WEST PATRAIKOS LEASE AREA

ENVIRONMENTAL REPORT 2016

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WEST PATRAIKOS LEASE AREA – ENVIRONMENTAL REPORT 2016

HSE Policies & System, Environmental Studies and Implementation

1. General Description of Licensing Area

The affected environment is divided into the physical, geological biological and socioeconomic environments of the area of Western Patraikos Gulf. The physical environment consists of the meteorological and oceanographic conditions in the lease area, the characteristics of the sea floor and the existing acoustic environment.

The biological environment within the license area includes the following living elements:

- Marine plankton, including both phytoplankton (flora), which form the base of the food chain, and zooplankton (fauna), which link phytoplankton to fish production;
- Benthos, which refers to the animals (benthic fauna) and plants (benthic flora) that are found on, in or near the seabed;
- Nekton, which includes all the animals, but primarily fish species, found in the waters of the study area;
- Marine birds or sea birds, with particular attention to those species specifically noted in the Barcelona Convention Action Plan for Sea Birds;
- Marine mammals, sea turtles, and other protected or endangered species; and Areas of special concern such as Marine Protected Areas (MPAs)

Key marine environmental characteristics of the region include high salinity in sea waters, low concentration of nutrients, and low productivity and high seismicity. The socioeconomic environment discussions provide an overview of the main socioeconomic features relevant to the coastal area of Western Patraikos Gulf that may be affected by hydrocarbon activities.

Economic resources reviewed are as follows:

- Commercial and recreational fisheries;
- Aquaculture;
- Shipping and marine operations including ports and oil terminals;
- Telecommunications, specifically submarine cable systems;
- Recreation and tourism; and
- Archaeological resources, antiquities, and cultural heritage.

2. Project Description

The project consisted of the development of 3D Marine Seismic Survey (MSS) to be carried out in West Patraikos Gulf waters, in Western Greece. The MSS area is located within "West Patraikos Contract Area", awarded from the Greek State. In addition, the MSS includes acquisition of regional 2D seismic lines running inside and outside the Contract area.

The Contract area (red contour) and the Area of Interest (AOI, blue contour) for the carrying out of the 3D seismic surveys are shown in Figure 1. Coordinates of the AOI are reported in Table 1.

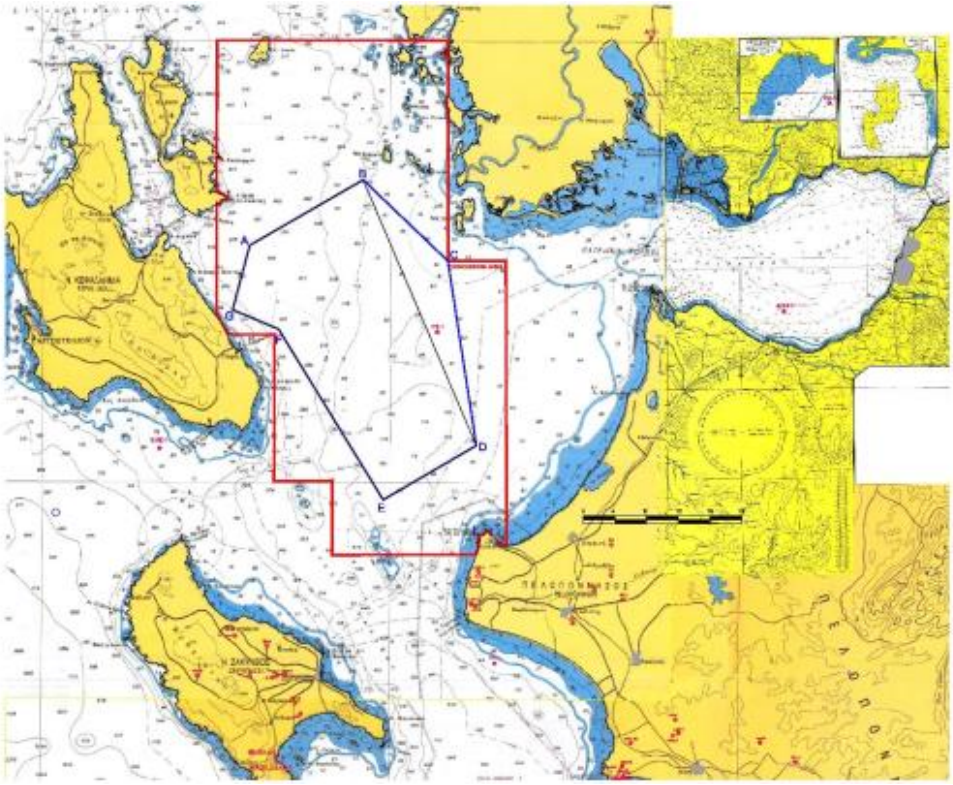


Figure 1 Contract Area (red contour) and Area Of Interest (blue contour) of 3D Survey (HELPE, 2015)

Table 1 Coordinates of Area of Interest of 3D Survey (HELPE 2015)

VERTEX	EASTING	NORTHING
A	482248.25	4235413.16
B	496522.32	4243654.30
C	507195.88	4233446.02
D	510766.71	4210225.94
E	499043.17	4203399.04
F	485884.86	4224868.84
G	480100.41	4227315.50

The Contract Area with the 2D Lines are shown in the following Figure 2. Length and coordinates of the 2D Lines are reported in Table 2.

