7.

**Table 7:** Number of Fishers registered in 2001-2005 in Trinidad and Tobago (Fisheries Division, 2007).

Year	#First Application	# Renewals	Total
2001	251	627	878
2002	203	335	538

2003	268	326	594
2004	260	438	698
2005	370	490	860

In 2002, it was estimated that there were about 2,491 fishermen in Trinidad. This estimate was based on the census of vessels, and information on the numbers of fishermen usually involved in different types of fishing operations. If this method is applied to the 2003 vessel census for the Gulf of Paria the estimated number of fishermen based on the west coast is about 1200.

## 7. Descriptions of the Main Fisheries in the Gulf Of Paria

An examination of fishing activity in the Gulf of Paria is focused on vessels operating out of the major landing sites located between the NP Fishing Complex in Port of Spain and Fullerton and Iacos in the south (highlighted in Table 4).

During the period of the 2003 fishing vessel census, 430 mainly commercial vessel operators operating out of sites on the west coast were interviewed to establish the primary fishing gear used. The results indicated that 31% used multifilament or monofilament gillnets, 22% used surface handlines, 20% used bottom lines, 20% were reported to use trawl gear, and 3% used fish pots.

Fishing patterns for the major fishing methods used in the Gulf of Paria are described in the following section. The artisanal multi –gear fleet that targets coastal pelagic and demersal finfish opportunistically, using a variety of hand operated gears exhibit similar patterns of operation. The trawl fleet that targets shrimp and associated groundfish is generally described as one fishery.

### 7.1 Inshore Coastal Fisheries of the Artisanal Multi-Gear Fleet

#### 7.1.1 Gillnet Fishing

Gillnet fishing is one of the most important fishing methods used by the artisanal fishing fleet and the gillnet fishery is particularly important on the south and west coasts of Trinidad,

Within the Gulf of Paria, gillnets are the most commonly used gear and areas of operation for this gear overlap with most other methods. A survey of the fishery in 2000 (Nagassar, 2001), found that there were about 100 vessels and 400 fishermen on the west coast directly involved in gillnetting.

The nets used are the multifilament (green) nets that are generally fished at night at the surface of the water, supported by a float line. They are generally attached at one end to the boat and the boat is allowed to drift with the current. One or two net sets are usually made per trip. This net is used to target carite, kingfish and other pelagic species.

The monofilament (transparent/ white) nets may be used either in the day or at night. They are generally weighted and set below the surface of the water and anchored at both ends, or at one end with the other attached to the boat by the cork or float line (Chan A Shing, 2002). These nets target groundfish species such as croaker and salmon. About 60% of gillnets are set as demersal nets. Characteristics of the nets used are outlined in Table 8.

**Table 8:** Characteristics of gillnets.

Type of Net	Mesh Size (inches)	Weight(lbs)	Mesh Depth	Length (m)	Average cost of net (\$TT)
Nylon Multi-filament	4” 3.75”	50 or 25lb bales (3 -6 bales per net)	100 mesh/ 50lb	732 – 1190 m	n/a
Nylon Mono-filament	4” 3.75”	50 or 25lb bales (5 – 8 bales per net)	100 mesh/50lb 50 mesh/25lb	450 – 1098m	\$2457/100lbs (Repairs est. at \$261/100lbs/month) (Nagassar, 2001)

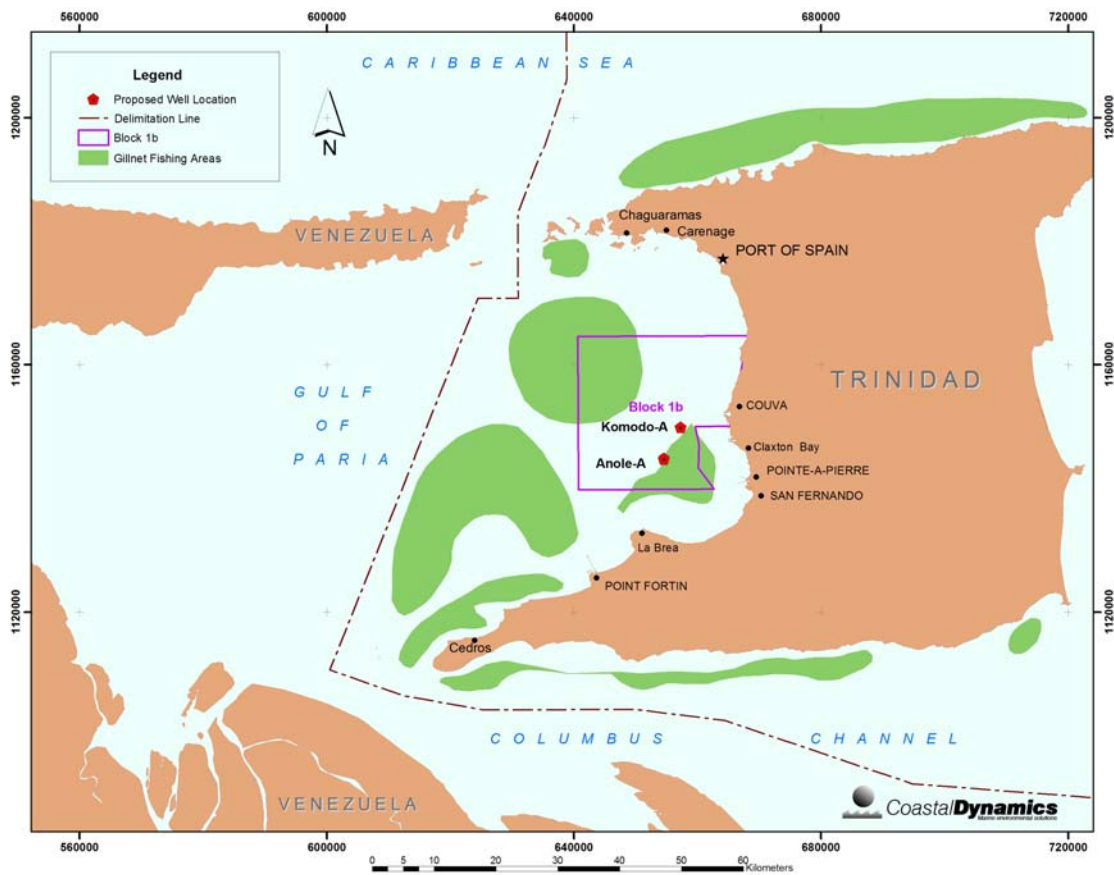
(From Chan A Shing, 2002)

The peak season for gillnet fishing is June to December, during the rainy season, when carite is most abundant (Ferreira 2003). The nets are however, used throughout the year. The demersal gillnets that target groundfish are also used throughout the year. The most commonly used mesh size is 4” (stretched mesh). The smaller mesh of 3.75” is used by a specific fishery operating out of Claxton Bay and targeting mullet in the central Gulf of Paria.

This is an inshore fishery and most fishing occurs at depths of 9 – 14 m. Figure 2 indicates the areas in which gillnet fishing commonly occurs.

The average catch of the net varies greatly with a range of 8 – 360 lbs of fish per 100lbs of multi-filament net and 11 – 540 lbs of fish per 100lbs of mono-filament net (Nagassar, 2001).

Port of Spain, Claxton Bay, Fullerton and Icacos are the most important sites for gillnet fishing in the Gulf of Paria. The estimated annual landings and value from the gillnet fishery for the period 2001 to 2005 are given in Tables 9 and 10. The figures a fluctuation in annual landings ranging between 750 and 1060 metric tones with values between \$TT 7.5 and \$TT10.5 million.



**Figure 2:** Gillnet fishing areas (Chan A Shing, 2002).

**Table 9:** Estimated annual landings from the gillnet fishery at selected sites.

Home Port/ Landing Site	Annual Landings from Gillnet Fishing (Metric Tonnes)				
	2001	2002	2003	2004	2005
P.O.S.	389	497	451	505	429
Claxton Bay	0	106	76	169	105
Orange Valley	0.2	7	44	50	37
San Fernando	69	39	53	26	21
Bonasse/ Cedros	101	83	58	57	47
Fullerton	155	122	167	116	84
Icacos	101	264	99	138	39
<b>Total</b>	<b>815</b>	<b>1028</b>	<b>948</b>	<b>1061</b>	<b>762</b>

(From Fisheries Division catch and effort data 2001 - 2005)

**Table 10:** Estimated annual values from the gillnet fishery at selected sites.

Home Port/ Landing Site	Annual Ex-vessel values from Gillnet Fishing (\$TT millions)				
	2001	2002	2003	2004	2005
P.O.S.	3.9	4.5	4.6	6.4	5.3
Claxton Bay	0	0.3	0.3	0.5	0.4
Orange Valley	0	0.4	0.4	0.5	0.4
San Fernando	0.6	0.4	0.5	0.2	0.2
Bonasse/ Cedros	0.8	0.7	0.5	0.5	0.5
Fullerton	1.4	1.1	1.6	1.3	1.1
Icacos	0.7	1.5	0.7	1.1	0.5
<b>Total</b>	<b>7.4</b>	<b>8.9</b>	<b>8.6</b>	<b>10.5</b>	<b>8.4</b>

(From Fisheries Division catch and effort data 2001 - 2005)

### 7.1.2 Pelagic Line Methods

Pelagic or surface line methods include “a la vive”, trolling or towing, and switchering. A la vive refers to fishing with live bait using hooks and lines of nylon twine. In trolling or towing, four (4) to six (6) lines are towed from bamboo outriggers off the vessel. Leader lines vary between 20m and 90m in length and there is usually one hook per line. Artificial lures or “spoons” are used and the line is deployed while the boat is stationary. Pelagic lines are important at Bonasse, Fullerton, Otaheite and San Fernando where they target carite, kingfish and other pelagic species.

Line fishing occurs throughout the year in the Gulf of Paria with peaks in activity in the second half of the year when carite and kingfish are more abundant. The estimated annual landings and value from pelagic line fishing for the period 2001 to 2005 are given in Tables 11 and 12.

**Table 11:** Estimated annual landings from pelagic lines at selected sites.

Home Port/ Landing Site	Annual Landings from Pelagic Lines (Metric Tonnes)				
	2001	2002	2003	2004	2005
San Fernando	32	18	30	36	20
Otaheite	123	78	77	75	82
Bonasse/Cedros	134	136	128	122	205
Fullerton	21	56	16	53	25
Icacos	7	47	28	22	16
<b>Total</b>	<b>317</b>	<b>335</b>	<b>279</b>	<b>308</b>	<b>348</b>

**Table 12:** Estimated annual landings from pelagic lines at selected sites.

Home Port/ Landing Site	Annual Ex-vessel values from Pelagic Lines (\$TT millions)				
	2001	2002	2003	2004	2005
San Fernando	0.3	0.2	0.3	0.4	0.2
Otaheite	1.3	0.9	0.9	0.8	1
Bonasse/Cedros	1.3	1.5	1.4	1.4	3.3
Fullerton	1.9	0.6	0.2	0.6	0.4
Icacos	0.1	0.5	0.3	0.3	0.3
<b>Total</b>	<b>4.9</b>	<b>3.7</b>	<b>3.1</b>	<b>3.5</b>	<b>5.2</b>

### 7.1.3 Seines

In Trinidad small coastal pelagics are caught by beach seines, trawls and Italian seines mainly in the Gulf of Paria in shallow inshore areas. A bait seine fishery for Jashua (*S. aurita*) operates off the north coast and in the Gulf of Paria. These species were most abundant between July and December (Heilemann, 1987, Maharaj and Recksiek, 1991).

### 7.1.4 Fishpots

Fishpots are used by fishermen from Bonasse where annual landings over the period 2001 to 2005 averaged about 31 tonnes with a value of \$TT 650,000. The main target species are snappers, groupers. This fishery is artisanal and pots are set and retrieved

manually. A study in 2000 (Mohammed, 2001) stated that fish pots were also used predominantly by fishermen in Carenage.

## 7.2 Fishing Operations of the Trawl Fleet

A 2003 census of fishing vessels (Fisheries Division, 2004) indicated that there were 137 vessels in the trawl fleet and about 320 fishermen employed on trawlers. The fleet has been categorized into four types based on vessel length, engine horsepower and degree of mechanization (Fabres, 1989). The characteristics of the vessels in the trawl fleet are outlined in Table 13 below. The artisanal vessels carry one stern trawl which is set and retrieved manually. The semi-industrial vessels also carry one stern trawl but the operation is mechanized. The industrial trawlers carry two nets on outriggers that are set and retrieved with a hydraulic winch.

All components of the trawl fleet operate from sites located along the Gulf of Paria. There are five major landing sites: National Petroleum (NP) Fishing Complex is the main base for the industrial fleet; Orange Valley Wholesale Fish Market is the base of the semi-industrial fleet; and Otaheite and the San Fernando Fish Market and Icacos are the major sites for the artisanal fleet.

**Table 13:** Characteristics of average fishing vessel in each of the three categories of trawlers (Kuruville et al 2000).

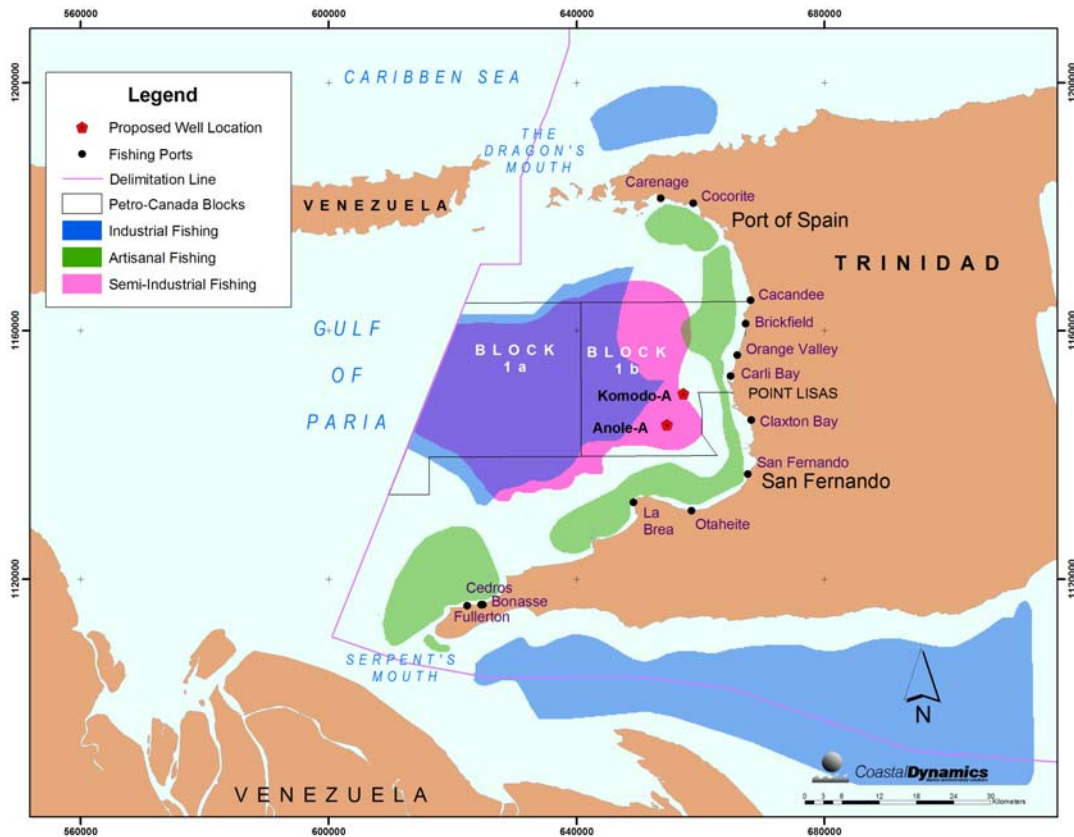
Type Of Trawler	Number (2003) **	Length (M)	Tonnage* (Tonnes)	Engine Power (Hp)	Onboard Facilities/Storage	Gear/Deck Equipment
Artisanal Types I and II	102	6.7-10.4	-	48-110 (outboard engines and inboard diesel engines)	Portable barrels with ice with an average capacity for 31 kg of fish/shrimp	1.3 x 0.5 m doors, net headrope length-10.7m, mesh size- 3.5cm.
Semi-industrial Type III	10	9.3-12.1		165-250 (inboard diesel engines)	Ice hold with storage capacity for 5 metric tonnes fish/shrimp	1.9 x 0.9 m doors, net headrope length-12.9m, mesh size- 3.5cm. Winch, fishing aids and communication equipment.
Industrial Type IV	20 – 25	10.9-23.6	30-96	365-425	Vessels with ice hold have storage capacity for 8 metric tonnes of fish/shrimp. Vessels with refrigerated hold have storage	2.7x 1.2 m doors, net headrope length-15m, mesh size- 3.5cm. Winch, fishing aids and communication equipment.



Type Of Trawler	Number (2003) **	Length (M)	Tonnage* (Tonnes)	Engine Power (Hp)	Onboard Facilities/Storage	Gear/Deck Equipment
					capacity for 12 tonnes	
* Gross Registered Tonnage (GRT). ** Fisheries Division Vessel Census 2003						

Artisanal vessels conduct one day trips (8 – 20 hours), while semi-industrial vessels make trips of one to five days, and industrial vessels five to eleven days. The average number of hauls per day for an artisanal trawler (Types I and II) is 4 - 6 with an average duration of a haul being 0.5 – 2 hrs. Semi-industrial trawlers make an average of 4-5 hauls per day but with an average duration of 3 – 4 hrs/ haul, while the industrial trawler makes 3-4 hauls/ day at 2-4 hrs per haul. The average vessel speed for artisanal, semi-industrial and industrial trawlers is one, two and three knots respectively (Ferreira and Martin, 2005).

All trawlers operate in the Gulf of Paria on the west coast of Trinidad year round. The operations are zoned in terms of distances from the coast and depths, depending on the vessel size and engine horsepower. The industrial trawlers, and to a much lesser extent the semi-industrial trawlers, also operate in the Columbus Channel on the south coast. Industrial vessels operate on the north coast in the area west of S'aut D'eau from November 15 to January 15.



**Figure 3:** Trawling areas by fleet type (source: Kuruvilla et al., 2000).

The areas and depths exploited by the various fleets are given Table 14.

**Table 14:** Areas exploited by the trawler fleets (Maharaj, Ferreira, and Lum Young 1993).

Vessel Type	Region Fished	Depths (m)	Area of Ground (km <sup>2</sup> )
Artisanal	Gulf of Paria	1.8-18.0	329.0
Semi-industrial	Gulf of Paria	9.0-41.4	1,792.93
Industrial	North Coast	37.8-57.6	234.98
	Gulf of Paria	9.0-48.6	1,268.72
	Columbus Channel	18.0-41.4	826.23

Generally, shrimp landings and catch rates are higher in the first half of the year during the dry season. The shrimp catch rate for the artisanal vessels operating in the southern Gulf of Paria is generally about 2-4kg/hr, while that for the artisanal and semi-industrial vessels operating in the northern Gulf of Paria is 1-3kg/hr. The catch rate for the industrial trawlers is 2-7kg/hr (Ferreira and Martin 2005).