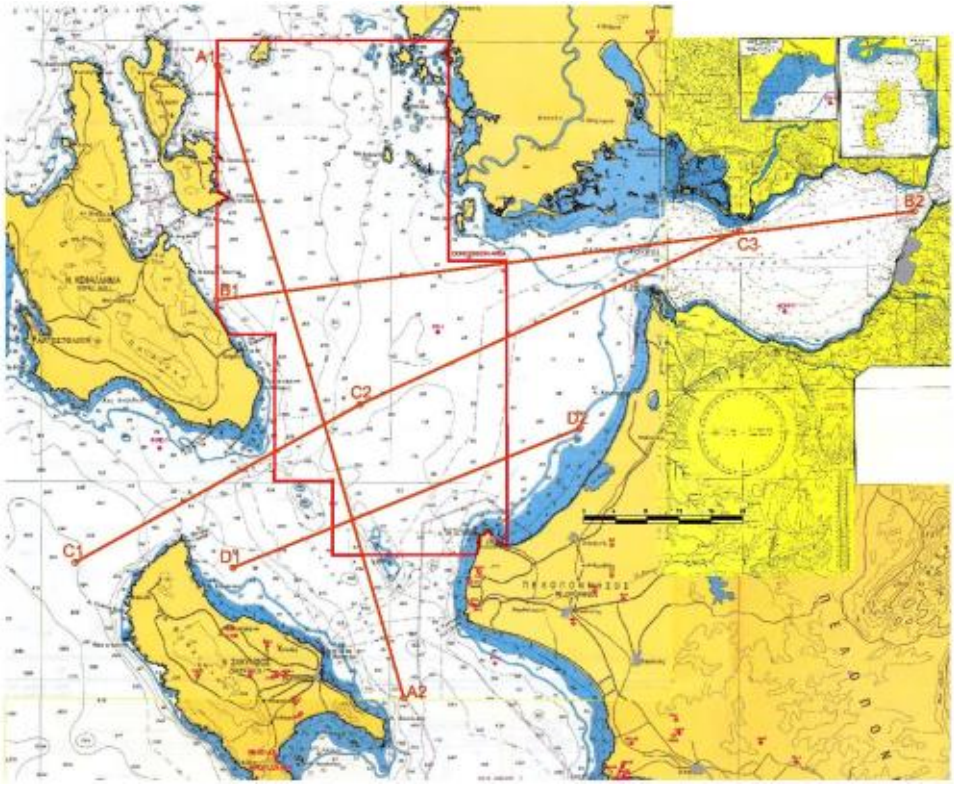


Figure 2 Contract Area and 2D Lines (HELPE, 2015)

Table 2 Coordinates of Area Of Interest of 2D Survey (HELPE 2015)

LINE	LENGHT	VERTEX	EASTING	NORTHING
A	83.0 km	A1	478131.27	4258078.61
		A2	489186.41	4221287.68
		A3	501621.70	4178425.71
B	88.5 km	B1	477989.78	4228535.92
		B2	565781.08	4239708.00
C	93.5 km	C1	460259.41	4195522.65
		C2	496101.56	4215409.75
		C3	543857.84	4237240.70
D	47.0 km	D1	480110.19	4194868.54
		D2	523716.37	4212403.26

Seismic acquisitions are expected to be undertaken on a 24 hour, 7 days per week basis, depending on weather conditions and operational efficiency. It has to be noted that vessels may be kept on standby due to adverse weather conditions, equipment repair and any emergency condition.

The survey was carried out through a towed marine seismic methodology that requires the use of:

- a seismic vessel;
- arrays of airguns as energy sources;
- a series of streamers as receiving system.

3. Introduction

The following are representing the implementation of HELPE's policies and systems related to the Patraikos Lease Area.

Hellenic Petroleum has operated during the past in the Ionian Seas as an operator and has gained a deep understanding and knowledge of the context, regulations, local communities' relations and management that could guarantee a smoother development process in the area under lease with no impact to the environment and local communities. In 2014, the Greek State awarded a Lease Agreement for Hydrocarbon Exploration and Production in the offshore deep water area of West Patraikos Gulf.

Hellenic Petroleum, acting as Operator, is fulfilling its commitments and has planned the exploration work program by implementing the most up-to-date, safe and environmentally friendly technological methods and practices. Hellenic Petroleum has recently executed successfully a 3D-2D marine seismic survey with the outmost respect to the local social and physical environment of Patraikos Gulf.

Throughout the course of the seismic campaign, Hellenic Petroleum developed policies, procedures and manuals related to the activity. This list includes:

1. Environmental Baseline Report prior to the commencement of the operations.
2. Environmental Action Plan for the 3D and 2D marine seismic survey for West Patraikos Lease area.
3. HSE offshore seismic project plan for West Patraikos Lease area and bridging documentation.
4. Stakeholder Engagement and External Auditing

4. HSE Studies and Reports

4.1. Environmental Baseline Report & Environmental Action Plan

Environmental Baseline Report

The purpose of the Environmental Baseline Report was the collection of data, the survey and evaluation of the environmental condition in the exploration area in order to:

- Survey the condition of the environment within the exploration area before starting any work, to ensure non liability of the contractor for environmental damage that may occur in the research area from other activities.
- Be part of an integrated system for monitoring the condition of the environment in the research area, to allow the monitoring of any impact of the individual stages of the research program.

The elaboration of the Basic Environmental Study of the Wider Research Area was based on the JMD 170225/2014 (GG 135/B/27.1.2014), which sets out the specifications for environmental licensing files of projects and activities and on the requirements of JMD 169896/ 8.08.2013 (*"Approval of Strategic Environmental Assessment (SEA) for hydrocarbon exploration and exploitation in the area of the Western Gulf of Patras")* according to which environmental indicators shall be used as fundamentals of monitoring and they shall represent in a comprehensive way important aspects of developments in the environment.

The Report addressed the existing physical, biological and socioeconomic environment and sensitivities of West Patraikos (Figure 3). Topics regarding the physical environment covered geography, bathymetry and seabed morphology, seabed sediments, geology, oceanography, meteorology and acoustic environment.

The biological environment focused on the marine ecosystem, marine vegetation, plankton, benthos, fish and fish habitats, aquacultures, marine mammals, seabirds, sea turtles, protected sites and sensitive habitats. The socioeconomic environment was also addressed which included the local economy, tourism, commercial fishing, submarine cables, shipping and ports as well as reference to wrecks and the archaeology of the area.