Estimated landings for the entire trawl fleet in 2004 were 1442 metric tonnes of shrimp and fish valued at \$20.3million. Table 15 shows the landings for the period 2000 to 2004 broken down by vessel type (Fisheries Division, 2007)

A 2002 survey estimated the total annual earnings for an average artisanal trawler at US\$15,526 (TT\$96,262), for an average semi-industrial trawler at US\$78,056 (TT\$483,947), and for an average industrial trawler at US\$100,010 (TT\$620,061) (Kuruville et al, 2002).

**Table 15:** Landings from the Trawl fleet for 2000 to 2004.

Trawl Fleet	Estimated annual landings in metric tonnes (mt)				
	2000	2001	2002	2003	2004
Artisanal	543	571	453	440	401
Semi-industrial	405	379	398	362	369
Industrial	755	817	1,094	812	672
<b>Total landings (mt)</b>	<b>1,703</b>	<b>1,767</b>	<b>1945</b>	<b>1,614</b>	<b>1,442</b>
<b>Estimated value (\$TT millions)</b>	<b>25.9</b>	<b>28.8</b>	<b>28.8</b>	<b>22.4</b>	<b>20.3</b>

Shrimp processing is handled by a variety of privately owned companies and the products sold locally include fresh chilled shrimp, peeled, and breaded shrimp. Exports are mainly in the form of fresh chilled or frozen shrimp to the CARICOM market. Table 16 shows the quantity and value of shrimp export from 2000 to 2003.

**Table 16:** Shrimp Exports for 2000 to 2003.

Year	Quantity (tonnes)	Value (TT\$million)
2000	115	7.4
2001	179	8.6
2002	102	4.8
2003	119	5.0

## 8. Status of the Resources

Research findings suggest that the coastal marine resources are either heavily exploited or over exploited. There does not appear to be any potential for expansion of the coastal fishery for shrimp and groundfish or for the coastal pelagic fishery for carite and kingfish. There are problems of incidental capture of non target species in both of these fisheries and a high level of discards of juvenile finfish particularly in the artisanal and semi-industrial trawl fishery.

There are a number of management measures prescribed for these fisheries. For the trawl fishery, results of resource assessments suggest that shrimp stocks are overexploited and recommend a reduction in fishing effort and the implementation of bycatch reduction strategies to reduce the impact of this fishery on the groundfish resources. These measures must be consistent with those of neighbouring countries, particularly Venezuela with whom the stocks are shared. The management recommendations for the coastal pelagic fishery for carite include a phased increase in mesh size for gill nets to 4 ¾", and a freeze in fishing effort (Ferreira and Martin, 2005).

## 9. Fisheries Regulations

The legislative basis for management of domestic fishing is the Fisheries Act 1916, and the subsequent amendments to the Act, the Fisheries (Amendment) Act 1966, and the Fisheries (Amendment) Act 1975. The Act applies to all rivers and tidal waters in Trinidad and Tobago and to the 12 mile territorial sea. It does not apply to the Exclusive Economic Zone (EEZ).

The subsidiary regulations adopted under the Fisheries Act include the Fisheries Regulations, which list the types and dimensions of nets permitted for use in the territorial waters, prescribe minimum sizes for various species of fish, and declare certain prohibited fishing areas.

A management regime is in place for the trawl fishery involving area of operation and gear specifications (Fisheries [Control of Demersal (Bottom) Trawling Activities] Regulations 2001, Fisheries (Conservation of Marine Turtles) Regulations, 1994) as well as numbers of vessels (1988 Cabinet decision) as follows:

- Trawling is permitted on the north coast of Trinidad outside of 2 nautical miles in the area west of S'aut D'eau from November 15 to January 15, but not under cover of night.
- Trawling is permitted on the south coast of Trinidad outside of 2 nautical miles.
- Trawling is subject to a zoning regime in the Gulf of Paria.
- Artisanal trawlers are permitted to operate outside of 1 nautical mile from the coast.
- Semi-industrial trawlers are permitted in depths of 6 fathoms or more.
- Industrial trawlers are permitted in depths of 10 fathoms or more.

- Trawling is prohibited on the east coast of Trinidad and within 12 nautical miles of the coast of Tobago.
- The stretched mesh size in the cod end of the trawl net must be no smaller than approximately 7.5cm (3 in.) when trawling for fish, and approximately 3.5cm (1.4in.) for shrimp.
- Semi-industrial and industrial trawlers are required to use Turtle Excluder Devices (TEDs) on their nets.
- A ceiling has been placed on the numbers of artisanal, semi-industrial and industrial trawlers.

For the gillnet fishery, the Fisheries (Amendment) Regulations 2002, make provisions for the following:

- Minimum mesh size (diagonal stretched mesh) of approximately 11cm.(41/4 in) except where mullet is targeted.
- Monofilament nets with diagonal stretched mesh not less than approximately 9 cm (31/2 in.) may be used for catching mullet.
- No species other than mullet may be landed in excess of 15% of the total catch when using the prescribed monofilament net for catching mullet.
- Monofilament nets with a diagonal stretched mesh less than approximately 11cm (41/4in) may not be carries on board a vessel together with nets of another mesh size.

## 10. Potential Impacts of Exploratory Drilling Operations in Blocks 1a & 1b on Fisheries in the Gulf of Paria

### 10.1 Introduction

The potential impacts of exploratory drilling activities on the established fisheries of the Gulf of Paria would result from those activities that could cause damage to the marine environment and consequently the fisheries resources, and any activities that would limit or obstruct the traditional operations of the fishing fleet.

It is recognized that these operations are occurring in an area that is not pristine and already subject to existing energy sector-related activities including drilling, refining, and transport, other industrial activities, and a high level of marine traffic

The potential impacts of this project to the fisheries resource are discussed in the Socio-Cultural Assessment, Section 9.

## **10.2 Impacts on the marine environment and the fisheries resources**

### **10.2.1 Accidental Release of Hydrocarbons**

The main concern with regard to drilling in the marine environment is the potential for accidental release of hydrocarbons, and the resulting impact on the sea floor, water quality and sensitive coastal areas such as mangroves. This may have serious impacts on fisheries, affecting not only the movement of pelagic schooling species, but also contaminating the benthic communities on which demersal fish subsist.

### **10.2.2 Drilling Mud and Drill Cuttings**

Drilling activities generate large volumes of drilled rock (cuttings) to which variable amounts of drilling mud adheres. The overboard disposal of these cuttings leads to the development of waste piles in the immediate vicinity of the drilling rig. .

There is the potential for the discharge of the drilling cuttings to temporarily impact local populations of fish due to the increase in turbidity caused by the drill cuttings being dispersed in the water column.. The discharge of drill cuttings are also likely to have an impact on the seabed and smothering the benthic communities located in the immediate vicinity of the discharge.

### **10.2.3 Noise**

It is likely that the underwater noise levels will increase in the immediate area of the rig over the period of the exploratory drilling activity and noise will be transmitted underwater through the framework of the drilling rig. These increased noise levels have the potential to negatively affect the local fish populations (Stocker, 2001).

The Gulf of Paria is a however a heavily trafficked area with noise generated from maritime transport vessels and fishing vessels. The impact of the additional noise generated by the exploratory drilling operations will be dependent on the level generated in relation to the ambient noise within the environment.

### **10.3 Impacts on the operations of the fishing industry**

#### **10.3.1 Accidental release of Hydrocarbons**

The accidental release of hydrocarbons in the vicinity of fishing vessels or landing sites can result in damage to, or loss of fishing gear, and fouling of boats and engines. The ultimate result is a reduction in fishing effort and a loss of earnings.

The release of hydrocarbons in the coastal areas of the Gulf of Paria frequently results in the fouling of fishing vessels, engines and fishing gear, and the loss of valuable equipment and earnings through lost fishing time. The sources of the spills are both land and marine based and occur most frequently in the southern Gulf of Paria where there are refinery operations on land and oil platforms, wellheads and associated structures offshore.

#### **10.3.2 Transport and Servicing of the Drilling Rig**

There is potential for the transportation of the platform to obstruct routine fishing operations as it is moved from one site to the next. This is likely to be of temporary significance particularly if adequate notice is given to the fishing communities.

#### **10.3.3 Loss of access**

Loss of access to or exclusion from traditional fishing areas, disrupts the normal pattern of fishing operations. With the creation of safety zones around drilling platform, an area of about 0.8 km<sup>2</sup> around each platform is lost to fishing vessels.

Although the area is relatively small the impacts have been cumulative particularly in the southern Gulf where most of the platforms are located. Heavy commercial marine traffic also obstructs the activity of fishing vessels.

The negative impacts of these activities result from damage to fishing gear, and this is particularly relevant to the drifting gillnet fishery which may operate at night. Nets may be damaged by passing vessels or they may have to be hauled in and reset at another site resulting in a loss of fishing time.

#### **10.3.4 Physical obstructions to vessels and fishing gear**

In addition to concerns about loss of access, drilling rigs are physical obstructions to certain fishing activities. This is relevant again to the drifting net fishery where nets may drift onto and become entangled on the drilling rig.

In the event that the well is suspended so that future work could be done on it, then it would be necessary to install a temporary cap which will protrude approximately 1.5m above the seabed. This pipe will pose a snagging hazard for trawlers operating in the area.

#### **10.3.5 Drilling Rigs as Fish Attracting Structures**

Drilling rigs are considered both beneficial and harmful to fishing operations. There are claims that fish are attracted to rigs both by the lights and food effluents that are discharged into the surrounding water. Fishermen may attempt to fish around rigs as point areas of higher abundance. There are concerns however that fish may be attracted from surrounding areas to sites where fishermen are excluded from entering, resulting in a localised drop in catches.

### **10.4 Significance of Potential Impacts**

Table 17 presents an assessment of the significance of potential impacts of the exploratory drilling activities on the fisheries resources and fishing operations within Blocks 1a and 1b.

The severity of impact, and the significance to the resources and fishing operations are rated on a scale of 1 to 4 as follows:-

- 1 – none, or no identifiable effect on the resources and no impact on fishing operations;
- 2 – minimal, a minor or nuisance change to the resources or to fishing operations;



- 3 – moderate, the resource or fishing activity is affected for a short time and to a limited extent
- 4 – severe, the resources or fishing activities or the fishing communities are affected such that a change in revenue is sustained over a number of years.

The likelihood of occurrence of the impact is rated on a scale of 1 to 4 as follows:-

- 1 –unlikely;
- 2 – possible;
- 3 – very likely;
- 4 – definitely will occur.

The duration is considered to be short, medium and long term. Short being the period of actual activity, where the impact does not extend beyond the activity, medium where the impact may extend beyond the period of the activity by a few weeks or months, and long term where the impact is felt over a number of years.

<b>Table 17.</b> The significance of potential impacts of exploratory drilling activities on the fisheries resources and fishing operations within Blocks 1a and 1b.							
Activity	Aspect	Potential Impacts		Severity	Likelihood	Duration	Significance
		Fisheries resources	Fishing operations				
<b>Installation and operation of the rig</b>							
Towing of rig to site	Impact on fishing vessel operations		Obstruction of fishing operations in the path of towing operation	3	2	Short	2
Presence of drilling rig	Impact on fishing vessel operations		Obstruction to fishing operations (trawling/ drift nets)	3	3	Short	3
	Impact on fishing gear		Possible entanglement of drift nets	3	2	Short	2
Underwater Noise	Impact on fish populations	Fish may move away from noise		2	2	Short	2
Establishment of 500m safety zone	Loss of access to fishing areas		Loss of access to area for fishing	3	4	Short	3
	Obstruction to fishing gear		Obstruction to drift net operations	2	2	Short	2
	Loss of access to fish attracted to rig		Fish attracted to rig from surrounding areas inaccessible to fishing gear	2	3	Short	2
Illumination of rig at night	Attracts fish from surrounding areas to rig at night	Attracts fish from surrounding areas	Fish unavailable to gear/ reduced catch in adjoining areas	3	3	Short	2

**Table 17.** The significance of potential impacts of exploratory drilling activities on the fisheries resources and fishing operations within Blocks 1a and 1b.

Activity	Aspect	Potential Impacts		Severity	Likelihood	Duration	Significance
		Fisheries resources	Fishing operations				
Physical obstruction from capped well	Obstruction to trawling operations		Trawl gear could be snagged on structure/ loss or damage to net/ loss of fishing time	3	2	Short	2
<b>Discharges at sea</b>							
Domestic waste	May attract fish	Discharge of food waste may attract fish		2	2	Short	2
Discharge of drill cuttings into the water column		Smothering of benthic organisms and contamination of water column		2	2	Short	2
<b>Accidental discharges</b>							
Accidental release of hydrocarbons	Impact on benthic organisms and demersal fish	Smothering of benthic organisms	Increased mortality of demersal species/ reduced catch	4	2	Medium	3
	Impact on schooling pelagic fish	Fish may be fouled, increased mortality	Fish may move away from area/ reduced catch	3	2	Short	3
	Impact on fishing vessels, engines and gear		Fouling of vessels, engines and gear/ loss of fishing time and earnings	4	2	Medium	3

## 11. Proposed Mitigation Measures

Mitigation measures can be considered as immediate or short term and directly related to the specific project activities of Petro-Canada, and the more long term measures that take into consideration the cumulative impacts of the development of the energy sector and other industries in the Gulf of Paria on the fisheries sector.

### 11.1 Immediate and short term

Immediate and short term measures should ensure minimal impact of drilling activities on the marine resources in the area of operation. They should include a detailed oil spill response plan that would limit the impact on any potential spill on the surrounding environment. Such a plan should include a component that ensures that fishing communities in the area are immediately notified of any potential hazards.

Fishing communities should also be notified in advance of any movement of the drilling rig that may disrupt the activities of fishing vessels, and of the dates of commencement of drilling activity.

It is important that wells that are suspended at the end of the drilling operation are marked and that the location is published for the benefit of vessels equipped with GPS.

An important component of mitigating the actual or perceived impacts of the specific drilling activities in Blocks 1a and 1b, is the implementation of an ongoing programme of information dissemination and dialogue with the fishing industry. This is not always an easy process as the industry tends to be fractured and poorly represented with numerous groups purporting to represent the sectors interests. Discussion with established bodies, both governmental and non-governmental may yield useful proposals in setting up such a programme and may contribute to longer term benefits to the related communities.

### 11.2 Medium and long term

In the medium term it may also be useful to examine programmes of assistance for the fisheries sector that provide benefits to the sector in general, rather than to individuals or individual

communities. This assistance should be guided by needs identified and expressed by established entities that represent the interests of the sector, following a period of consultation.

In the medium to long term, the institution of mitigation measures with regards to the fisheries sector must take into consideration the cumulative impacts of industrial developments in the coastal and marine areas of the Gulf of Paria. The sector is becoming increasingly marginalized, both in terms of access to coastline for the mooring of vessels, and the landing and marketing of their catch, and in terms of access to fishing areas free of pollutants and debris.

The FAO Code of Conduct on Responsible Fisheries (FAO,1995) to which most governments have signed recognizes that conflicts may arise from the multiple use of coastal areas and deals specifically with these issues in Article 10 – Integration of Fisheries into Coastal Area Management. The Code recommends that states adopt an appropriate policy, legal and institutional framework to achieve sustainable and integrated use of the coastal resources; that representatives of the fisheries sector and fishing communities are consulted in the decision-making processes; that procedures and mechanisms are established to settle conflicts which arise between fisheries resource users and other users of the coastal area.

A recently drafted Strategic Plan for the Development of the Fish and Fish processing Industry of Trinidad and Tobago (Ministry of Trade and Industry, 2005), has outlined project activities to support the strengthening of fishing industry organizations and representation, and the establishment of an institutional framework for integrating the fisheries sector into the coastal development and planning approval process. The Seafood Industry Company (SIDCO) has been formed to implement strategies outlined in the Plan.

## References

- Agard, J., Boodoosingh, M., and J. Gobin, 1988, Petroleum residues in surficial sediments from the Gulf of Paria, Trinidad. *Mar. Pollut. Bull.* 13, 217 – 218.
- Agard, J., and J. Gobin., 2005. Gulf of Paria Heavily Polluted: Holistic development planning needed to balance development aspirations and environmental needs. *UWI Today* pp. 13.
- Amos, M., 1990. A Study of Type III Trawling in the Gulf of Paria. Thesis: University of the West Indies, Cave Hill (Barbados). Diploma. UWI/CERMES/9004PR. 56pp.
- Boodoosingh, M., 1992. A review of possible impacts of human activities on fisheries in the coastal waters of Trinidad and Tobago with emphasis on the Gulf of Paria. Fisheries Occasional Paper Series No. 2. Ministry of Agriculture, Land and Marine Resources, Trinidad. 126 p.
- Chan A Shing C., 2002. Atlas – Marine Fisheries of Trinidad and Tobago, Part 1, Trinidad Inshore Fisheries. Fisheries Information Series 10. 76pp Ministry of Agriculture, Land and Marine Resources, Port of Spain, Trinidad.
- Fabres, B., 1989. Trinidad and Tobago National Report. In: FAO Western Central Atlantic Fishery Commission (WECAFC). Report of the 2nd workshop on the biological and economic modeling of the shrimp resources on the Guyana-Brazil shelf. Cayenne, French Guiana, 2-6 May 1988. FAO Fisheries Report No. 418  
FAO, Rome, Italy. p. 60-63.
- Ferreira, L., and Martin, L., 2005. National Report – Trinidad and Tobago. CRFM 2005, Report of the First Annual CRFM Scientific Meeting, CRFM Fishery Report No.11. pp. 257-276.
- Fisheries Division, 2003. The Fisheries Division Census of Fishing Vessels of Trinidad. Fisheries Division, Ministry of Agriculture, Land and Marine Resources.
- Fisheries Division, 2007. Fisheries and Aquaculture Statistics for Trinidad and Tobago. Fisheries Division, Ministry of Agriculture, Land and Marine Resources. 63p.
- Food and Agriculture Organisation of the United Nations (1995). Code of Conduct for Responsible Fisheries. Rome, FAO. 1995. 41p.