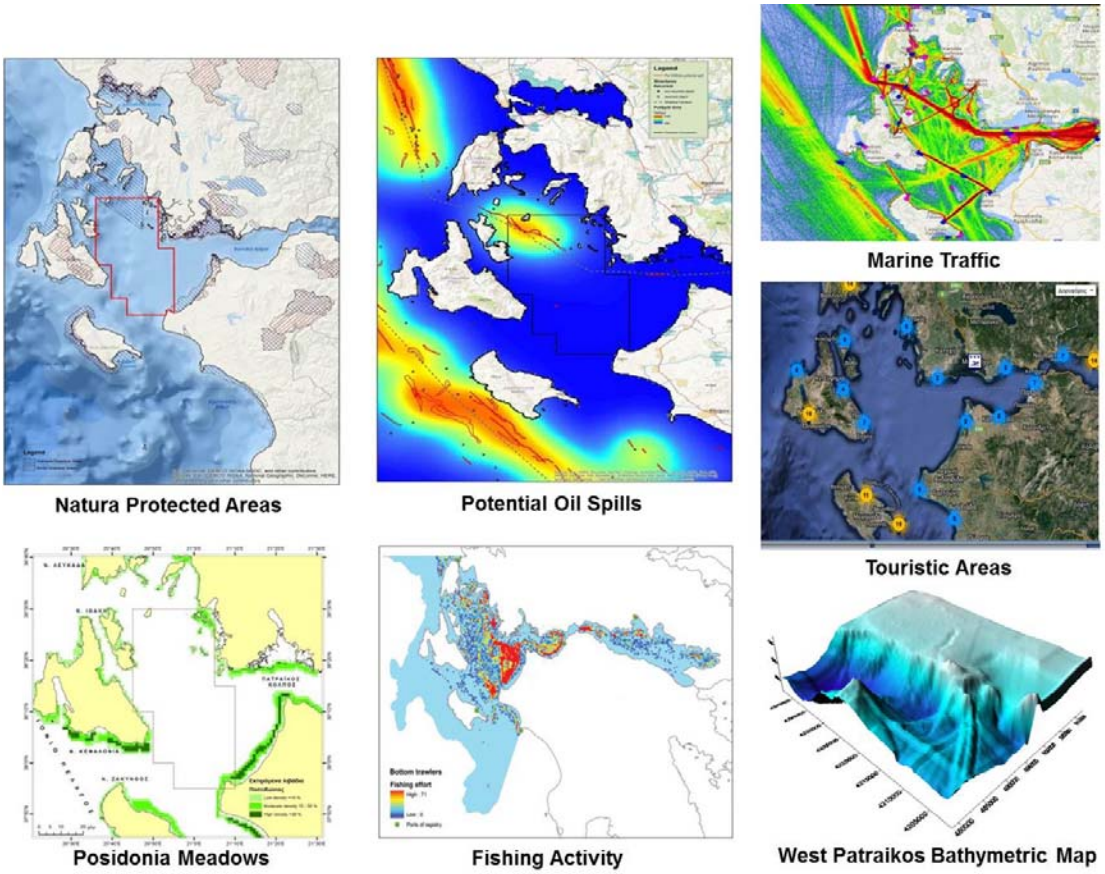


Figure 3 Biological and Socioeconomic Environment and Sensitivities of West Patraikos

Environmental Action Plan

Purpose of the Environmental Action Plan was:

- the assessment and evaluation of impacts of the proposed activities on all environmental components;
- the assessment and evaluation of environmental risks for the seismic activity;
- to propose mitigation measures in order to minimize the risks and impacts and relevant monitoring during the project activities.

In particular in the Decision of the approval of the SEA study the following requirements of the EAP were set:

- detailed and documented compliance of the proposed Marine Seismic Survey with all the requirements of the legislation on the environment.
- minimize the impact of the proposed Marine Seismic Survey to critical components of marine ecology.
- limiting disruption to existing maritime activities such as fishing.
- especially with regard to prevent effects on cetaceans, the measures of the EAP of the Marine Seismic Survey should as a minimum include provisions for the following issues:
  - Complete response to commitments and guidance of international agreements which have been signed by Greece, as in particular the ACCOBAMS.
  - Sufficient number of appropriately trained marine mammals observers on board for the visual and passive acoustic observation of marine mammals and interruption of air guns, in case of their approach towards.

The potential impacts of the project activities have been identified, with regard to abiotic, biotic and human environment. Particular attention has been given to marine noise, marine ecology and socioeconomics environment. The impact of marine noise has been evaluated based on the results of modelled noise propagation. Identified impacts were focused on the impact on marine mammals due to marine noise that, considering the scheduled period and the limited duration of the activity, can be considered moderate for the presence of the areas of special importance for cetaceans and due to the possible behavioral response of mammals to noise.

In order to protect the marine fauna, with particular regard to the marine mammals, mitigation measures were implemented during the survey in accordance to ACCOBAMS and JNCC Guidelines, with particular regard to the following:

- presence on board of qualified Marine Mammals Observers (MMO) and technicians for Passive Acoustic Monitoring (PAM);
- adoption of the soft-start technique and establishment of an Exclusion Zone around the seismic vessel of 750m where visual and acoustic monitoring of the presence of marine mammals will be continuously carried out and its verification in the field (Figure 4);

- establishment of Exclusion zones of normal operation of airguns within environmentally sensitive areas of the project area as well as within a buffer zone of 1 km around the sensitive zones (Figure 5);

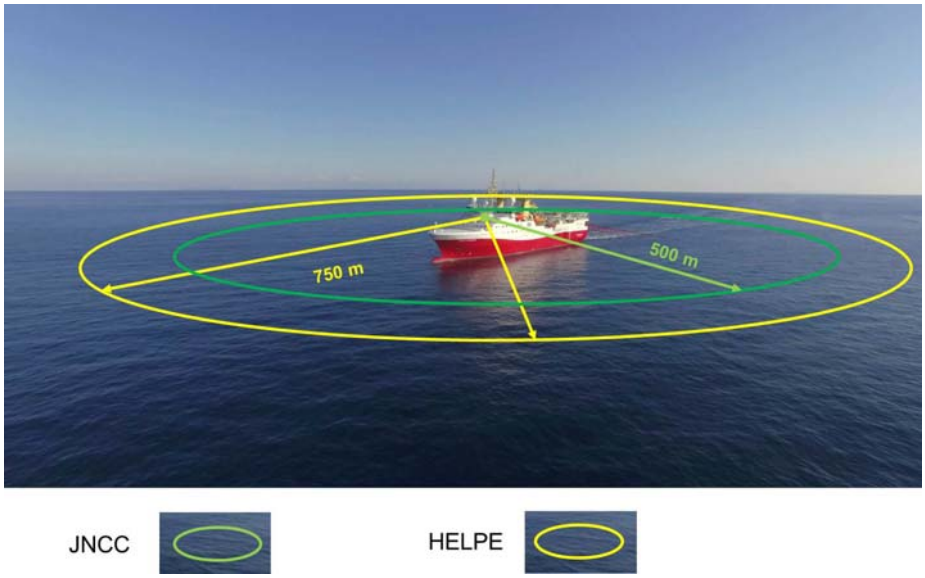


Figure 4 Verification Zone West Patraikos Marine Seismic Survey

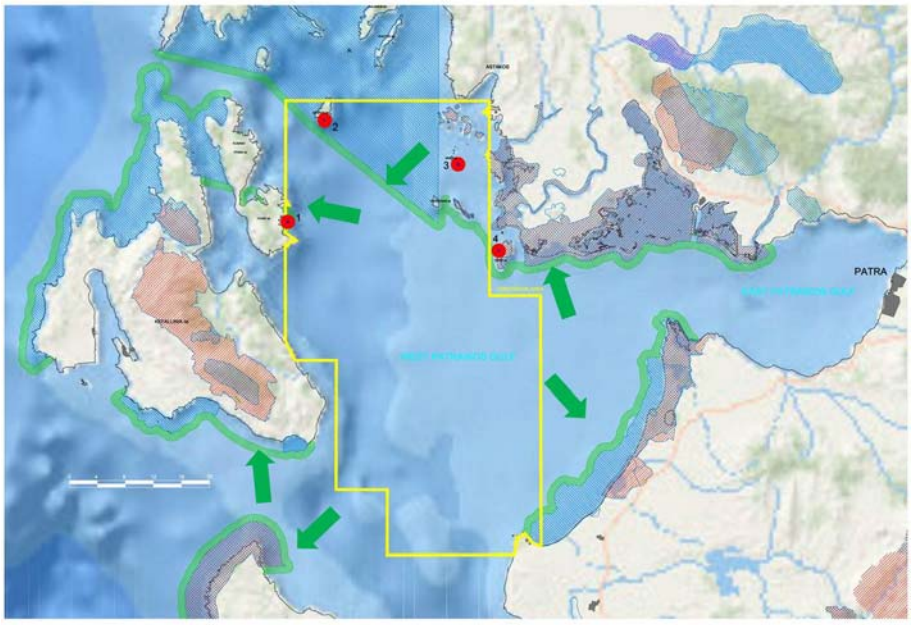


Figure 5 Exclusion Zone West Patraikos Marine Seismic Survey

Furthermore, the following were implemented during the survey:

- a dedicated Environmental Monitoring Plan (EMP) aiming to verify the noise levels in proximity of the identified environmental sensitivities;
- an oil spill prevention and response plan and a waste management plan

4.2. Environmental Parameters and Monitoring (MMO'S & PAM's / Acoustic Monitoring)

MMO'S & PAM's

Following the above mentioned mitigation measures and guidelines, properly trained, qualified and experienced Marine Mammal Observers (MMOs) and Passive Acoustic Monitoring (PAM) Operators were on board the seismic vessel whose primary role was to detect marine mammals and to advise on stopping of the air guns upon detection of marine mammals within the exclusion zone and initiate soft start to give marine mammals enough time to move away from the acoustic source and outside the exclusion zone.

Two expert MMOs (daylight hours) and two dedicated PAM Operators (24-hours) worked onboard the seismic vessel throughout the entire 3D and 2D MSS acquisition activities. Visual monitoring and Passive Acoustic Monitoring were carried out prior to commencement and throughout acquisition activities. The MMO's conducted visual watches for marine mammals during daylight hours, from sunrise to sunset. Passive Acoustic Monitoring for marine mammals was carried out throughout the entire day to ensure optimal detection probability. Passive acoustic daily monitoring along with Marine Mammal observation were logged and recorded accordingly.

There were six sightings of at least one species, with a total estimate of 16 individuals (Table 3). No sightings resulted in a start-up delay, but one sighting resulted in a shut-down of a soft-start. Five out of six sightings were observed by MMOs whilst on effort, and one was observed by vessel crew aboard the workboat. All visual sightings recorded throughout the survey are shown in the following table:

Table 3 Marine Mammals Visual Sightings

Observations	Date	Time	Specie	Distance (m)	Mitigation Measures	No of Individuals
1	**26/01/16**	**9:16**	**Tursiops truncatus**	**650**	**Yes**	**4**
2	27/01/16	12:18	Unidentified dolphin	1.500	No	3
3	29/01/16	13:04	Unidentified cetacean	3.000	No	3
4	31/01/16	10:03	Unidentified dolphin	3.600	No	2
5	02/02/16	13:14	Unidentified dolphin	1.500	No	3
6	03/02/16	09:05	Unidentified cetacean	800	No	1