- Groenewoud van het, H., Scholten, M.C.Th., Daan, R., and M. Mulder (1999). Assessment of sediment contamination and biological effects around former OBM drilling locations on the Dutch continental shelf. Netherlands Organisation for Applied Scientific Research. TNO report TNO-MEP-R 98/515. 50p.
- Heileman, S., 1987. A preliminary survey of the clupeoid fishes of Trinidad with notes on *Opisthonema oglinum*, *Sardinella aurita* and *Harengula jaguana*. 28p. Technical Report of the Institute of Marine Affairs, Hilltop Lane, Chaguaramas.
- Kuruvilla, S.; Ferreira, L.; Soomai, S. 2000. The trawl fishery of Trinidad and Tobago. Fisheries Division, Ministry of Agriculture, Land and Marine Resources; Port of Spain (Trinidad and Tobago). Fish. Info. Ser. no. 9, [18 p.]
- Kuruvilla, S.; Ferreira, L.; Soomai, S; Jacque, A. 2000. Economic performance and technological features of marine capture fisheries: the trawl fishery of Trinidad and Tobago. Fisheries Division, Ministry of Agriculture, Land and Marine Resources; Port of Spain (Trinidad and Tobago). 49 p. Regional Workshop on the Effects of Globalization and Deregulation on Fisheries in the Caribbean. Castries (St. Lucia); 4 Dec 2000.
- Kuruvilla, S.; Chan A Shing, C.; Ferreira, L.; Martin, L; Soomai, S; Lalla, H; Jacque, A. 2002. Study on subsidies in the fisheries sector of Trinidad & Tobago. Fisheries Division, Ministry of Agriculture, Land and Marine Resources; Port of Spain (Trinidad and Tobago). 110 p.
- Lequay, K., 1984. A Baseline Study of Nutrients and Primary Production in the Nearshore Diego Martin to Port of Spain Coastal Waters. IMA Technical Report, 21p.
- Maharaj, V. 1989. The by-catch in the artisanal shrimp trawl fishery, Gulf of Paria, Trinidad. Master of Science Thesis in Fisheries Aquaculture and Pathology. University of Rhode Island. US. 168p.
- Maharaj, V. and Recksiek, C., 1991. The by-catch from the artisanal shrimp trawl fishery, Gulf of Paria, Trinidad. Mar. Fish. Rev. vol 53, no.2, p 9 – 15. Inter-Research, Halstenbek, Germany.
- Mike, A.J. A survey of the recreational/part time fishery of the north west peninsula of Trinidad.

Thesis: The University of Hull, UK. B.Sc. 88 p. Sep 1993.

Mike, A.J. and Cowx, 1996. A preliminary appraisal of the contribution of recreational fishing to the fisheries sector in north-west Trinidad. Blackwell Science Ltd; (UK). *Fish. Manage. Ecol.* Vol.3, pp.219-228.

Ministry of Trade and Industry, 2005. Strategic Plan for the Development of the Fish and Fish Processing Industry in Trinidad and Tobago. The Fish and Fish Processing Industry Team. 116p.

Mohammed, F., 2001. Progress Report on the Fish Trap Fishery of Trinidad. Presented at the National Consultation on the Monitoring and Advisory Committee on the Fisheries Of Trinidad and Tobago. Fisheries Division, Ministry of Agriculture, Land and Marine Resources. pp. 25 - 43.

Nagassar, N., 2001. Frame Survey of the Gillnet Fishery of Trinidad and Tobago. Presented at the National Consultation on the Monitoring and Advisory Committee on the Fisheries Of Trinidad and Tobago. Fisheries Division, Ministry of Agriculture, Land and Marine Resources. pp. 44 – 66.

Ramjohn, D.D. 1995. Local Knowledge Survey. FAO/ UNDP Project “Integrated Coastal Fisheries Management”. FI:DP/INT/91/007. Trinidad.

Ramjohn, D.D. 1999. Checklist of Coastal and Marine Fishes of Trinidad and Tobago. Fisheries Division, Ministry of Agriculture, Land and Marine Resources; Port of Spain: Trinidad and Tobago. *Fish. Info. Ser.* no. 8, 151 p.

Stocker, M. 2001. Fish, Mollusks and other Sea Animals’ use of Sound, and the Impact of Anthropogenic Noise in the Marine Acoustic Environment. Web published at [http://www.msa-design.com/FishEars.html#\\_edn47](http://www.msa-design.com/FishEars.html#_edn47)



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Petro-Canada Trinidad and Tobago Limited

Socio-Cultural Assessment  
for the Environmental Impact Assessments (EIAs)  
for Block 1a and 1b Drilling Activities

February 2007

Prepared for Coastal Dynamics

Submitted by  
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## Appendix I: Summary Report of PCTT Fishing Survey

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## **1. Introduction**

Petro-Canada Trinidad and Tobago (PCTT) is planning to drill three exploratory wells Block 1a and one exploratory well in Block 1b in the Gulf of Paria. (See figure 1) The wells are to be drilled at depths of up to 4500m below the seabed. A Jack-up rig called the “Rowan Gorilla III” will be used to drill the wells. Drilling is scheduled to start as early as June 2007 in Block 1a but could begin as late as December. Wells will be drilled sequentially, with each well requiring approximately 30 – 45 days to complete. Drilling activities are expected to take as much as six months to from start to finish. Wells which contain proven reserves will be suspended and temporarily capped if it is thought they may be of future use. Wells with no proven reserves will be abandoned.

A supply base for the rig during this exercise will be located in La Brea. This base will supply all consumables (diesel fuel, drilling mud and other drilling supplies as well as food and water as required by the crew) for the rig. The La Brea base will also supply the rig which PCTT proposes to use for the conduct of exploratory drilling in block 22 off the northeast coast of Tobago.

Coastal Dynamics has been engaged by PCTT to provide environmental consultancy services to prepare two (2) Environmental Impact Assessments (EIAs) for their Block 1a and Block 1b drilling programmes in the Gulf of Paria. Coastal Dynamics has contracted Mary Schorse to provide socio-cultural assessment services for these EIAs. Given that the activity is primarily marine-based, the focus of the socio-cultural assessment has focused primarily on the users of the marine environment, specifically the fishing community of the central Gulf of Paria. Attention was also given to the coastal communities and other areas of the central Gulf which are in close proximity to the proposed drilling sites and to La Brea which is the location of the proposed supply base for the drilling rig. Figure 2 indicates the land and marine areas which constitute the study area for the socio-cultural studies.

## **2. Methodology**

The description of the baseline socio-cultural environment was generated through a review of existing literature and supplemented by data collected from field investigation. Data sources for baseline studies include CSO publications, land use planning and other studies generated for the area, studies conducted by the Fisheries Division and data generated from other team members.

Field investigation consisted of stakeholder consultations (See Appendix I for list of stakeholder consultations) and a fishing survey. The PCTT Fishing Survey was designed to capture information on the current level of fishing activity in the Gulf as well as to gather data on the views of the fishing community with respect to the proposed drilling activity. The survey was administered to fishermen in key fishing communities located on the west coast of Trinidad. Special attention was paid to those communities in the central gulf who were expected to be most affected by project. The survey was administered to a ten (10%) percent sample of the estimated fishing community in the central gulf. Fishermen at key north and south Gulf landing sites were also interviewed. In total 90 interviews were conducted. A summary report of the survey complete with questionnaire and breakdown of survey locations is found in Appendix II

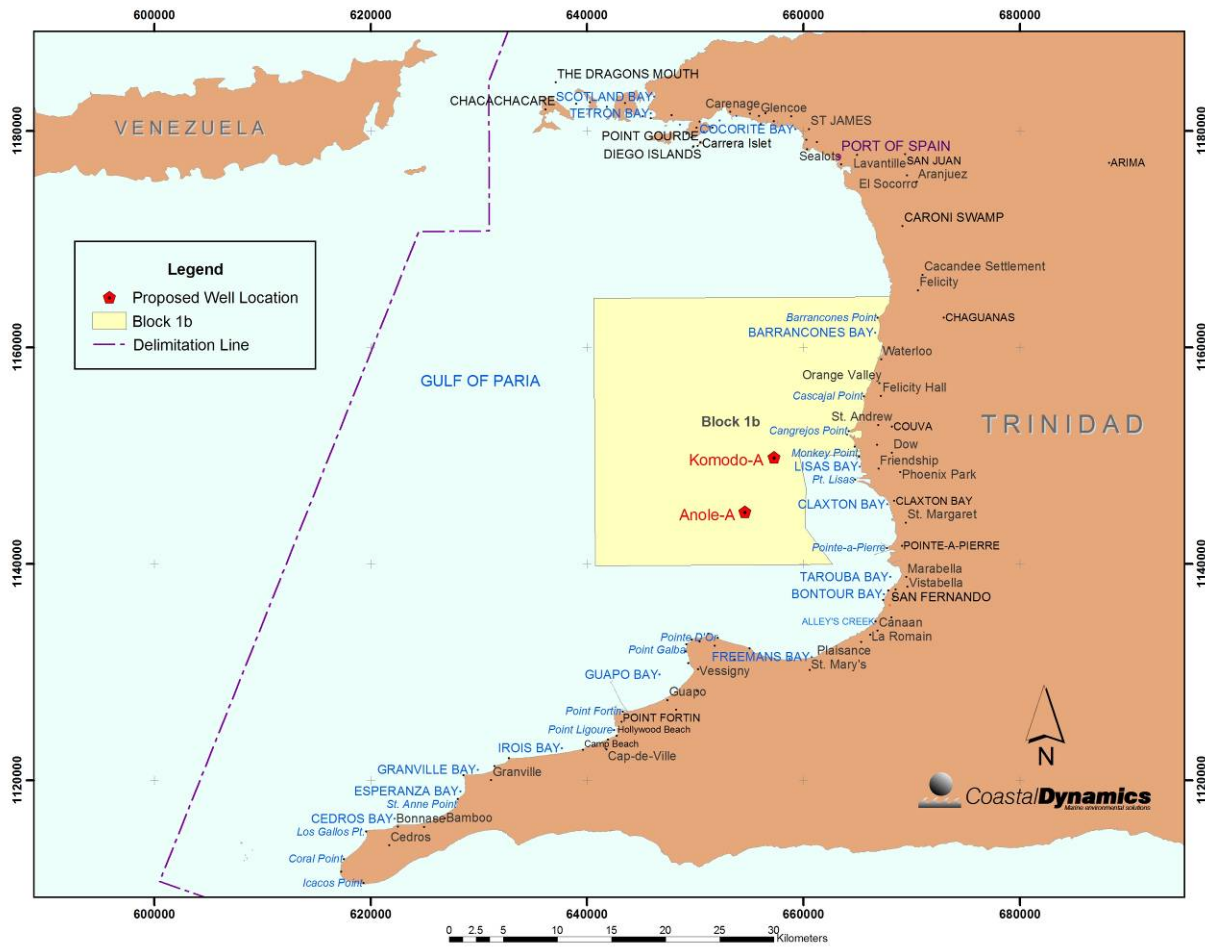


Figure 1: Location of Proposed Drilling Sites

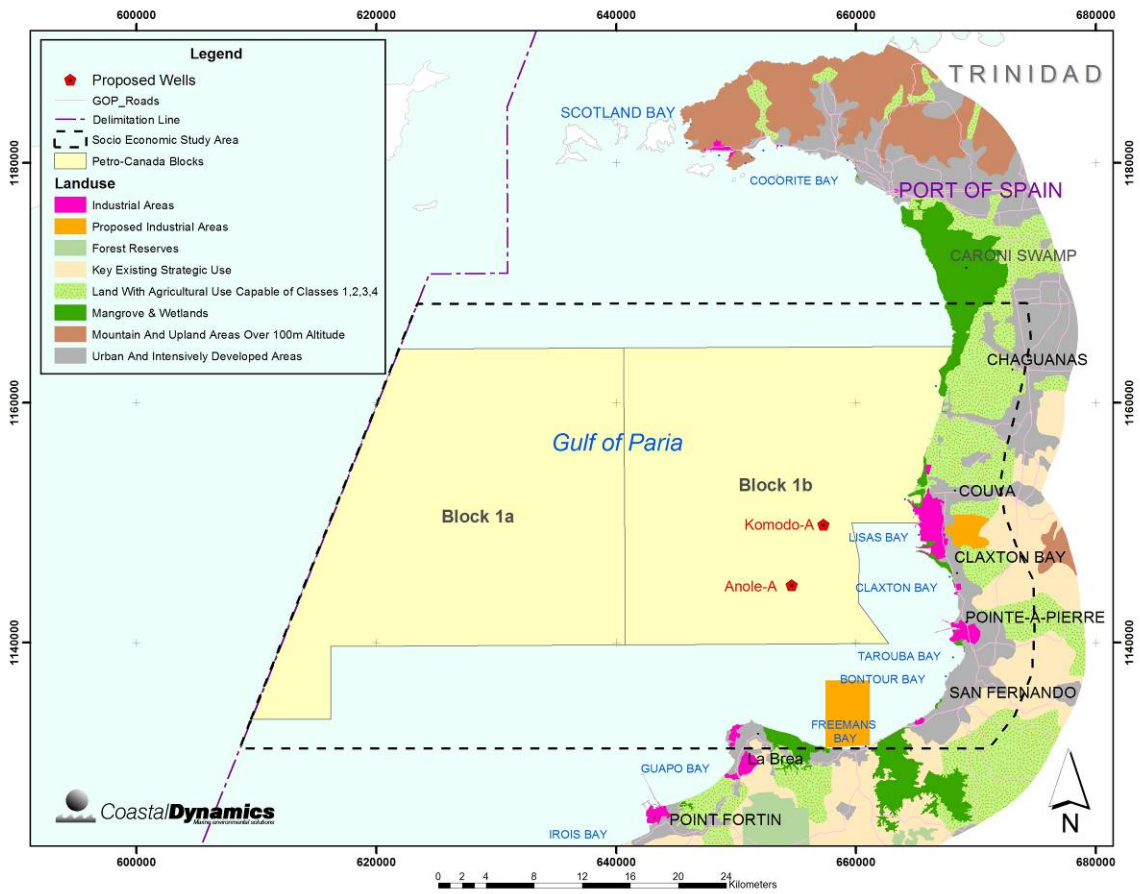


Figure 2: Study Area



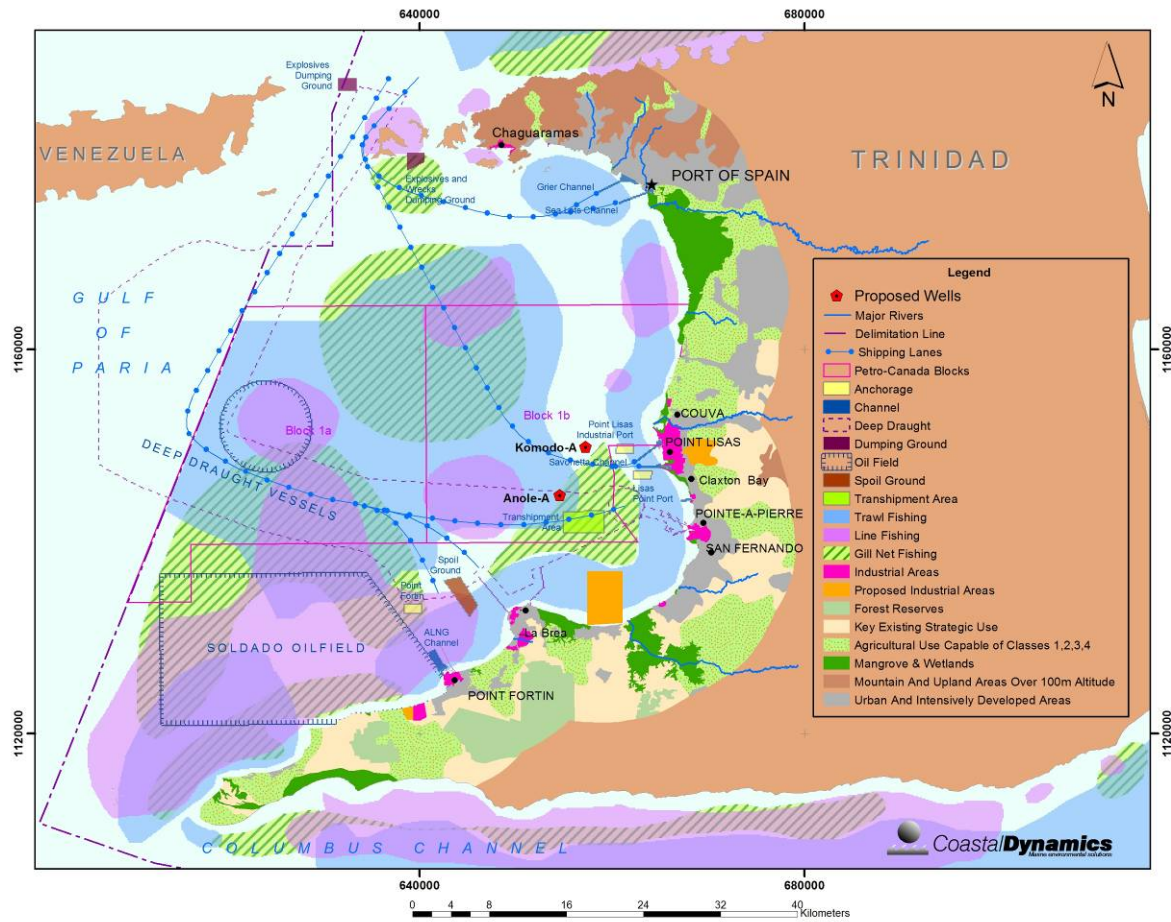


Figure 3: Multi-Sectoral Use of Trinidad’s Gulf Coast Coastal Zone

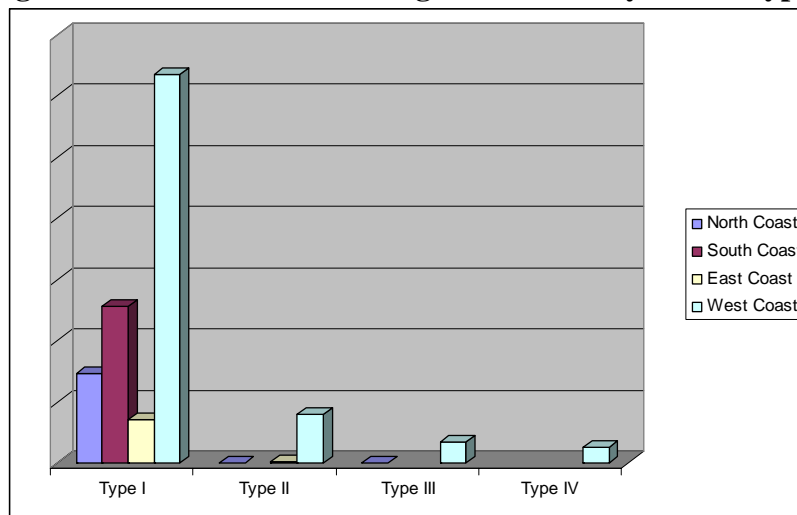
### 3. Land & Water Use

The land and water resources of the study area are some of the most heavily utilized in the country. Land based activities include human settlements, port facilities, heavy industry, agriculture and recreation. The primary uses of the marine resources are fishing and oil and gas based activities. Marine transportation also plays a critical role given the number of ports located within the study area and the transportation infrastructure these ports provide for the many industries located along the Gulf coast. Figure 3 shows the locations of these activities. The following section further describes these activities as they relate to the study area.

#### 3.1. Fishing

The fishing community on the west coast of Trinidad is the largest and most vibrant in the country and represents 50% of the vessels operating nationally. The 2003 Vessel Census conducted by the Fisheries Division estimates that as many as 429 fishing vessels currently operate out of landing sites located along Trinidad's west coast. The vast majority of these vessels are Type I vessels (19-33 ft pirogues with one or two outboard engines and predominantly manual operations). A small number of Type III semi-industrial (32-40 ft with inboard diesel engines and mechanized operations) and Type IV industrial (55- 72ft with inboard diesel and mechanized operations) are also active in the Gulf. These vessels engage in trawling activities and are housed at the N.P Fishing Complex in Port of Spain and at the Orange Valley landing site. Figure 4 shows the distribution of fishing vessels by home port which are grouped by coast.

**Figure 4: Distribution of Fishing Vessel Fleet by Vessel Type and by Coast**



Source: Draft Report on 1998 Census of Fishing Vessels

Although the overall number of operational fishing vessels is in decline (down from 771 in 1998), the industry still represents an important economic activity for a number of the coastal communities with in the study area. Table 1 below lists Gulf ports with more than twenty boats.

**Table 1: Listing of Most Active Home Port in the Gulf of Paria**

Home Ports	No. of Vessels	Type of Site
Bonase (Cedros)	23	Fishing centre
Brickfield	22	Fishing centre
Carli Bay	22	
Claxton Bay	26	Fishing centre and retail market
Cocorite Fishing Centre	31	Fishing centre and retail market
Fullerton	27	
N.P. Fishing Complex (POS)	25	Home Port for Industrial Trawlers
Orange Valley	21	Fishing centre, wholesale and retail market
Otaheite	36	Fishing centre and retail market
Port of Spain Fish Market	24	Wholesale and retail market
San Fernando	46	Wholesale market

**Source:** 2003 Census of Fishing Vessels, Fisheries Division, Ministry of Agriculture, Land and Marine Resources

As Fisheries Division generally collects data by vessel, there is little information on the individuals engaged in fishing. An estimate based on types and numbers of vessels puts the number of fisherman active in the Gulf of Paria at close to 1,400, with over half of that number operating out of ports in the central Gulf. This number does not include vendors, wholesalers and other individuals otherwise involved in landing site management and administration. Three major fish markets are located along west coast, namely at Port of Spain, Orange Valley and San Fernando. In 2002 the Fisheries Division published the Marine Fisheries of Trinidad and Tobago Atlas which estimated the number of persons directly involved in the fishing industry at 13,000; the number of persons indirectly involved was estimated to be as high at 50,000. Local sources have recently put the number of people employed by the fishing industry at 1,500 for San Fernando, and as many at 300 in Otahetie.

The fishing industry is characterized as being predominantly artisanal based on the marine resources occurring in the coastal and territorial waters. The main types of fishing gear used by vessels in the Gulf are lines (longline, trolling, a la vive, palangue, and banking), nets, fishpot, and trawling. The recently conducted PCTT Fishing Survey indicates that nets are the preferred choice of gear followed by lines. Table 2 summarises the first and second choices for fishing gear as well at the estimated cost of each type of gear.

**Table 2: PCTT Fishing Survey Fishing Gear Summary**

	<b>Primary Fishing Method</b>	<b>Secondary Fishing Method</b>	<b>Estimated Cost of Equipment</b>
<b>Nets</b>	45%	17%	\$15,000
<b>Bottom Lines (banking)</b>	22%	41%	\$2,000 - \$5,000
<b>Surface Lines (trolling)</b>	13%	6%	\$2,000 - \$5,000
<b>Trawling</b>	9%	27%	\$5,000 - \$30,000
<b>A la vie</b>	9%	6%	\$5,000
<b>Fishpot</b>	1%	3%	\$2,000 - \$5,000
<b>Switchering</b>	1%	0%	\$1,000
	100%	100%	

Source: PCTT Fishing Survey (2007)

Other characteristics of the central Gulf fishing community revealed by the survey are that the vast majority of fishermen rely on fishing as their main source of income. Incomes, although difficult to estimate due to great variance in catches, averaged between \$1,000 – 2,000 per week. Just over sixty-percent of survey respondents estimated earning less than \$2,000 per week. Those reporting the highest levels of income were the industrial trawlers which estimated a weekly per vessel income of \$12,000. It was noted, however, that those figures could go lower as well as higher, depending on their catch. Just over twenty-five percent of respondents indicated supplementing their fishing income with additional work.

Fishing tends to take place during the night and during the day, generally seven days a week, twelve months of the year. Although some individual fishermen indicated seasonality in their choice of fishing gear and at times species, there was no strong trends in seasonality with respect to fishing gear type or species type that could be detected from the aggregate data. The only slight seasonal trend which emerged is that fish catches were noted to be more abundant during the rainy season, namely June – September. Table 3 below indicates the main species reported in catches and the estimated range of daily catch size. Table 4 summarises data collected from the Fishing Survey and from various Fisheries Division documents.

**Table 3: Summary of Fish Catches**

<b>Main Catch Species Reported</b>	<b>Range of Daily Catch Sizes (lbs)</b>
Kingfish	80 - 400
Red Fish	50 - 300
Cavalli	80 - 300
Salmon	80 - 100
Carite	80 - 400
CroCro	100 - 500
Grouper	80 - 100
Ancho	20 - 50
Mullet	40 - 2,000 *
Bechine	100 - 500
Catfish	100 - 500
Shark	80 - 300
Shrimp	60 – 100
* large catches of mullet were primarily reported in Claxton Bay	

Source: PCTT Fishing Survey (2007)

**Table 4: Summary of Landing Site Data**

Landing Site	Carenage	Cocorite	N.P. Fishing Complex (POS)	Brickfield	Orange Valley	Carli Bay	Claxton Bay	San Fernando	Otaheite	Bonasse (Cedros)	Fullerton
# of Boats (1)	26	40	26	25	21	20	24	45	38	32	28
Main Gear	Lines A la Vie	Lines - Trolling and Banking	Trawling	Bottom Lines Nets	Trawling	Nets	Nets Banking	Nets Banking	Mixed	Mixed	Net A la vie Trawling
Primary Boat Type	Type I Pirogue (19 - 33 ft w. outboard engine)	Type I Pirogue (19 - 33 ft w. outboard engine)	Type IV Industrial Trawler (55 - 72 ft with inboard engine)	Type I Pirogue (19 - 33 ft w. outboard engine)	Industrial Trawlers	Type I Pirogue (19 - 33 ft w. outboard engine)	Type I Pirogue (19 - 33 ft w. outboard engine)	Type I Pirogue (19 - 33 ft w. outboard engine)	Type I Pirogue (19 - 33 ft w. outboard engine)	Type I Pirogue (19 - 33 ft w. outboard engine)	Type I Pirogue (19 - 33 ft w. outboard engine)
Primary Types of Fish Caught	Redfish, Kingfish, Carite, Cavalli, Bonito	Refish, Kingfish, Salmon, Shark, Carite, Cavalli,	Shrimp, mixed groundfish (by-catch)	Refish, Kingfish, Salmon, Shark, Carite, Cavalli, CroCro	Shrimp	Carite, Kingfish, Salmon, CroCro, Redfish, Cavalli	Carite, Kingfish, Cavalle, Snapper, Salmon, Mullet, CroCro, Bouchet, Redfish	Redfish, Kingfish, Carite, Catfish, Cavalli, Bechin, CroCro	Redfish, Kingfish, Salmong, Shark, Carite, Cavalli, Shrimp, Bechin, Anchho, Conch, Crab	Carite, Cavalli, Kingfish, Shark, Salmon, Shrimp	Redfish, Kingfish, Salmon, Shark, Carite, Cavalli, Shrimp
Ave Size (kg) of Landings/ month (2)	n/a	n/a	n/a	2,187	64,945	n/a	8,777	5,709	15,065	25,195	16,234
Ave Value of Landings/month (2)	n/a	n/a	n/a	TT\$31,343.41	TT\$816,755.79	n/a	TT\$29,004.44	TT\$62,012.95	TT\$275,648.74	TT\$417,387.28	TT\$337,499.30
Estimated Value of Per Boat Landings (Ave. Landing Value / # of Boats)	n/a	n/a	n/a	TT\$1,253.74	TT\$38,893.13	n/a	TT\$1,208.52	TT\$1,378.07	TT\$7,253.91	TT\$13,043.35	TT\$12,053.55
Estimated Weekly Income (3)	\$2,000 - 3,000	\$2,000 - 3,000	\$12,000	\$2,000	\$2,000 - 3,000	\$2,000 - 5,000	\$3,000 - 5,000	\$2,000	\$1,000 - 2,000	\$2,000	\$3,000 - 5,000
(1) Figures taken from Fisheries Division 2003 Census of Fishing Vessels											
(2) Data taken from Fisheries Division Landing Statistics. Figure is an average for the year (2005) for all types of Gear											
(3) Rough estimate based information collected in PCTT Fisheries Survey. Weekly Income estimation was in most cases very difficult for respondents who often reported a wide range of incomes based on an extremely variable weekly catch											

Source: PCTT Fishing Survey (2007) and Catch Data from Fisheries Division (2005).

Fishing takes place throughout the Gulf of Paria. Fishermen operating out of the central Gulf landing sites indicated fishing areas which included a large percentage of blocks 1a and 1b. Figures 5 – 12 depict the areas where fishermen at the various landing sites indicated that they fish.

### **3.2. Oil & Gas Activity**

The Gulf of Paria is home to numerous oil platforms, wellhead and associated structures. Currently, all energy related activities have been restricted to the southern portion of Trinidad's waters in the Gulf of Paria. A 24 inch natural gas pipeline crosses the study area from production facilities offshore the north coast of Trinidad to the LNG Plant at Point Fortin. Figure 13 shows the demarcation of lease blocks for the purpose of exploration and production of oil and gas reserves in the Gulf of Paria.

### **3.3. Marine Transportation**

The vast majority of ships coming into the Gulf of Paria enter from the north through the Boca Grande. A deep draught channel for use by LNG Tankers, Oil Tankers and other deep draught vessels runs through the middle of the study area. There are eight (8) ports within the Gulf of Paria. Four of those ports are situated immediately within the study area (Point Lisas, Claxton Bay, Pointe-a-Pierre and Brighton). The Point Fortin Port, although technically south of the study area, has a shipping lane which transects the study area. The remaining ports are located in the northwest peninsula, well to the north of the study area. See Figure 14.

According to recent statistics available from the Trinidad Pilots and Berthing Masters Association Ltd, the Gulf receives an average of 630 vessels per month. In recent years, the three busiest ports have been Port of Spain, Point Lisas and Chaguaramas. These ports accounted for 27%, 23% and 20% respectively of the total vessel movements in the Gulf. The port at Point Fortin, although currently only accounting for 8% of total vessel movements, has seen a dramatic increase in activity (5 vessel movements in 1996 to 107 in 2003) due in large part to the LNG Tankers. This activity is expected to increase with further develop of the LNG facilities in Point Fortin. Marine activity is expected to increase at Point Lisas and Brighton ports as well. Plans to expand these port facilities, both of which are vested in the National Energy Company (NEC), are currently being developed. Port expansion activities are expected to support the industrial development proposed for the Pt. Lisas and Union Estates (further discussion on this development is found in section 3.4). Figure 15 depicts current marine traffic volumes.

Apart from marine transport and fishing vessels, work boats and service vessels operate in the southern Gulf. Pleasure craft can also be found throughout the Gulf, although these types of vessels are found predominantly in the ports along the northwest peninsula.

Plans by the Ministry of Works and Transport to introduce later this year a water taxi service involving four high speed catamaran vessels operating from San Fernando to Port of Spain will add additional marine traffic to the area. In addition to the proposed San Fernando to Port of Spain route, it is expected that ferry service will be expanded to include Point Fortin and Diego Martin in the second phase of the project targeted for some time in 2008.