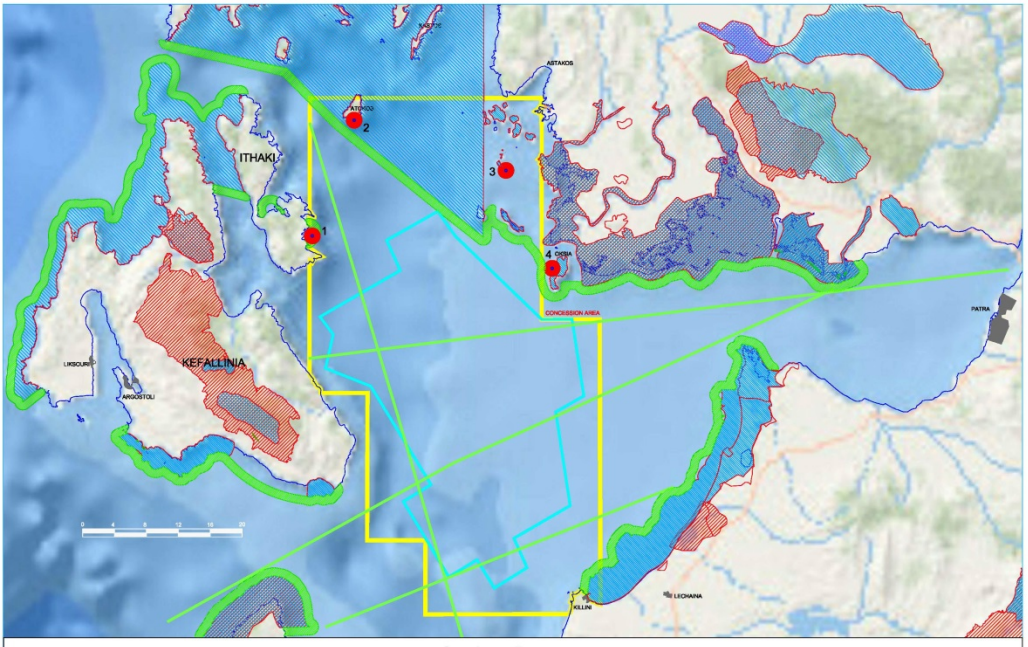
Acoustic Monitoring

The Patraikos Gulf Acoustic Monitoring Project was an ongoing project for measuring the acoustic levels before, during and after the 3D Marine Seismic Survey carried out by HELPE S.A. In the framework of the EAP study, sensitive zones and exclusion zones of normal operation of airguns were designated within the project area. Those zones included sensitive environmental elements which were proposed to be included in the monitoring plan. The proposed monitoring carried out by means of survey, allowing for:

- verify the actual presence of mammals;
- define the background noise level and verify the anticipated Exclusion Zone

A research vessel was used to carry out the acoustic survey and two separate portable systems were used for the monitoring of the ambient noise on the four predefined stations (Figure 6).

Ambient noise measurements (prestart and post completion of seismic activities) at the proximity of the four (4) predefined locations



Sound recording sensors

No	Location	UTM (HAYFORD) ED 50 Z 34 N CM 21°				UTM WorldGeodeticSystem 1984 Z 34 N CM 21°				UTM GreekGeodeticReferenceSystem 1987 CM 24°			
		LONGITUDE λ	LATITUDE φ	EASTINGS X	NORTHINGS Y	LONGITUDE λ	LATITUDE φ	EASTINGS X	NORTHINGS Y	LONGITUDE λ	LATITUDE φ	EASTINGS X	NORTHINGS Y
1	ITHAKI	20°45'14.10"	38°20'38.75"	478495	4244094	20°45'11.78"	38°20'34.88"	478439	4243904	20°45'06.01"	38°20'25.41"	216093	4248578
2	ATOKOS	20°48'49.13"	38°28'29.87"	483744	4258603	20°48'46.81"	38°28'26.01"	483688	4258413	20°48'41.02"	38°28'16.54"	221817	4262923
3	MODIA Isl.	21°01'55.13"	38°25'05.96"	502793	4252302	21°01'52.84"	38°25'02.10"	502736	4252112	21°01'47.03"	38°24'52.65"	240667	4255999
4	OKSIA	21°05'53.40"	38°18'27.72"	508583	4240031	21°05'51.11"	38°18'23.85"	508527	4239841	21°05'43.30"	38°18'14.40"	246060	4243536

Figure 6 Predefined Monitoring Stations

The objectives of this acoustic study was to measure ambient sound levels as a function of sound frequency components, time and position as well as correlate acoustic anomalies to major acoustic sources within the survey areas:

a. Prestart

In general, all stations exhibited high ambient sound levels concentrated on the top (or above) limit of the bibliographic prevailing ambient noise (Figure 7). This was partially due to the sampling procedure, which involved:

- Shallow deployment (in just 20m water depth) and close to the shore. The above induced high levels of benthos, sea surface bubble and spray and offshore turbulence fluctuations noises, and
- Deployment in proximity to sea-farms which in some cases induced high levels of mechanical noise caused by the specific "industrial" (mechanical) activity.

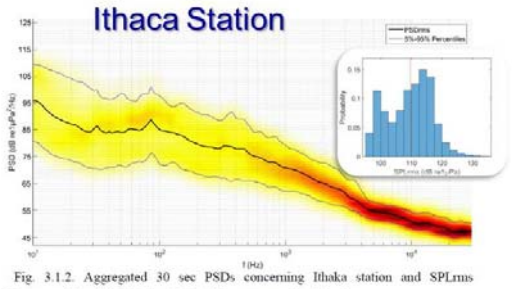


Fig. 3.1.2. Aggregated 30 sec PSDs concerning Ithaka station and SPLrms histogram (din width 2.5 dBre1µPa) with average value indication.

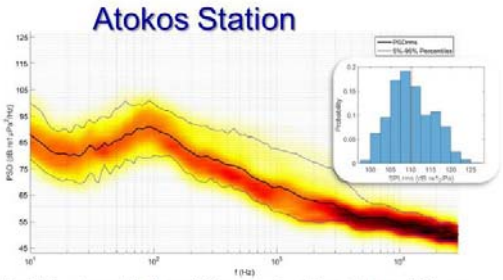


Fig. 3.1.4. Aggregated 30 sec PSDs concerning Atokos station and SPLrms histogram (din width 2.5 dBre1µPa) with average value indication

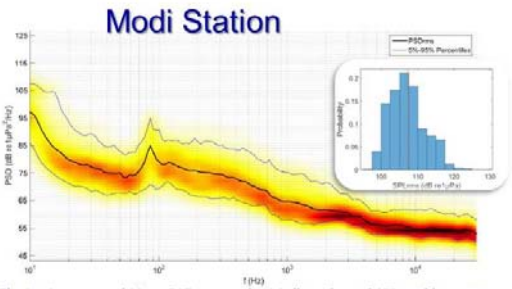


Fig. 3.1.6. Aggregated 30 sec PSDs concerning Modia station and SPLrms histogram (din width 2.5 dBre1µPa) with average value indication.