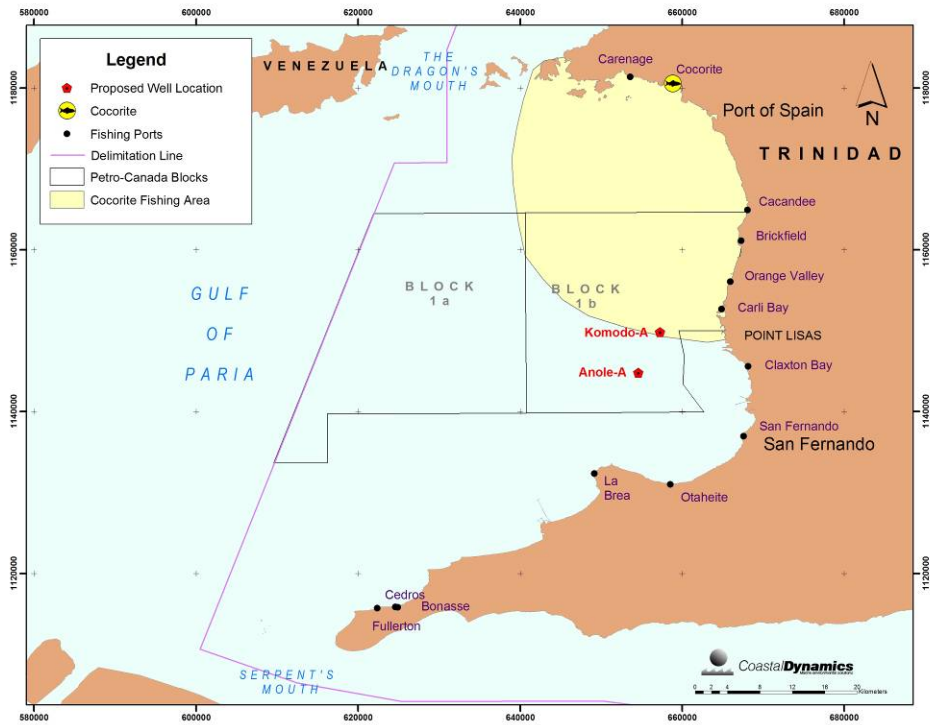


Figure 5 – Fishing location for fishermen operating out of Cocorite

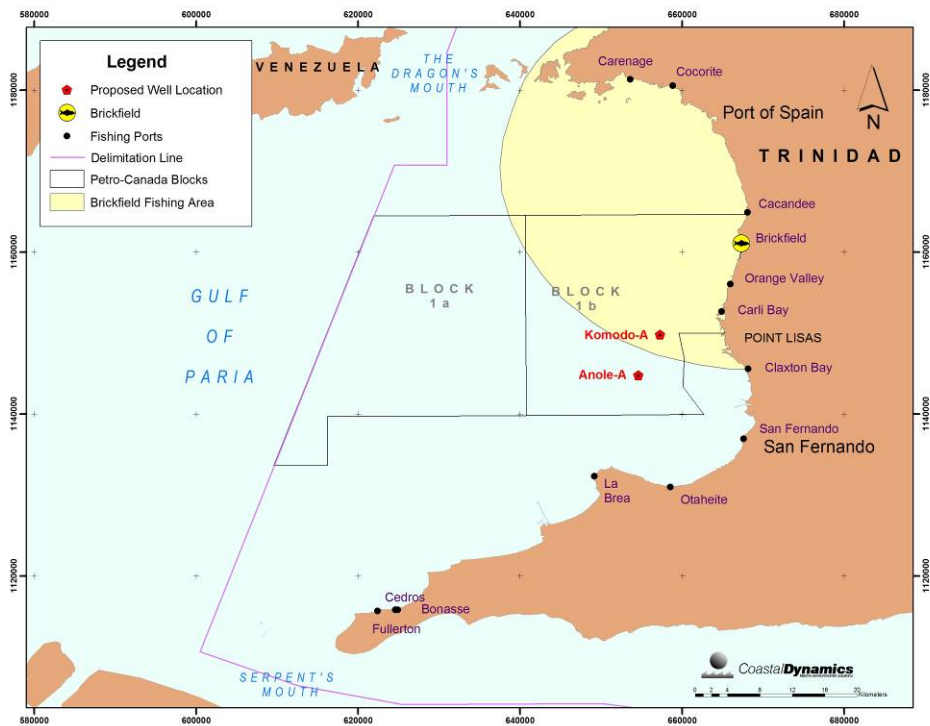


Figure 6 – Fishing location for fishermen operating out of Brickfield

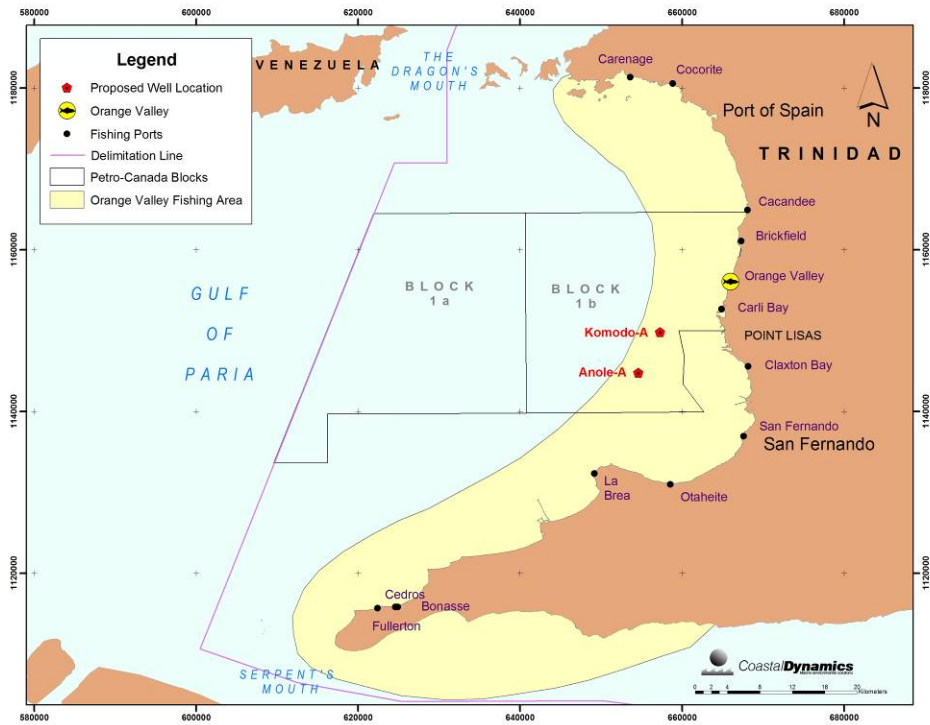


Figure 7 – Fishing location for fishermen operating out of Orange Valley

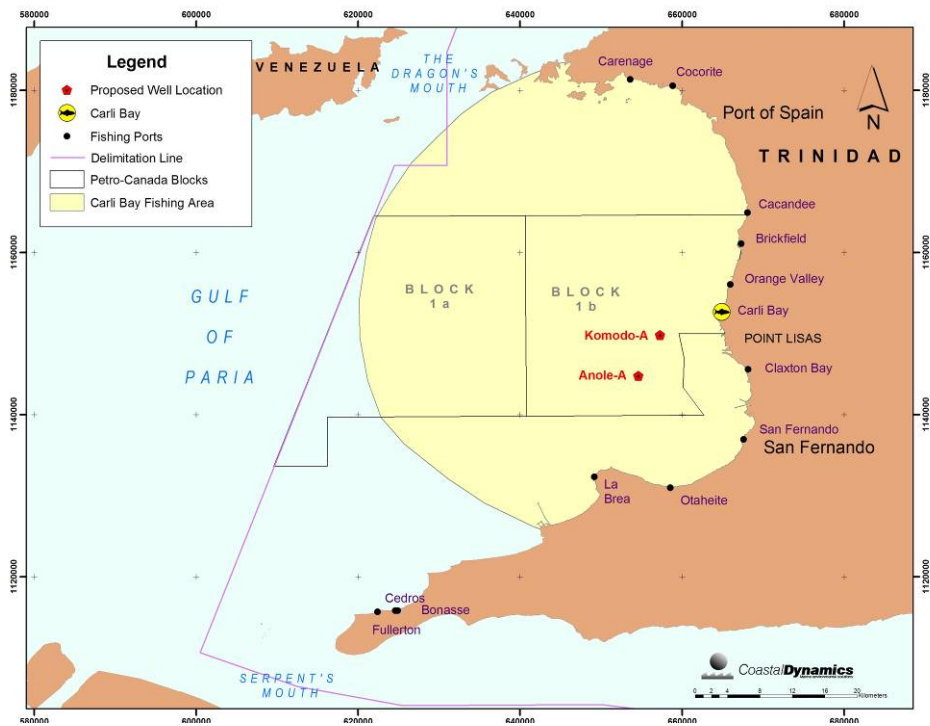


Figure 8 – Fishing location for fishermen operating out of Carli Bay



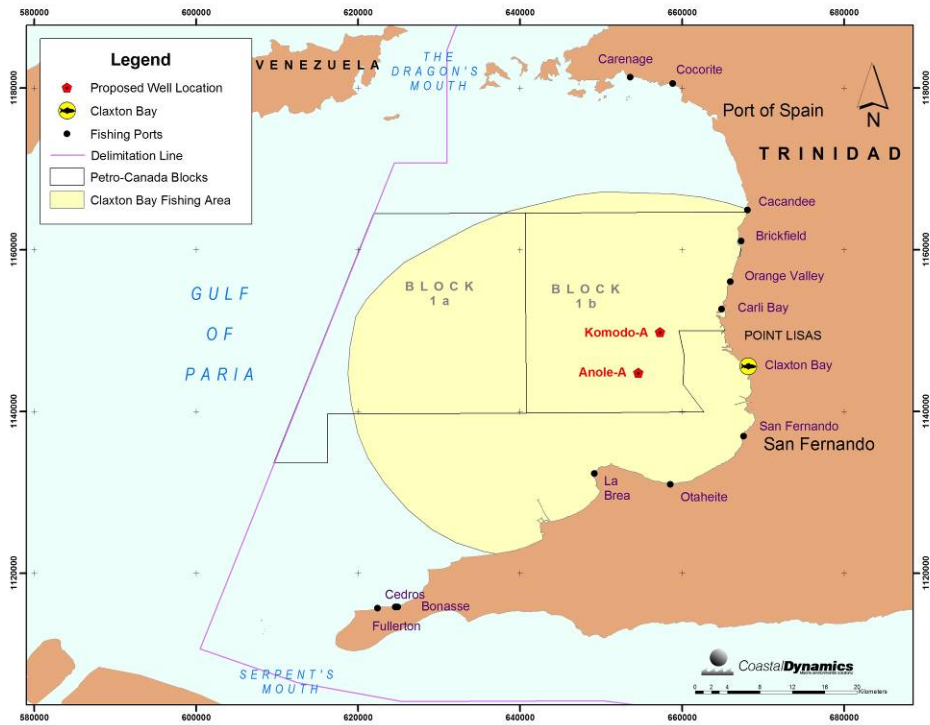


Figure 9 – Fishing location for fishermen operating out of Claxton Bay

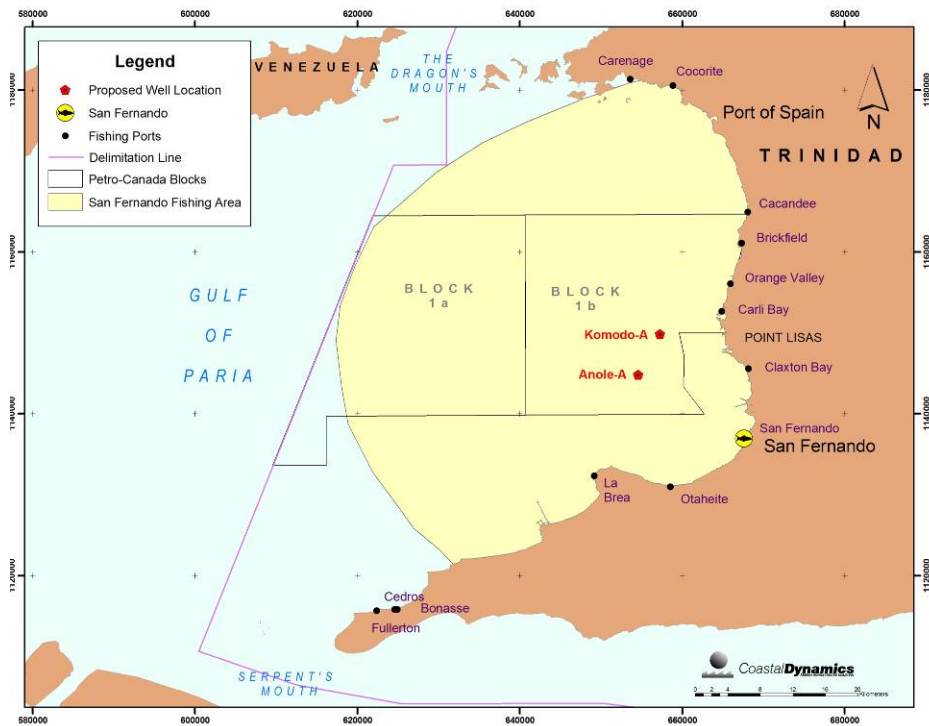


Figure 10 – Fishing location for fishermen operating out of San Fernando

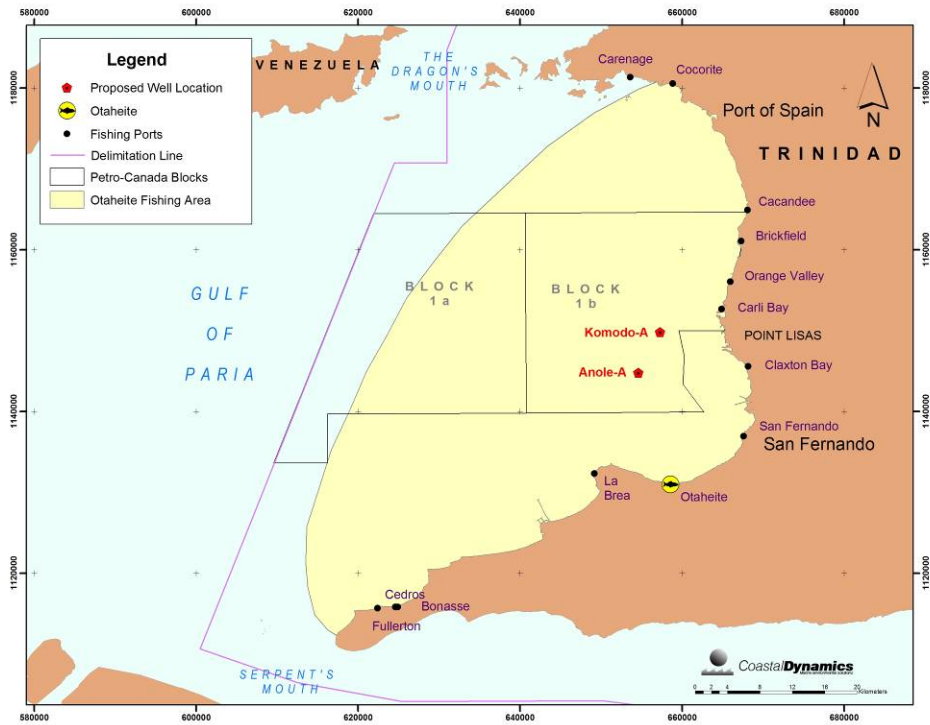


Figure 11 – Fishing location for fishermen operating out of Otaheite

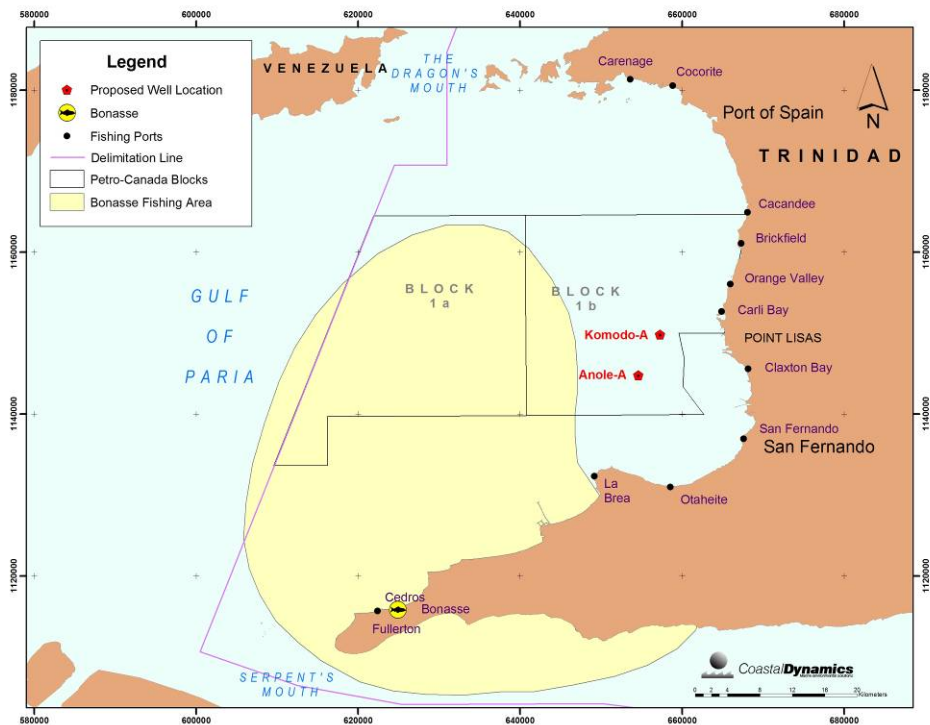


Figure 12 – Fishing location for fishermen operating out of Bonasse (Cedros)

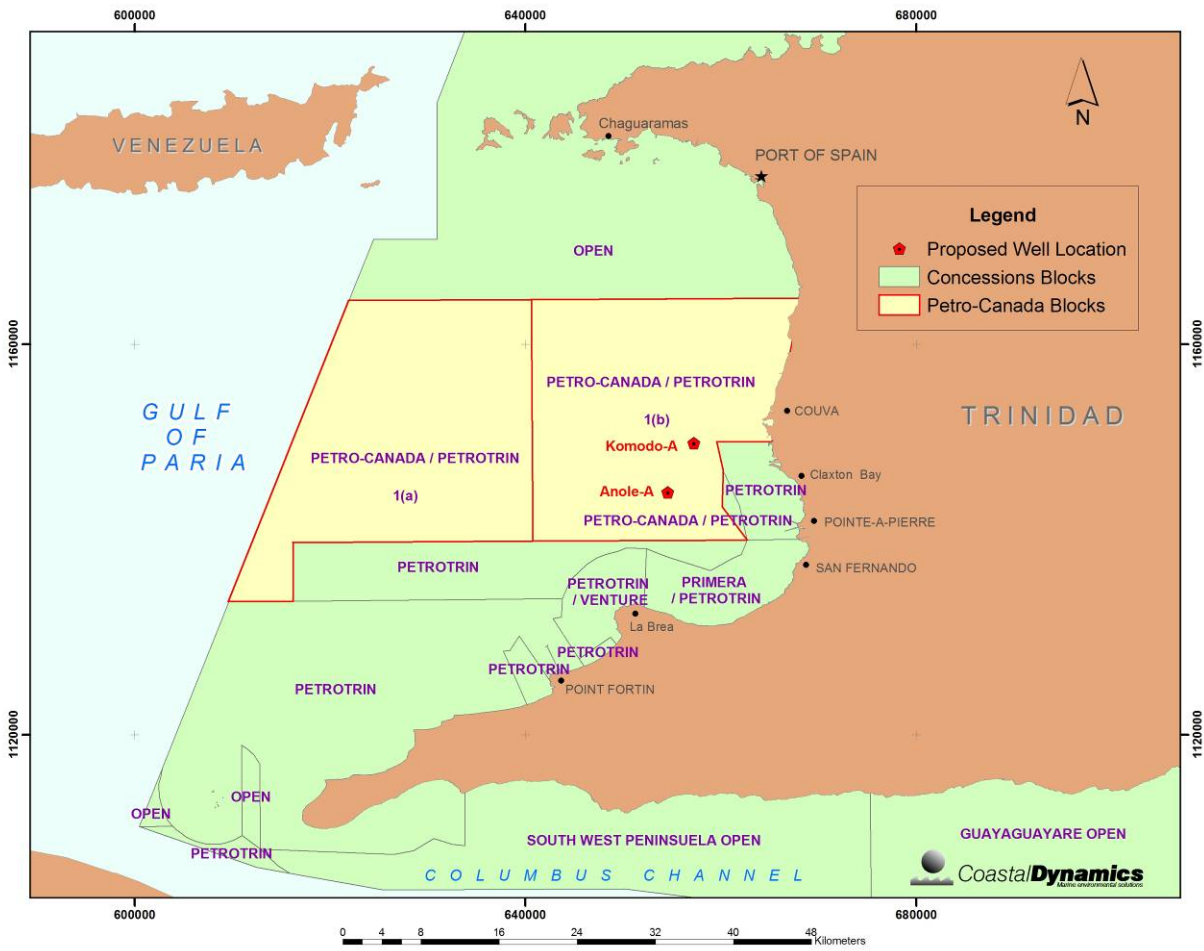


Figure 13 – Gulf of Paria Oil and Gas Lease Blocks

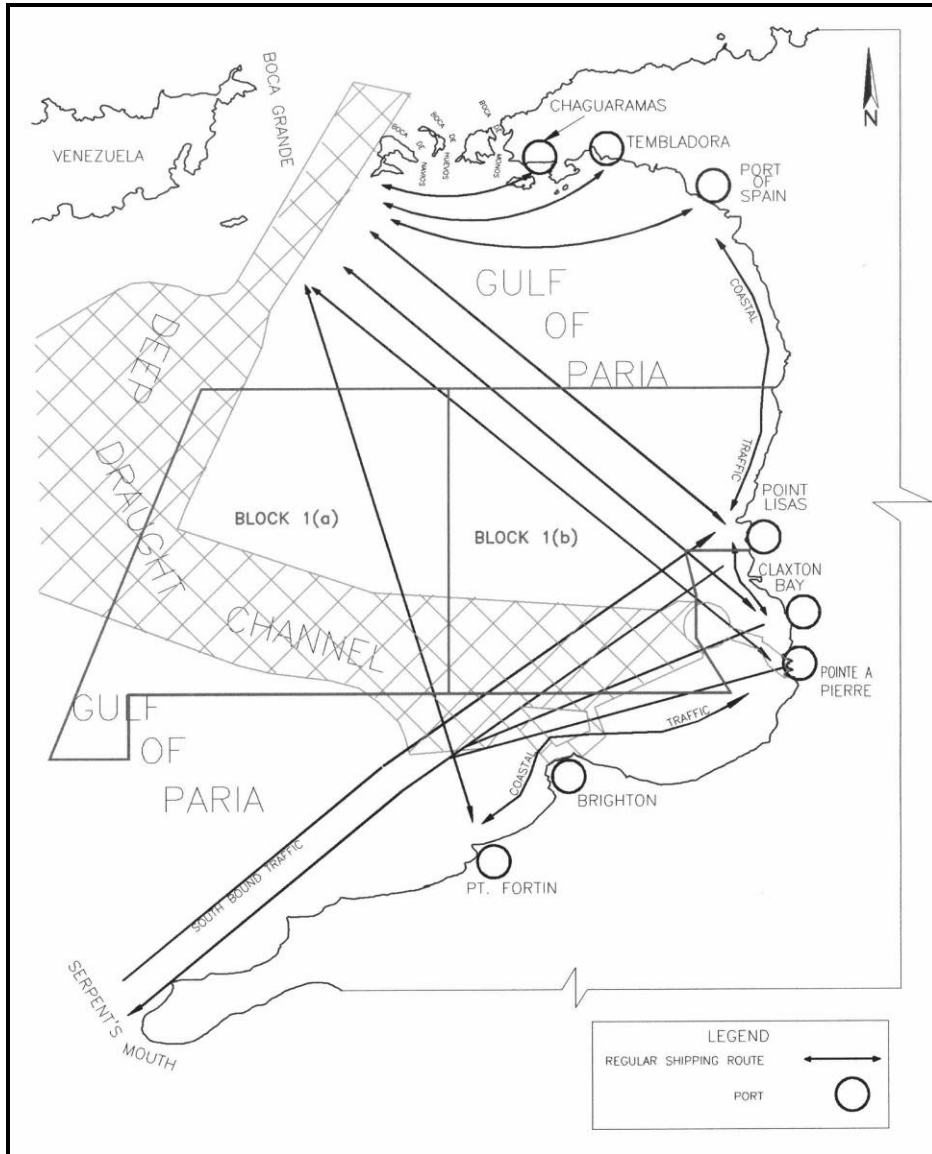


Figure 14 – West Coast Ports and Shipping Lanes

Port	Average Monthly Vessel Movements								
	1995	1996	1997	1998	1999	2000	2001	2002	2003
Port of Spain	187	227	242	259	306	291	256	279	340
Point Lisas	238	221	274	267	280	284	322	326	294
Pointe -a-Pierre	174	179	178	203	197	173	163	157	161
Point Fortin	9	5	45	60	44	46	60	69	107
Claxton Bay	69	75	72	76	91	80	60	52	88
Brighton	-	2	4	3	12	4	1	5	7
Chaguaramas	146	136	187	247	201	164	240	280	254
Tembladora	7	12	16	13	10	17	15	13	13
<b>TOTAL</b>	<b>830</b>	<b>857</b>	<b>1018</b>	<b>1128</b>	<b>1141</b>	<b>1059</b>	<b>1117</b>	<b>1181</b>	<b>1264</b>

Figure 15 – Current Levels of Marine Traffic in the Gulf

### **3.4. Industrial**

Industrial activity is prevalent in the central and southern Gulf areas with a significant number of existing and proposed industrial estates. Current industrial estates include (1) the existing Pt. Lisas Industrial Estate (a 1,200 ha estate housing approximately one hundred twenty (120) heavy industrial companies), (2) Pointe-a-Pierre oil refinery, (3) Union Estate (a recently established 265 ha estate expected to house an aluminum smelter, a urea plant, an ammonia plant and other heavy industry), (4) La Brea Industrial Estate (LABIDCO) and (5) the Atlantic LNG Industrial Complex in Point Fortin. See Figure 16.

Proposed industrial estates include (1) a 1400 ha expansion of Pt. Lisas, (2) an 1300 ha industrial estate at Chatham, and (3) a 1,400 ha offshore industrial estate off the coast at Otaheite. All of the new industrial estates (as well as Union and LABDICO) are the responsibility of The National Energy Company (NEC). NEC has been mandated by the Government to do the business development for the energy sector. These estates must address the needs of heavy marine-dependent industrial plant which require land and infrastructure with ready access to deep water berths for export and import of industrial cargo. To support all the new industrial development in the southwest peninsula, NEC has also proposed to construct five ports, two at Brighton, one at Cap-de-Ville/Chatham, one at Pt Lisas, and one in Galeota (an expansion of the facilities owned by bpTT). Development approvals are currently being sought for the Brighton and Pt. Lisas ports.

### **3.5. Agriculture**

Until recently, Caroni (1975) Limited was the primary agricultural land holder in the coastal region of the central Gulf with much of the lands between Caroni and Couva under sugar cane. Since the closure of Caroni's sugar cane industry in 2003, however, some of that land has reverted to other purposes, namely housing and industrial development. According Caroni representatives, a large percentage of Caroni's coastal lands have been divided into 2-acre agricultural plots and distributed. As many as 1,200 2-acre parcels are expected to remain under some form of agriculture, thus ensuring that agriculture will remain a predominant land use type on the coastal zone of the Gulf.

### **3.6. Residential**

According the 2000 Population and Housing Census there are just under 100,000 people representing as many as 27,000 households in the coastal communities of the central Gulf. The vast majority of these households are located in the developed urban areas of San Fernando, Couva/Pt. Lisas, Claxton Bay and La Brea. (See Figure 16). The main fishing communities of the central Gulf are found in both heavily populated areas and smaller settlements and collectively represent just under twenty percent (20%) of the residential population of the study area. Table 5 provides a summary of the residential statistics for these communities. Further discussion of the residential population is found in Section 4. Population & Demographics.

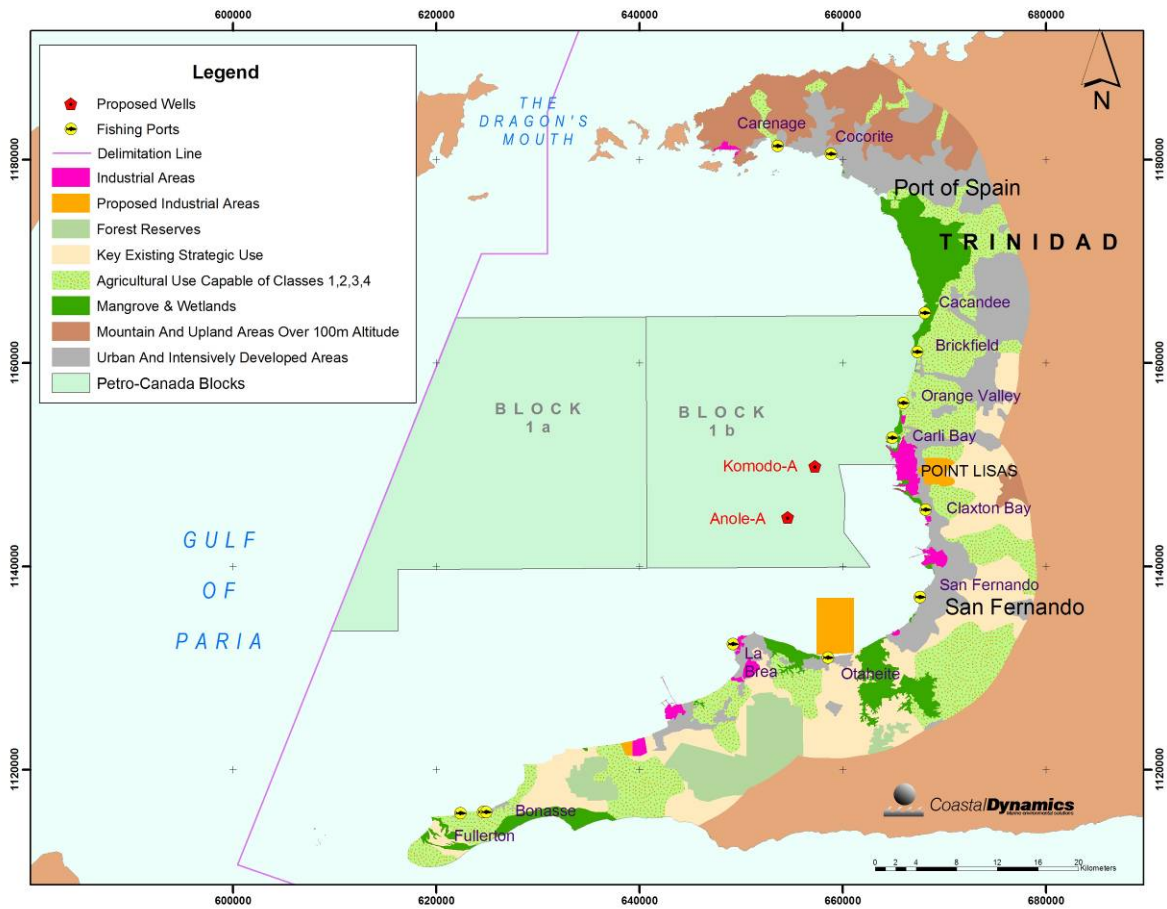


Figure 16: Areas of Urban Development in the Coastal Region of the Gulf of Paria

**Table 5: Summary of Population Statistics for Central Gulf Fishing Communities**

<b>Community District</b>	<b>Households</b>	<b>Population</b>	<b>Male</b>	<b>Female</b>
Brickfield	229	901	461	440
Orange Valley	225	1,102	554	548
Couva (Carli Bay)	884	3,262	1,615	1,647
Claxton Bay	1,343	5,534	2,730	2,804
San Fernando City Proper	545	1,879	913	966
Oropouche (Otaheite)	571	2,201	1,081	1,120
La Brea	979	3,080	1,560	1,520
<b>TOTAL for Study Area</b>	<b>4,776</b>	<b>17,959</b>	<b>8,914</b>	<b>9,045</b>
<i>Fishing Communities as % of Total Study Area</i>	<i>18%</i>	<i>18%</i>	<i>18%</i>	<i>19%</i>

Source: CSO 2000 Population and Housing Census: Community Register

### **3.7. Recreation**

There are numerous coastal resources within the study area which provide recreation for local residents as well as visitors from outside the area. Key bathing beaches are found primarily to the north of the study area (in the Chaguaramas peninsula) and at the southern end of the study area in La Brea and Point Fortin. Station Beach, Guapo Beach and Vessigny Beach are popular recreation sites for local residents. Vessigny Beach is one of three locations nationwide to have a Tourism Development Company (TDC) maintained beach facility.

Coastal wetlands also play an important part in recreational activities. The Caroni Swamp to the north of the study area is a nesting site for the Scarlet Ibis and popular tourist attraction for foreign and local visitors. Godineau swamp to the south of San Fernando and the wetlands in Oropouche (to the east of La Brea) are also cited as bird watching areas and are used as recreational sites by local residents.

The Pointe-Pierre Wild Fowl Trust is another wetland site which lies inland and is located within the Petrotrin Oil Refinery. The Trust is well known for its activities in wildlife conservation and environmental education and is another popular stop for local and foreign visitors.

## **4. Population & Demographics**

The population of the study area comprises some forty-nine (49) CSO defined community districts and falls under the jurisdiction of three different regional administration bodies, namely the Couva/Tabaquite/Talparo Regional Corporation, the San Fernando City Corporation and the Siparia Regional Corporation. The Couva/Tabaquite/Talparo Regional District represent the largest percentage (45%) of the study area population, followed by San Fernando with thirty-two



percent (32%) and Siparia with twenty-three percent (23%) . Table 6 below list some of the larger community districts under each of the regional bodies and the total populations.

**Table 6: Study Area Population Statistics by Regional Administrative Authority**

<b>Regional Corporation</b>	<b>Community District *</b>	<b>Households</b>	<b>Population</b>
<b>Couva/Tabaquite/Talparo</b>	Plaisance Park	589	2,076
	Calcutta Settlement	536	2,253
	Macaulay	606	2,385
	St. Margaret	691	2,413
	Point Lisas (Industrial Estate)	626	2,491
	California	714	2,716
	St. Andrews Village	731	2,754
	Point Lisas (NHA)	786	2,874
	Couva/McBean	2,086	8,239
	Claxton Bay	1,343	5,534
		<b>Sub-Total</b>	<b>11,248</b>
<b>San Fernando</b>	San Fernando City Proper	545	1,879
	Paradise	621	2,096
	Les Efforts West	670	2,218
	Gulf View	1,019	3,594
	Vistabella	1,615	5,613
	Marabella	3,302	11,180
		<b>Sub-Total</b>	<b>9,383</b>
<b>Siparia</b>	Mon Desir	553	2,111
	Dow Village	578	2,158
	Oropouche	571	2,201
	Aripero	625	2,369
	La Brea	979	3,080
		<b>Sub-Total</b>	<b>6,084</b>
	<b>Total for Study Area</b>	<b>26,715</b>	<b>98,050</b>

*\* Listed here are only the largest of the forty-nine (49) community districts*

**Source:** CSO 2000 Population and Housing Census: Community Register

As noted above, the total population of the study area is just under 1000,000. The population is relatively young with the largest percentage of the population (35%) under the age of twenty. Fifty-eight percent (58%) is under the age of thirty-five and thirty-three percent (33%) falls in the 35 – 65 age group. A very small percentage of the population (9%) is over 65.

Forty-five percent (45%) indicate completing a secondary education, however, as much as thirty-seven percent (37%) was educated only to the primary level.

According to CSO 2000 statistics, just under fifty percent of the overall population is employed. The main reasons given for not working included home duties (39%), schooling, (24%) and retired (11%). Approximately five percent (5%) of the study area indicated that they were actively seeking employment.

Those who are employed are engaged largely in semi-skilled (craft and related) and unskilled (elementary) labour activities which collectively employ thirty-six percent (36%) of the working population. Service and sales and clerical activities employ as much as one fourth of the working population. Labour statistics are not collected specifically for the fishing industry. Rather, fishing is included in a larger category with also covers agriculture, hunting and other forest related activities. This category, listed in the table below as agriculture, employs an estimated two percent (2%) of the study area population (approximately 2,000 persons). Based on other estimates by the Fisheries Division of number of fishermen operating in the central Gulf, fishing employs less than 1% of the study area population.

**Table 7: Distribution by Employment Type of Study Area Population**

<b>Legislator</b>	7%
<b>Professionals</b>	6%
<b>Technicians</b>	10%
<b>Clerical</b>	12%
<b>Service and Sales</b>	13%
<b>Agriculture*</b>	2%
<b>Craft and Related (semi-skilled)</b>	18%
<b>Plant and Machinery Operators</b>	9%
<b>Elementary (unskilled)</b>	18%
<b>Not Stated</b>	5%
<b>Total</b>	100%
<i>* Estimated % of population employed by fishing industry</i>	<i>&gt; 1%</i>

Source: CSO 2000 Population and Housing Census

Given that the majority of study area population is engaged in low-level occupations, it is not surprising that wages are low. Over sixty percent (60%) of the population earns less than \$2,000 per month. Construction, wholesale and retail trade and social and related services are the main industries in which the study area population is employed, thirteen percent (13%), sixteen percent (16%) and ten percent (10%) respectively. Petroleum and gas and related industries employ as much as nine percent (9%) of the overall study area population, however, this figure is much higher (13%) amongst the communities under the Siparia Regional Corporation. Similarly involvement in the sugar and agricultural industry which engages only six percent (6%) of the total study area population is much higher in the communities of the Couva/Tabaquite/Talparo Regional Corporation where it is as much as ten percent (10%). These figures, of course, have changed since 2000 (date of census data) with the closure of Caroni Limited, however, it is expected that many of those formerly involved in sugar production have moved to other sectors (construction, agriculture and some to fishing).

## **5. Economic Activity**

Trinidad and Tobago is one of the wealthiest countries in the Caribbean with a GDP close to US\$15,000 per person. The economy of Trinidad and Tobago continues to grow significantly, twelve percent (12%) in 2006 up from eight percent (8%) in 2005. Energy is the key economic sector, accounting for over 40% of the GDP and close to 45% of revenue in 2006. Driving this upsurge in the energy sector is a seventeen percent (17%) increase in oil and gas exploration and as thirty-seven percent (37%) increase in the refining of these products. Much of this activity is taking place between the southwest peninsula of Trinidad and the oil and gas fields off Trinidad's east coast.

Much like the 1970s, the country is again experiencing an energy boom which is also driving up costs, including the costs of labour. There are fears that the current boom which is edging up inflation rates is crowding out other sectors which are either stagnant or dropping in their contribution to GDP. Agriculture has now dropped to less than 1%, tourism has dropped to less than 0.5% and manufacturing has been stagnant at 6%. The Government of Trinidad and Tobago has recognized the need to develop non-energy driven industries. As such, seven industries have been targeted for intensified development focus. These are yachting, fishing and fish processing, merchant marine, food and beverage, and printing and packaging. A revitalized agricultural sector and the creation of an international financial center are also expected to be part of the programme for economic diversification.

## **6. Infrastructure**

### **6.1. Roads**

The primary transportation arteries through the study area are the Solomon Hochoy Highway (SHH) and the Southern Main Road. Both run in a north-south direction and provide for the vast majority of vehicular movement throughout the study area. The roads are the main transportation arteries which service industrial traffic and heavy trucks and well as private and public transportation and are currently utilised well beyond their capacity. Design plans are currently being developed for an extension of the SHH which would continue the existing highway from San Fernando down to Point Fortin. Plans are also in place for the widening of the South Truck from Dumfries to St. Mary's Junction. Figure 17 shows current road infrastructure.

### **6.2. Utilities**

Over eighty percent (80%) of the study area population has access to pipe born water. Two thirds of those with water access have water piped into their home while the remainder access water through a stand pipe.

Electrical connection is very high within the study area with ninety percent (90%) reporting electrical connection.

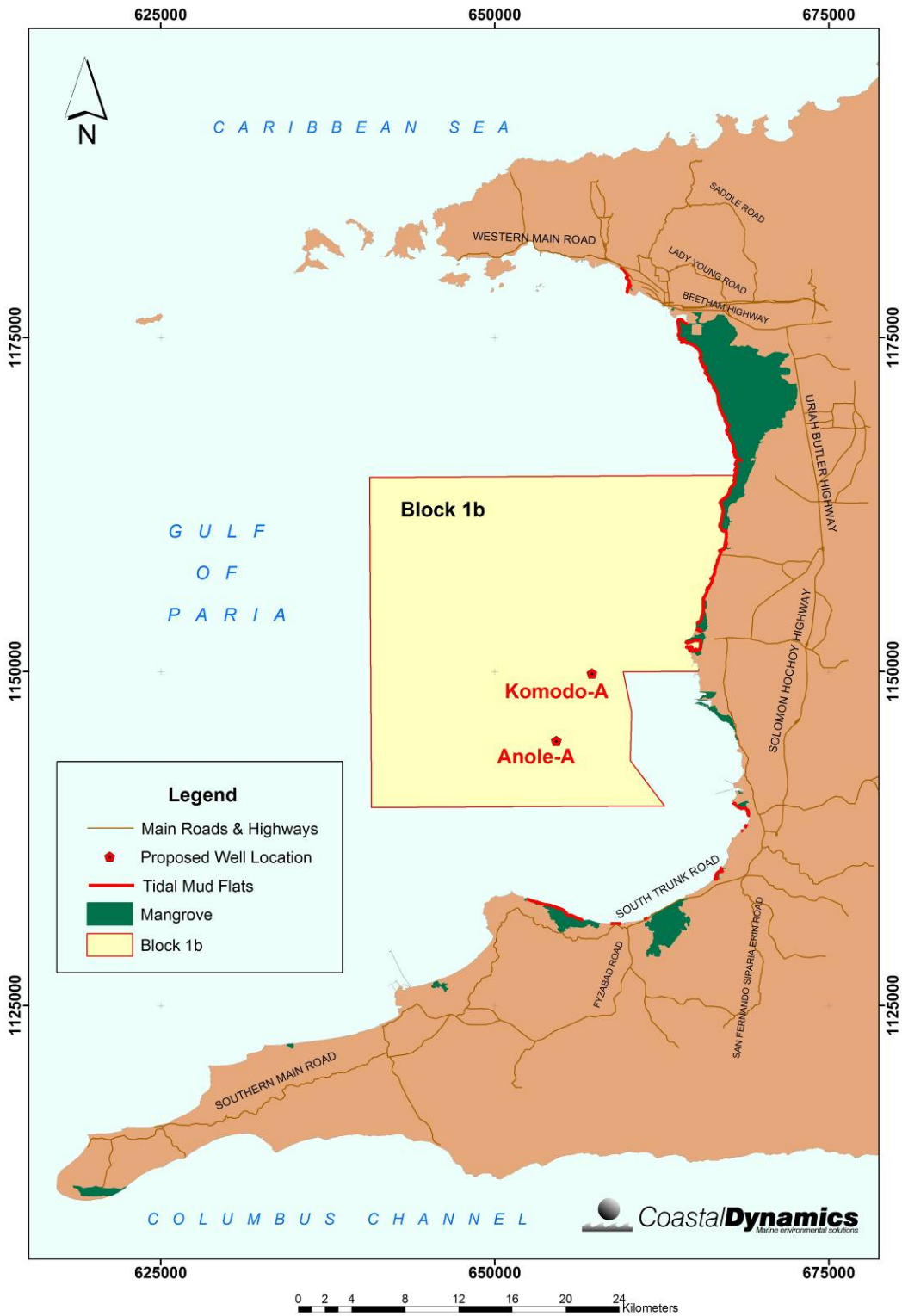


Figure 17: Current Road Network

### **6.3. Health Care Facilities**

The study area is serviced primarily by the San Fernando General Hospital and Couva District Health Facility. These facilities are designed to encompass routine and emergency cases and operate on a 24 hour basis. Additional health services can be secured at health centres located in Couva, Gran Couva, Claxton Bay, Marabella, Oropouche and La Brea. Health Centres are typically open Monday – Friday, 8 am – 4 pm and provide for routine and limited emergency cases. It has been proposed that a portion of former Caroni lands within the Felicity Estate be dedicated to a medical facility to service the Ministry of National Security. No additional information about these plans is currently available.