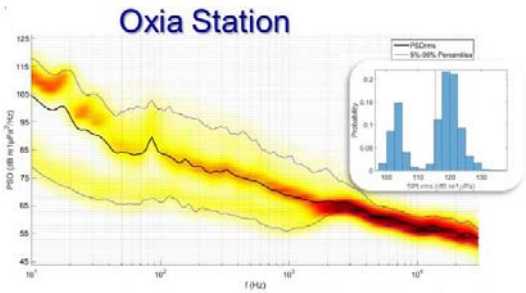


Fig. 3.1.8. Aggregated 30 sec PSDs concerning Oxia station and SPLrms histogram (din width 2.5 dBre1µPa) with average value indication.

Figure 7 Ambient Noise Measurements (prestart)

b. Post Completion

A main conclusion of the report was that no significant differences have been observed in the ambient noise between the pre-start and the post completion stages of the 3D seismic survey, implying that no seismic noise has remained in the soundscapes of the monitored areas (Figure 8). Small ambient noise differences in both the frequency and spatial domains may occur due to: (1) slightly different sampling locations (different depth ranges and proximities to the coasts as the vessel was drifted by the currents and the wind), (2) different traffic noise loads and (3) other random noises (weather conditions, self-noises etc.).

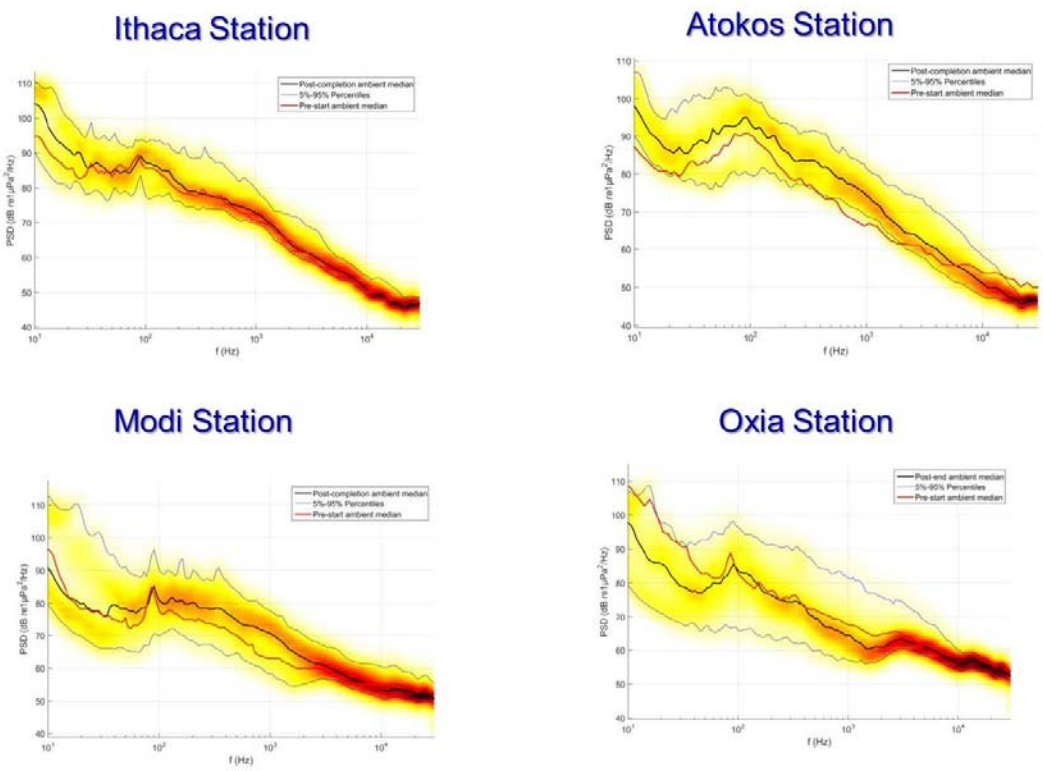


Figure 8 Ambient Noise Measurements (post completion)

Seismic noise monitoring & Verification of Exclusion Zone

The aim of the acoustic survey at that stage was to assess the sound pressure level of the noise induced by the air-gun seismic source to the predefined sampling locations. During the seismic noise monitoring, a total of 30 deployments have been realized. Additionally, field measurement of noise levels around the seismic source (air-guns) were carried out during the acquisition activities in order to record and study the seismic noise attenuation levels and validate the specified mitigation zone. None of the measured values exceeded the threshold values defined for permanent loss (PTS) and temporary loss (TTS) of auditory sensitivity for marine mammals (Southall et al., 2007) at any distance (Figure 9).