### **6.4. Emergency and Protective Services**

The Ministry of National Security has oversight over the various agencies providing emergency and protective services. Fire Services Division operates out a Southern Division headquarters located in San Fernando. Additional fire stations can be found in Couva, Mon Repos and Point Fortin. Fire Services are structured to deal primarily with onshore fire emergencies and are not able to provide much assistance to offshore events.

Similarly, the police service operates from a Southern Branch headquarters in San Fernando with additional police posts in Oropouche, La Brea, Mon Repos, Marabella and San Fernando.

## **7. Archaeological & Cultural Resources**

Published information on shipwreck, archaeological and historical sites is limited, however, data has been pieced together through discussions with representatives of the Trinidad and Tobago Archaeological Society, the Military Museum, and the Historical Unit and Maritime Services Division of the Ministry of Works and Transport. It has been noted that there are numerous shipwrecks and airplane wrecks in the Gulf. Most of those for which locations are known are located off the Chaguaramas peninsula.

The Military Museum also estimates that there are hundreds of explosive devices (battleship shells, unexploded depth charges, bombs, torpedos and other unexploded ordinance) left in the Gulf since World War II. Although it is generally thought that this ordinance is no longer dangerous, the Military Museum considers this to be a misconception and believes these devices could still post a threat.

## **8. Attitudes**

A series of stakeholder consultations were held during the period November - December 15, 2006. Stakeholders consulted included Government Ministries, State Agencies, Regional Administrative bodies, Representatives of the fishing industry including various regional fishing associations and relevant non-governmental organisations (NGOs). A complete listing of stakeholder consultations is found in Appendix I.

The key issues emerging from the consultations had to do with the pollution expected to result from the drilling mud and from the uncontrolled release of hydrocarbons. Fishermen in particular are concerned about the potential damage to equipment and potential damage to livelihood that could result from such releases. Questions were raised about compensation for damages caused by routine activity as well as from accidents. Stakeholders were also concerned about plans for waste disposal, particularly the disposal of the drilling mud.

The fishing community in particular is sensitive to the potential impacts of the proposed drilling activity. As an industry, they feel they have been continually neglected and recent announcements regarding plans for further industrial developments in the central Gulf coastal areas as well as the Gulf itself sends a message that they are being further marginalized. Fishermen are in favour of strengthened communication between themselves and PCTT. They will need advance warning of the movements and location of the drilling rig, exact location of the safety zone, the location of any caps or other permanent and semi-permanent structure on the sea bed, supply boat movements and information on any other auxiliary activity (operational discharges into the sea, well testing/flaring, etc.) which may impact on their ability to fish in the Gulf. The PCTT Fishing Survey captured some information on the fishermen's views on potential impacts from the proposed exploration drilling programme. Table 8 summarises those views.

**Table 8: Fishing Community Perceived Impacts**

<b>Potential Impact Element</b>	<b>Perceived Level of Impact</b>							
	significant	85%	minor	22%	no impact	20%	don't know	3%
<b>impact on seawater</b>	significant	85%	minor	22%	no impact	20%	don't know	3%
<b>impact on fishing grounds</b>	significant	55%	minor	14%	no impact	10%	don't know	
<b>changes in fish movement</b>	significant	76%	minor	9%	no impact	16%	don't know	
<b>changes in fish stocks</b>	significant	76%	minor	7%	no impact	17%	don't know	1%
<b>impact on mangroves</b>	significant	46%	minor	15%	no impact	34%	don't know	5%
<b>impact on beaches</b>	significant	49%	minor	13%	no impact	33%	don't know	5%
<b>damage to fishing gear</b>	significant	70%	minor	9%	no impact	21%	don't know	
<b>loss of access</b>	significant	69%	minor	20%	no impact	11%	don't know	
<b>damage to boats/engines</b>	significant	36%	minor	23%	no impact	41%	don't know	

Source: PCTT Fishing Survey (2007)

In addition to the damage expected to be caused by possible oil spills and pollution from drilling mud, fishermen were concerned about the potential of noise and vibration from the drilling to “run” fish. At the same time, however, they are concerned about the 500 m safety zone from outside perimeter of the rig stating that the lights from the rig have a tendency to attract fish.

Concern was also raised about the increased marine activity within the study area, particularly that of the supply boats and the potential for damage to nets

## References

Arthur D. Little International Inc. *Environmental Impact Assessment for Exploration Drilling in Offshore Block 2 (ab)*. Prepared for BHP Petroleum. April 1999

Atlantic LNG Company of Trinidad and Tobago. *Environmental Impact Assessment: Guapo Shoreline Protection Project*. November 2006.

Boodram, Kim. "From Chatham to Otaheite." *Business Express*/ January 3, 2007. p. 21.

Boodoosingh, Michael. *Fisheries Occasional Paper Series No. 2: A Review of Possible Impacts of Human Activities on Fisheries in the Coastal Waters of Trinidad with Emphasis on the Gulf of Paria*. Fisheries Division, Ministry of Agriculture, Land and Marine Resources, Government of Trinidad and Tobago. September 1992.

Central Statistical Office (CSO). *2001 Annual Statistical Digest No. 46*. Ministry of Planning and Development. 2005.

Central Statistical Office (CSO). *2000 Population and Housing Census: Community Register*. Ministry of Planning and Development, Government of Trinidad and Tobago. 2002.

Central Statistical Office (CSO). *2000 Population and Housing Census: Data Extracts*. Ministry of Planning and Development, Government of Trinidad and Tobago.

Chan A Singh, Christine. *Fisheries Division Information Series #10: Marine Fisheries of Trinidad and Tobago Atlas Part 1-Trinidad Inshore Fisheries*. Fisheries Division, Ministry of Agriculture, Land and Marine Resources. Government of Trinidad and Tobago. July 2002.

Chan A Singh, Christine. *Fisheries Division Internal Report No. 3: Draft Report on 1998 Census of Fishing Vessels (Trinidad)*. Fisheries Division, Ministry of Agriculture, Land and Marine Resources. Government of Trinidad and Tobago. May 1999.

"Fiscal Policy Failing Fishermen." *Sunday Guardian*. October 15, 2006. p. 21.

Fisheries Division, Ministry of Agriculture, Land and Marine Resources, Government of Trinidad and Tobago. "Report on Fishing Units by Home Port and Primary Gear Type grouped by Coast" from 2003 Census of Fishing Vessels. Unpublished.

Gooding, Ian. "The T&T Economy: Questions & Answers with Senator Conrad Enill." *Trinidad and Tobago Industry of Chamber and Commerce Contact Magazine* Vol. 6 No. 4 2006. p. 24 – 25.

Institute of Marine Affairs. *A Guide to the Beaches and Bays of Trinidad and Tobago*. 2004



Institute of Marine Affairs. *Environmental Impact Assessment for the Establishment of an Industrial Estate at Union Estate, La Brea (Phase 2) Southwestern Trinidad.- Final Report.* Prepared for The National Gas Company of Trinidad and Tobago Limited (NGC) & The National Energy Company of Trinidad and Tobago Limited (NEC). December 2003.

Jankie, Ariti. “*Water Taxi worries fishermen, drivers.*” Trinidad and Tobago Express. January 11, 2007. p. 16.

Javeed, Asha. “*Going Offshore at Otaheite.*” Business Guardian. January 11, 2007. pp 4 – 5

Halcrow in association with ADeB. *National Conceptual Development Plan.* Ministry of Planning and Development, Government of Trinidad and Tobago. October 1999.

Parsons Brinkerhoff in Association with Trintoplan Consultant Limited and Kisinger Campo and Associates Corp. *Diagnostisic Report – Final Draft: Comprehensive Transportation Study.* Prepared for the Ministry of Works and Transport. September 2006.

Petro-Canada UK Limited. *Trinidad & Tobago Blocks 1a & 1b Seismic Program: Environmental Impact Assessment, Revision: 02.* August 2004.

Rambarran, Jwala. “*Dutch Disease in Trinidad and Tobago.*” Trinidad and Tobago Industry of Chamber and Commerce Contact Magazine Vol. 6 No. 4 2006. p. 8 – 9.

Ramjohn, David. *Fisheries Division Technical Report ? – Local Knowledge Survey.* FAO/UNDP Project Integrated Coastal Fisheries Management. Ministry of Agriculture, Land and Marine Affairs, Government of the Republic Of Trinidad and Tobago. 1995.

Stapleton, Roxanne. “*Transportation under the Microscope.*” Business Express. January 10, 2007. pp. 6 – 7.

Trinidad Guardian website archives. <http://www.guardian.co.tt/archives/2006-06-03/bussguardian1.html>

**Appendix I:** Summary Report for PCTT Fishing Survey

Socio-Economic Assessment  
Petro-Canada Trinidad and Tobago Exploratory Drilling Activities  
in Blocks 1a and 1b in the Gulf of Paria

## **Fishing Survey Summary Report**

Updated: 2/2/07

### **9. Introduction**

As part of the data collection activities of the Social Impact Assessment for the Environmental Impact Assessment of Petro-Canada Trinidad and Tobago's (PCTT) proposed exploration drilling activities in Blocks 1a and 1b of the Gulf of Paria, a survey was administered to a sample of the fishing community with the study area. The objectives of the survey were to (1) obtain data on current fishing activity in the Gulf of Paria, (2) capture data to help create a profile of Gulf fishermen, and (2) gather information on views/concerns of fishing community with respect to PCTT's proposed exploration drilling activities.

A minimum sample size of 10% was selected. In determining the sample size, emphasis was placed on the fishing communities of the central Gulf, those communities expected to be most affected by the proposed activities, where the fishing community was estimated to be approximately 420 fishers. Ultimately questionnaires were administered to a 15% sample size (61) of this population. Limited sampling was done for fishing communities in the northern and southern Gulf where a 10% sample was targeted for those landing sites estimated to have more than 20 boats operating from that location (Carenage, Cocorite, N.P. Fishing Complex, Bonasse [Cedros], and Fullerton). Surveys were administered to a random sample of fishermen at landing site locations estimated to have more than 20 boats. Table 1 indicates locations of sampling and numbers of surveys completed per location.

Surveys were administered during the period January 10 – 30, 2007. Some of the difficulties reported to be encountered by the field staff at certain locations included (1) limited number of fishermen on hand and (2) unwillingness to participate. These difficulties were addressed by field staff going to actual homes of fishermen in order to complete surveys and allowing respondents to self-complete the questionnaire. A total of 90 questionnaires were completed. A copy of the questionnaire is found in Appendix I. An analysis of the data collected is found in the following section.

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**Table 1. Fishing Survey Sampling Details**

Home Ports	No. of Vessels	Targeted Sample Size*	No. of Surveys Completed
<b>Northern Gulf of Paria</b>			
Carenage	26	7	5
Cocorite Fishing Centre	40	7	9
N.P. Fishing Complex (Port of Spain)	26	4	0
<b>Sub-Total</b>		18	14
<b>Central Gulf of Paria</b>			
Brickfield	25	6	10
Orange Valley	21	6	3
Carli Bay	20	6	7
Claxton Bay	24	6	15
San Fernando	45	8	9
Otaheite	38	8	17
<b>Sub-Total</b>		52	61
<b>Southern Gulf of Paria</b>			
Bonasse (Cedros)	32	6	6
Fullerton	28	6	9
<b>Sub-Total</b>		12	14
<b>OVERALL TOTAL</b>		82	90
* Fishing population was calculated by estimating two persons per vessels.			

## 10. Data Analysis

### Fisher Profile

Survey respondents represented a wide range of ages (21 – 69) with an overall average of 44. Males appear to dominate the industry with only one woman (from Otaheite) participating in the exercise. Fishers tend to live in the communities very close to the landing site. Most indicated they have lived in these locations their entire lives.

Ninety-two percent (92%) indicated fishing was their main income source. Twenty-seven percent (27%) indicated having additional sources of income. Additional income came from such sources as jobs in construction, carpentry, security, delivery, public service, boat repair and ice supply; employment as a Fisheries Division data collector, a teacher, bar owner; pensions.

Weekly incomes from fishing were very difficult for respondents to estimate as they varied greatly depending on the catch for that week. As such the responses ranged greatly some indicating incomes of between 0 - \$5,000. In terms of an overall average, thirty-seven (37%) of respondents indicated they earned between \$1,000 – 2,000 weekly. Twenty – nine percent (29%) estimated incomes between \$2,000 – 5,000; and twenty-two (22%) estimated weekly incomes between \$500 - \$1,000. It should be noted that on a good week income can be well over \$5,000,

however, this is not generally a sustained level. Fishermen report that there are weeks when income is next to nothing.

Supplemental incomes tend to be less than \$1,000 weekly (44% of respondents), while twenty percent (20%) report incomes between \$1,000 – 1,500 and twenty-eight percent (28%) report supplemental incomes in excess of \$1,500.

Most fishermen surveyed (83%) are registered with the Fisheries Division. Seventy percent (70%) operate from only one landing site while the remainder move to different sites depending on the season, availability of fish, etc.

### **Fishing Gear and Equipment**

Of those surveyed, seventy-one percent (71%) indicated they owned their own fishing vessel, generally only one or maybe two. Only twelve percent (13%) of boat owners indicated owning three or more boats.

Ninety-two percent (92%) of those surveyed owned or operated Type I pirogues (19 – 33 ft w/ outboard engines and all manual operations). Four percent (4%) utilized Type III vessels (34 – 40 ft w/ inboard engines and partly mechanized operations). Five percent (5%) indicated operating Type IV industrial trawlers (71 – 74 ft vessels with inboard engines and generally mechanized operations).

Fishing gear varied, however, forty-five percent (45%) of respondents indicated nets were their primary fishing method. Bottom lines (banking) were selected by twenty-two (22%) of respondents, followed by surface lines (trolling) which was the primary gear of choice by thirteen Percent (13%). Table 2 summarizes choices for fishing gear.

**Table 2: Fishing Gear Preferences**

	<b>Primary Fishing Method</b>	<b>Secondary Fishing Method</b>	<b>Estimated Cost of Equipment</b>
<b>Nets</b>	45%	17%	\$15,000
<b>Bottom Lines (banking)</b>	22%	41%	\$2,000 - \$5,000
<b>Surface Lines (trolling)</b>	13%	6%	\$2,000 - \$5,000
<b>Trawling</b>	9%	27%	\$5,000 - \$30,000
<b>A la vie</b>	9%	6%	\$5,000
<b>Fishpot</b>	1%	3%	\$2,000 - \$5,000
<b>Switchering</b>	1%	0%	\$1,000
	100%	100%	

Over eighty percent (80%) of respondents indicated fishing between 5 – 7 days per week, many indicating that they fish seven days per week. Bad weather and bad seas was most often cited as a reason for not fishing, followed by equipment problems and scarcity of bait. Other reasons cited for not fishing included tides, illness, safety/security, no fish biting, level of industrial activity and cost of fuel.

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Fishermen reported fishing at all times of the day and night, however two main shifts emerged from the responses, e.g. going out at 4 – 6 in the morning and returning between 4 – 6 in the afternoon or going out between 2 – 4 in the afternoon and returning the next morning between 4 – 8 am. Net fishers were split between these two shifts , however most other gear tended to be used primarily during the day shift.

### **Fish Catches**

Fish catches, like weekly income, were very difficult for respondents to estimate due to their constant variance. The types of fish caught and the average ranges of daily catch are summarized in the table below.

**Table 3. Summary of Estimated Fish Catches**

<b>Main Species reported in Catches</b>	<b>Range of Daily Catch Sizes (lbs)</b>
Kingfish	80 - 400
Red Fish	50 - 300
Cavalli	80 - 300
Salmon	80 - 100
Carite	80 - 400
CroCro	100 - 500
Grouper	80 - 100
Ancho	20 - 50
Mullet	40 - 2,000 *
Bechine	100 - 500
Catfish	100 - 500
Shark	80 - 300
Shrimp	60 – 100

\* large catches of mullet were primarily reported in Claxton Bay

The fishing survey did not reveal any trends in seasonality either in terms of fishing methods or the catching of fish types. Although individual fishermen did indicate some seasonality in terms of their choice of gear, no larger trends could be identified when all responses were considered. What was noted repeatedly, however, was that many of the fish species caught were found to be more abundant during the rainy season. Tides (and moons) were also raised as an issue by some fishermen in terms of their choice of when to fish.

Eighty-four percent (84%) of respondents indicated they felt catches overall had been getting worse over the last five years; eleven percent (11%) felt there has been no change.

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When asked to compare catches in 2006 with those in 2005 sixty-seven percent (67%) indicated they were worse, twenty percent (20%) felt they had not changed and thirteen percent (13%) reported that they had gotten better.

Industrial pollution in the Gulf was the main reason cited for perceived changes in catches. Trawling was the next most cited cause of change, following by man-made pollution, over fishing and general changes in environmental conditions (longer rainy seasons, etc.). In terms of where to fish, these areas are broadly defined in the following figures.

### **Perceived Impacts of Drilling Activity**

The majority of respondents (86%) had previous knowledge of the proposed exploration drilling activities. Those respondents who had the least knowledge of the project were from the sampling areas in the northern and southern Gulf (Carenage, Cocorite, Bonasse and Fullerton).

Respondents were most concerned about oil spills occurring as a result of the drilling (and most likely also thinking ahead to the extraction phase) and felt that the oil and drilling muds in the water would greatly impact their livelihoods. Of greatest concern was the potential impact on seawater quality. Other issues of concern to over two thirds of respondents include changes in fish stocks and fish movement as a result of drilling, damage to gear (largely as a result of drilling mud and oil spills but also potentially caused by the supply boats) and loss of access (not being able to fish in the area where the drilling rig is located).

Potential Impact Element	Perceived Level of Impact							
	significant		minor		no impact		don't know	
<b>impact on seawater</b>	85%		22%		20%		3%	
<b>impact on fishing grounds</b>	55%		14%		10%			
<b>changes in fish movement</b>	76%		9%		16%			
<b>changes in fish stocks</b>	76%		7%		17%		1%	
<b>impact on mangroves</b>	46%		15%		34%		5%	
<b>impact on beaches</b>	49%		13%		33%		5%	
<b>damage to fishing gear</b>	70%		9%		21%			
<b>loss of access</b>	69%		20%		11%			
<b>damage to boats/engines</b>	36%		23%		41%			

### **Ideas Regarding Industrial Assistance**

Sixty-two percent (62%) of respondents stated that they had received a radar reflector from PCTT. Of those, forty-six percent (46%) felt that the reflector had been helpful; twenty percent (20%) felt they were only somewhat helpful and twenty-eight percent (28%) indicated that they didn't know. Most of those responses were due to the fact that the fishermen fished in the day and therefore boats could see them or that they hadn't yet installed the reflector.

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Safety equipment and training were one of the main areas suggested by respondents for assistance. Specific suggestions included providing lifesaving and safety equipment (flares, life jackets, lights, radios, GPS) for boats; provide training in first aid, boat safety and navigation; put navigational lights and markers showing the location of anything located on the seabed (capped wells, rig supports, etc) as well as along shore to help fishermen find their way better at night. Safety concerns were also raised in connection with the increased marine traffic caused by the supply boats. Security concerns (although not related to the drilling activities) were raised with respect to increased piracy in the area and the need for a greater coast guard presence in the Gulf.

Compensation for impacts on livelihood was perhaps the issues most often raised. Fishermen are concerned that the impacts on their livelihood, either through loss of access, change in quality and quantity of catches and damage to equipment will be afforded adequate compensation. Several respondents were also interested in gaining employment outside of the fishing industry as they are becoming increasingly concerned about the viability of their livelihood given the increasing levels of all types of activity in and corresponding increased demands being placed on the resources of the Gulf. Many are concerned about industrial pollution in the Gulf and feel that industry should play a greater role in maintaining and protecting the marine and coastal resources.

Finally, respondents at every landing site made suggestions for improvements in the port facilities. Improvements range from the provision of proper storage and security facilities for fishing gear (which often gets stolen), cold storage facilities for fish catches, ice machines, on site gas facilities, and proper changing facilities and washrooms.

Respondents were very keen to have open and regular lines of communication between fishing industry representatives and representatives of the oil and other companies operating in the Gulf.

## **11. Individual Landing Site Summaries**

### **Brickfield**

Average age of fisher is 43, majority surveyed have been fishing for over 20 years. All indicate living in the area and have been doing so for most of their lives. Nine out of ten are registered fishers. All indicated fishing was their primary source of income.

None export directly, majority sell their catches to local vendors, wholesalers, and a few sell to exporters. Incomes were stated to be varied, however, the majority of survey respondents indicated a weekly income of \$1,000 – 2,000.

Fifty percent (50%) operate solely from Brickfield, the other half indicated using landing sites in Chaguaramas on occasion.

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Eighty percent (80%) of survey respondents indicated they owned their own boat. The majority indicated owning one or two boats, however, several respondents indicated owning between 3 – 5. The vast majority of boats utilized were pirogues (21 – 33 ft) with two outboard engines.

Bottom lines and gillnets were the most prevalent types of fishing gear utilized by these fishermen, although indicated they sometimes used longlines and did some trawling. The trawling, however, was primarily to catch bait.

Most fishermen go out to fish seven days a week. Net fishers tend to fish during the day (6a – 6p) however line fishers fish in different shifts which cover a 24-hour period.

There is no strong seasonality indicated by the survey responses with many responding that they fish all year, however, it is acknowledged that fish tend to be more abundant at the start of the rainy season.

Tides, bad seas and equipment malfunctions are the primary reasons for not going out to fish.

Brickfield fishermen indicated they would like a jetty which could provide them with access to deeper waters. The areas close to shore where boats are docked is muddy and shallow.

### **Orange Valley**

*Note: summary is based on only three surveys, however, based on comparisons of fisheries data on this landing site, fairly accurately, represents the current activity.*

Fishermen are long time residents of the Couva/Freeport area. Fishing is main source of income with incomes ranging from \$1,000 - \$5,000. All are registered with Fisheries Division and own their own vessels. Orange Valley fishing vessels are predominantly industrial trawlers, with some semi-industrial trawlers. The boats operate with crews of 3 – 5 persons. Equipment is estimated to cost between \$20,000 - \$30,000. Trawling is obviously the main type of fishing here, and the type of fish caught is shrimp. Trawling takes place year round and round the clock.

### **Carli Bay**

Based on survey responses, the average age of fishermen in Carli Bay is 45. All have lived in the area for over 20 years. All indicate fishing is their main source of income and estimated weekly income is predominantly reported to be between 2,000 – 5,000. Forty percent (40%) indicate having additional sources of income which bring in between 1,000 – 1,500 weekly.

Eighty-six percent (86%) are registered fishermen. Over seventy percent (70%) operate from sites other than Carli Bay, namely Orange Valley and San Fernando. All indicated owning their own vessels and generally owned between one and two boats. All respondents indicated operating pirogues (19 – 33 ft) with outboard engines.

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Nets were the preferred fishing gear and respondents indicated they tended to fish at night. Most stated they fished year round, five to seven days per week.

### **Claxton Bay**

Average of fishers in Claxton Bay is 42. All live within the area and have done so all their lives. Most indicate they have been fishing for over 20 yrs and that it is their primary source of income. The majority (80%) are registered with the fisheries division.

Sixty-six percent (66%) of respondents operate solely from Claxton Bay; the remainder indicated landing at other sites such as Orange Valley, San Fernando, and Cedros.

Survey respondents indicated weekly incomes averaging as high as \$5,000, although, it was noted that incomes can vary greatly from week to week. A few respondents supplemented this income with other activities. Approximately 30% of respondents indicated that they do export their catch.

Only 50% of those surveyed indicated owning their own vessel. A little over half of those who own vessels own one or two, the remainder indicated owning between three and five boats. The boat of choice is the pirogue (21 – 33 ft) with one outboard engine.

Gillnets were the primary choice of fishing gear for all respondents. Other types of gear utilised included bottom lines (most preferred second method), surface lines and fishpots. Gillnets were most often valued at between \$5,000 - \$10,000.

Net fishing most often took place at night (approximately 6 pm – 6am), however, there are some fishermen who operate during the day. Most indicated operating seven days a week on a year round basis. It was noted repeatedly that heavier catches were generally recorded in the period June – Oct/Nov. Bad weather was most often cited as the reason for not going out to fish. Main types of fish caught include kingfish, carite, redfish, salmon, mullet, catfish and cro cro.

### **San Fernando**

San Fernando fishermen had an average of 45 years of age and primarily from the San Fernando area. They have all lived in the area for more than ten years, two thirds for more than 20 years. All indicate fishing as the main source of income and estimate weekly incomes between \$500 – 5,000. All are registered fishermen and have been operating from the San Fernando site for over ten years. Over 75% of respondents own their own vessels, the majority of those indicating that they own one or two. Crews vary between 2 and 3 persons and the main type of vessel operated is a pirogue (21 – 33 ft) some with one and some with two outboards.

The main fishing methods are nets and bottom lines (banking), with a few fishermen indicating they also utilize trolling, fishpot and a la vie methods.

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Two thirds of fishermen indicate fishing seven days per week, the remaining fish between 3 -5 days. Bad weather, illness, and increased industrial activity were the main reasons cited for not being able to fish. Net and bottom line fishermen indicate that they fish year round. Fishing takes place both during the night and day with both main types of fishing (nets and banking).

### **Otaheite**

Otaheite fishermen responding to the survey averaged 38 years of age. Otaheite was the only landing site which has a woman fisher/boat owner and survey respondent. The fishermen are all long time residents of the area (all residents for over 10 years, 70 % of respondents in the area for over 20 years), but come from a variety of villages surrounding the fishing port. Although nearly all indicated fishing was their main source of income, 38% supplement their income with other activities, including jobs in construction, teaching, public service, ice vending and bar owner. Weekly incomes from fishing were most often cited as being between 1,000 – 2,000.

Eighty percent (80%) indicated they did not export their catch but rather sold directly to vendors and wholesalers. Otaheite has retail and wholesale vending activity right at the port. Twenty percent (20%) indicated that they do export.

Only 65% of the respondents indicated they were registered fishermen. Over 40% indicated that they operate from landing sites other than Otaheite. Moruga, Cedros, and Orange Valley were cited as other locations.

Just under half of the respondents (48%) indicated they owned their own fishing vessels. Eighty percent (80%) of owners use pirogues (19-33 ft) with outboard engines, thirteen percent (13%) operate pirogues (27-42 ft) with inboard engines and seven percent (7%) operate industrial trawlers.

A wide variety of fishing gears are utilized, with bottom lines (banking) and trawling being the most popular. Most survey respondents indicated fishing year round, and primarily during the day. Some indicated operating both day and night shifts. All respondents indicated fishing between 5 – 7 days/week.

### **Fullerton**

Fullerton fishermen surveyed have an average age of 46 and are long time (20+ years) residents of the area. All indicate fishing is their main source of income and are registered with the Fisheries Division. None indicated operating from any other fishing beach All those surveyed indicated they owned their own vessels which were pirogues (19 – 33 ft) with one or two outboard engines. Weekly incomes are estimated between 500 and 5,000, with the average somewhere between 3,000 – 5,000.

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Fishing methods included surface and bottom lines, nets, trawling, seine and a la vie. Main fishing methods identified were nets and a la vie; trawling was cited as a secondary method for over half of those surveyed. Just over sixty percent (60%) indicated fishing seven days per week, the remainder fish between three and five days weekly. Bad seas and lack of fish were the main reasons cited for not going out to fish.

### **Cedros/Bonasse**

The average age of the fishermen surveyed was 54 years of age. All respondents cited fishing as their main source of income and indicated over 20 years of residence in the area. All are registered with the Fisheries Division. While all respondents indicated they have been fishing out of Cedros for over ten years, 50% indicated they utilized other landing sites as well. Moruga was mentioned as an alternative port.

Pirouges (19 – 33ft) were the vessels that all fishermen indicated they operated. Boat owners indicated using crews of 3 – 5 persons.

Surface lines and nets were cited as the main fishing method, however, trawling, fishpots and seine (mainly for bait) were also cited as methods used. Not all fishermen indicated they fished seven days per week. Bad weather and equipment malfunction were the main reasons cited for not going out.

Weekly estimated incomes tended to be somewhere between 2,000 – 3,000, however, this is not a guaranteed weekly figure.

### **Cocorite**

Fishermen in Cocorite have an average age of 41 and are all long time residents of the area (20+ years). Two thirds of survey respondents indicated fishing was their primary source of income. Other sources of income cited were security guard, boat repair, delivery services, and fisheries division data collector. Incomes range between 1,000 – 5,000 with other half of the respondents indicating weekly incomes in the 2,000 – 5,000 range. Supplemental income sources tended to bring in less than 1,000.

Nearly all fishermen were registered with Fisheries Division. None of the respondents indicated operating from another fishing beach. All indicated that they have been operating from Cocorite for over 10 years. Over 75% of those surveyed owned their own boats. Only one boat owner indicated owning more than 2 boats. All respondents indicated they operated pirogues with outboard engines. Fishing methods utilised included surface lines, bottom lines, nets, trawling, fishpot, a la vie, and seine (for the purpose of catching bait). The most often used gear were trolling, alavie, and banking. Most fishermen fish 7 day/week, and are held back mainly by bad weather.

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## **Carenage**

Respondents to the survey in Carenage averaged 45 years of age. All lived in Carenage their entire lives and nearly all indicated fishing was the primary source of income. Income estimated varied with an average estimated at around 2,00 – 3, 000. Sixty percent (60%) of the respondents indicated they supplemented their fishing income with other sources. Less than half of those responding indicated they were registered fishermen.

Just over half owned their vessels. All fished from pirogues. Methods used included surface lines, bottom lines, net, fishpots, seine (to catch bait), and a la vie. A la vie was the chosen at the main fishing method for the majority of fishers.

**Appendix I:** PCTT Fishing Survey Questionnaire

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## PETROCANADA SURVEY

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Survey Objectives:    1) Obtain data on current fishing activity in Gulf of Paria  
                              2) Gather information on views/concerns of fishing community with respect to  
                                  PetroCanada's proposed exploration drilling activities in Gulf of Paria

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Date \_\_\_\_\_

Questionnaire # \_\_\_\_\_

Location \_\_\_\_\_

Good morning/afternoon/evening. My name is \_\_\_\_\_. I am working with Coastal Dynamics, a marine environmental consulting firm, who is conducting an environmental impact assessment (EIA) of proposed exploration drilling activities in the Gulf of Paria. As part of the EIA, Coastal Dynamics is conducting a survey on current fishing activity in the Gulf. Could you please spare 15 minutes of your time to participate in this survey?

### 1.0 CHARACTERISTICS OF INTERVIEWEE:

1.1 Name :(Optional) \_\_\_\_\_ Age: \_\_\_\_\_ Sex: M\_\_\_\_\_ F\_\_\_\_\_

1.2 Address: \_\_\_\_\_

1.3 How long have you been living in the area? < 2 yrs  2-5 yrs  5-10 yrs  10-20 yrs  20+ yrs

1.4 Is fishing your main source of income? Yes  No

1.5 What, if any, are your other sources of income? \_\_\_\_\_

1.6 What do you estimate as your weekly income from fishing?

< \$500  \$500. to \$1000.  \$1000 to 2000  \$2000 to \$5000.  >\$5000.

1.7 What do you estimate as your weekly income from other sources?

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< \$800     \$800. to \$1000.     \$1000 to 1500     >\$1500.

1.8    Do you export fish?    Yes     No

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## 2.0 Resource Use :

2.1 Are you a registered fisher with the Fisheries Division? Yes  No

2.2 Do you operate from any other fishing beach? Yes  No

2.3 How long have you been operating from this fishing beach?

Less than 1 year  Two – five years  Five to ten years  More than ten years

2.4 Do you own the fishing vessel you operate? Yes  No  (*go to 2.5*)

If yes, how many vessels do you own? < 2  3-5  > 5

How people work on the boats that you own 1 - 2  3-5  > 5

2.5 What types of vessels do you own or operate? (Tick from the list below)

a) Pirogue (6-10 m)

b) Pirogue with inboard engine (8-12 m)

c) Stern Drag with winch, inboard engine, frame for trawl net (10-12 m)

d) Industrial Trawler with 2 outriggers, 2 industrial nets (17-22 m)

2.6 What are your fishing methods? (tick all that apply)

Lines - trolling  banking or palangue

Net (ex. Driftnet, gillnet, fillet net)

Trawling

Fishpot

Seine

Other \_\_\_\_\_

2.7 What is your main fishing method? \_\_\_\_\_

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2.8 What is the estimated cost of equipment for this method (excluding boats, fuel, boat maintenance, etc)?

- < \$1000.
- \$2000. to \$5000.
- \$5000. to \$10000
- \$10000 to \$15000
- \$15000 to \$20000
- > \$20000
- Don't know

2.9 What is your second preferred fishing method? \_\_\_\_\_

2.10 What is the estimated cost of equipment for this method (excluding boats, fuel, boat maintenance, etc)?

- < \$1000.
- \$2000. to \$5000.
- \$5000. to \$10000
- \$10000 to \$15000
- \$15000 to \$20000
- > \$20000
- Don't know

2.11 Where do you fish?

*(Use the map provided, allow the interviewee to point out on the map within and outside of the Gulf of Paria, mark these areas on the map provided. If interviewee has difficulty identifying fishing zone on a map, ask how far from shore he generally fishes)*

2.12 What time do you normally go out to fish? 3 - 6 am  6 am – 12 pm  12 - 6 pm  after 6 pm

What time do you normally return from fishing? 3 - 6 am  6 am – 12 pm  12 to 6 pm  after 6 pm

Other Leaving time  Returning time

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2.13 How many days do you fish per week? < 3  3-5  5-7

2.14 What might prevent you from fishing?

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2.15 What types of fish do you generally catch with each fishing method indicated above and at what time of year?

Type of fishing	Types of fish caught	Time of year
Surface lines (towing or trolling)		
Bottom lines (banking)		
Driftnet		
Trawling		
Fishpot		
Seine		
Other		

2.16 For each of the types of fish listed above, how many pounds of fish do you generally catch in a day?

Type of Fish	Quantity (lbs)

2.17 How do you think your catch has changed over the last five years?

Better  Same  Worse

2.18 More specifically, how do your catches in 2006 compare with those in 2005?

Better  Same  Worse

2.19 What do you think are the reasons for any changes in the amount of fish and type of fish caught over the last five years?

- Industrial Pollution (e.g. discharge from industrial estates, oil and gas activities)
  - Over fishing
  - Trawling
  - Man-made Pollution (Garbage, sewage etc.)
  - General environmental conditions (e.g. longer rainy season)
  - Other, \_\_\_\_\_
  - Not applicable
-

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### 3.0 THE PROJECT:

3.1 Have you heard about the proposed project – Exploration Drilling in the Gulf of Paria?

Yes  No

**If No, explain about the project (using attached project description & map)**

3.2 What do you think some of the impacts of this drilling might be?

**a. Marine-based impacts?** (Tick from the list below, check all that apply)

	<b>Significant Impact</b>	<b>Minor Impact</b>	<b>No Impact</b>
Impact on seawater quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Impact on the fishing grounds	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Changes in fish movements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Changes in fish stocks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**b. Land-based impacts?**

Impact on mangroves	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Impact on beaches	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**c. Impacts on Fishing Activity**

Damage to fishing gear	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Loss of access	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Damage to boats and engines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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3.3 Have you received a radar reflector from Petrocanada? Yes  No

3.4 If yes, how has it been helpful? \_\_\_\_\_

3.5 If not, would you like a radar reflector? Yes  No

3.6 In what ways can corporations/industry operating in the Gulf of Paria support the Fishing Industry?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

3.7 Any other issues/concerns related to the exploration drilling activities in the Gulf of Paria that you would like to raise?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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NAME OF INTERVIEWER(S): \_\_\_\_\_ SIGNATURE: \_\_\_\_\_

INTERVIEWER'S COMMENTS:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_