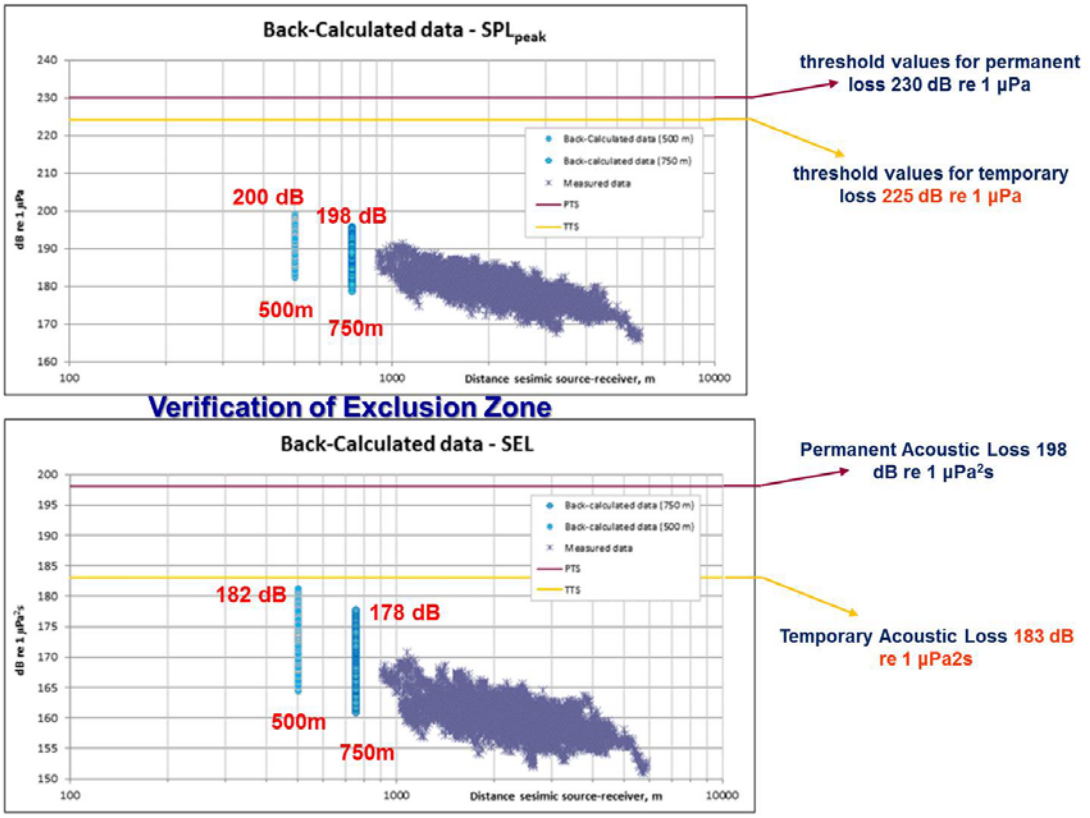


Figure 9 Verification of Exclusion Zone

Coastal Zone Inspection for the Presence of Marine Mammals

A visual inspection for marine mammals' presence was carried out. The vessel departed from Astakos port heading to the survey area. A coastline of 35 nm was visual inspected and twenty predefined areas were closely approached. The areas with the highest likelihood of marine mammal presence were selected based on the coastal morphology and sea currents directivity. The visual inspection of the coastal zone environment did not show any mammal.

Figure 10 Coastal Zone Inspection

4.3. Marine HSE Services, Project HSE Plan and Bridging Documentation

Marine HSE Services related to policies and systems implementation before the commencement of the marine 3D towed streamer seismic survey in the Lease Area were conducted with due consideration to:

- Relevant regulations in place governing the area of operation and Geophysical industry best practice
- Hellenic Petroleum internal HSE policies, practices and systems and integration with the chosen geophysical contractor, systems and equipment

Marine HSE Services covered all items involved in the 3D marine acquisition from tendering till the inspection of the vessels took place before the commencement of the work in the project area.

The purpose of the Project HSE Plan was to provide a clearly defined interface between the client, contractor and any subcontractors during project execution. Document covered project-specific information and used in conjunction with the Crew HSE Plan which covered vessel-specific information. The document was written to align with the expected format of OGP's Report 432 "Managing HSE in a geophysical contract" and was accordingly made up of five sections:

Section 1: Introduction and Purpose
Section 2: Description of the Project
Section 3: Management System Interfaces
Section 4: Contingency and Emergency Response Plans
Section 5: Project Specific Hazard Management

Bridging document addressed the HSE aspects of the arrangement between HELLENIC and seismic contractor regarding seismic operations for HELLENIC's offshore operations in Greece.

4.4. Fish Liaison Officers

The seismic survey in the Golf of Patraikos has been a challenging experience in terms of managing boat traffic within and around the project block area. The 3D survey involved a high number of turns and was of close proximity to the shore on several occasions being conducted in an area where fisheries from a wide range of regions normally operate. The second part of the project throughout the 2D phase covered a wider area outside the original seismic block area. Prior to commencement of operations, all affected parties in the local fisheries communities were informed of the geographical extend and nature of seismic activities.

Great effort was taken by the FLO team to minimize disturbance to fishing activities within the affected area by being on watch (between them) 24/7 throughout operations (Figure 11). The team would have to act promptly to retrieve all kinds of FADs - fishing gear, buoys and debris from the water and advise local fisheries and seismic vessel crew on potential safety hazards. When necessary, the FLO would request that the captains of certain fishing boats or indeed the streamer vessel adjust their course to avoid collision (Figure 12).

Figure 11 Fish Liaisons Officers Effort

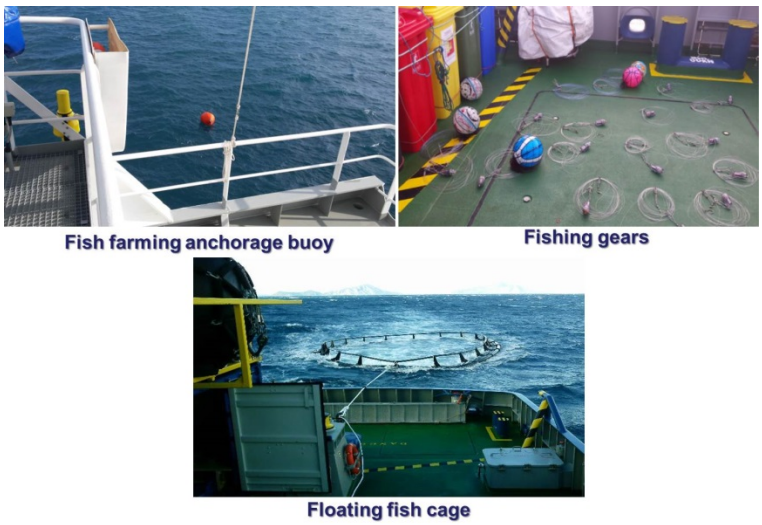


Figure 12 Fish Liaisons Officers - Incidents

Onshore Fish Liaison Activities

Onshore FLOs scheduled informative meetings prior to the commencement of the seismic survey with:

- Port Authorities: Patras, Pyrgos, Kyllini, Zakynthos, Kefallonia, Ithaca, Messologi, Astakos, Lefkas, Preveza and Parga as well as the nearby areas of Nafpaktos, Kalamos, Mitikas and Katakolo.
- Regional Units: Fisheries Departments
- Regional Units: Governer or Vice Governer
- Associations of Commercial Fisheries
- Association of Small Scale Fisheries
- Representatives of Fisheries
- Head Offices of Marinas
- Recreational clubs (sailing, diving, water sports)

Stakeholders were given a leaflet which gave the coordinates of the project area, depicted the vessels that were involved and clearly identified the distance limits surrounding the seismic vessel away from which that all fishing activity should be kept. The FLOs were on a 24/7 on call basis with local fishermen in the event that any matter arose and needed to be resolved. Daily reports of their stakeholder engagement activities were sent to all relevant parties. The 72h Acquisition Plan was also sent to inform all relevant Port Authorities.

It was expected that due to the direction of the lines, the 60^{o} azimuth was the survey that carried the most risk with the local ferries regularly transiting through the prospect area and the local fishermen.

Offshore Fish Liaison Activities

Continuous presence of two Fish Liaison Officers onboard the Polar Empress and the 7 Oceans took place for the duration of the survey to redirect fishing vessels away from the line route of the Polar Empress since it was not possible to divert from the route or change the sailing speed. Additionally, they would detect and remove fishing gear and equipment that would be destroyed and / or damage the streamers, something that would affect the accurate recording of the acquisition.

Coordination of the substantial ship traffic in the area was an issue of concern. Ship traffic from ferries connecting Patras with surrounding Islands in Ionian Sea and liner traffic between Greece and Italy regularly passed through the NE corner of prospect. Ferries between Kylini – Poros crossed SW prospect area and when shooting the NS azimuth, the northern line changes also crossed the ferry route between Sami – Astakos. In addition to this traffic, there was also frequent traffic entering/exiting the Patraikos Gulf to and from Greece.

There was continuous communication with the Coast Guard which was notified of the next 76 hour plan on a daily basis so that all ferry companies/vessels would in turn be informed about the survey well in advance. In addition, security warnings were broadcasted for the entire duration of the survey.

Moreover, the offshore FLO's were on watch 24/7 throughout the execution of the project to thwart vessel traffic from the survey area and the lie route of the Polar Empress. On several occasions, the FLOs requested fishing boats to adjust their course in order to avoid collision. Throughout the seismic survey, the FLO team engaged with 4 types of fishing vessels:

1. Small scale coastal fishing vessels – active at depths up to 50 m daytime, using static gill nets and static long lines. Communication was difficult since many did not have VHF on board.
2. Trawlers – active mostly during the night hour and picking gear in the early morning. Communication was easy since trawlers were properly equipped with radar, AIS and plotter. They promptly followed instructions when reached via VHF.
3. Multivalent Fishing Vessels – These vessels were not allowed to operate within or around the survey area due to the nature of their fishing gear (static gill nets and drifting long lines for swordfish).
4. Recreational boats (yachts, sailboats, speedboats, recreational fishing boats) – Active mostly during the day, communication via VHF proved to be almost impossible. All vessels had to be confronted in person in order to be instructed to leave the survey area or line route.

4.5. Vessels Inspection & Audit - Stakeholder Engagement - External Audits

Vessel Inspection & Audit

Prior to the mobilization of the seismic vessel an inspection took place. The CMID (Common Marine Inspection Document) standardized vessel inspection was provided in order to confirm the vessel's safety and environmental integrity status. The seismic vessel was assessed for its operating safety status and all aspects of the safety management system in place onboard were examined such as the vessel's internal structural integrity, the safety of the personnel and its compliance with environmental protection requirements.

Stakeholder Engagement

The main objectives of the stakeholder engagement that took place in the broader area of West Patraikos were to ensure that adequate and timely information was provided to those most affected by the project, to provide these groups with sufficient opportunity to voice their opinions and concerns and to ensure that comments are received in a timely manner so that they can be address immediately so as to mitigate and provide solutions that could otherwise be detrimental to the safe, timely and proper execution of the project.

Full consultation was undertaken with all levels of authority and especially pertinent governors of involved prefectures, ministers and other top official authorities. Specifically, the following relevant authorities were engaged and fully informed about all aspects of the project and its socioeconomic importance for the local communities' and overall country's development. Further engagement took place with port authorities since they were directly responsible for the application of the NAVEX order in their area that affected shipping traffic and large and small scale fishing activities in their jurisdiction.

External Audits

Two external audits took place while commencing the 3D marine acquisition in the Patraikos Project Areas. Representatives from Ministry and the Directorate of Environmental Approvals were being on board the seismic vessel and observed the petroleum operations as well as the proposed mitigation measures established by the approved EAP. Furthermore an external certified auditor was on board in order to evaluate the effectiveness of the management system and its compliance with the approved Project HSE Plan during the execution of seismic operations.

5. HSE statistics

5.1. HSE Summary

The marine seismic survey was completed on February 7, 2016 without any major incidents related to health, safety or environment. All involved parties were well informed and worked in a professional manner so that all parts of the operation integrated effectively to result in an overall successful project. West Patraikos HSE Statistics are highlighted below:

- Hellenic Petroleum, Patraikos Gulf Project took place over 61 days
- No injuries to any crew member, nor were there any crew members in a position which could be considered dangerous (Table 4).
- No work related injuries or illnesses sustained by crew members during the project (Table 4).

Table 4 HSE Statistics West Patraikos Marine Seismic Survey

Measure	Result
Fatality	Zero
Loss Time Incident (LTI)	Zero
Restricted Work Case (RWC)	Zero
Medical Treatment Case (MTC)	Zero
Zero	8 non work related

5.2. Safety Incidents

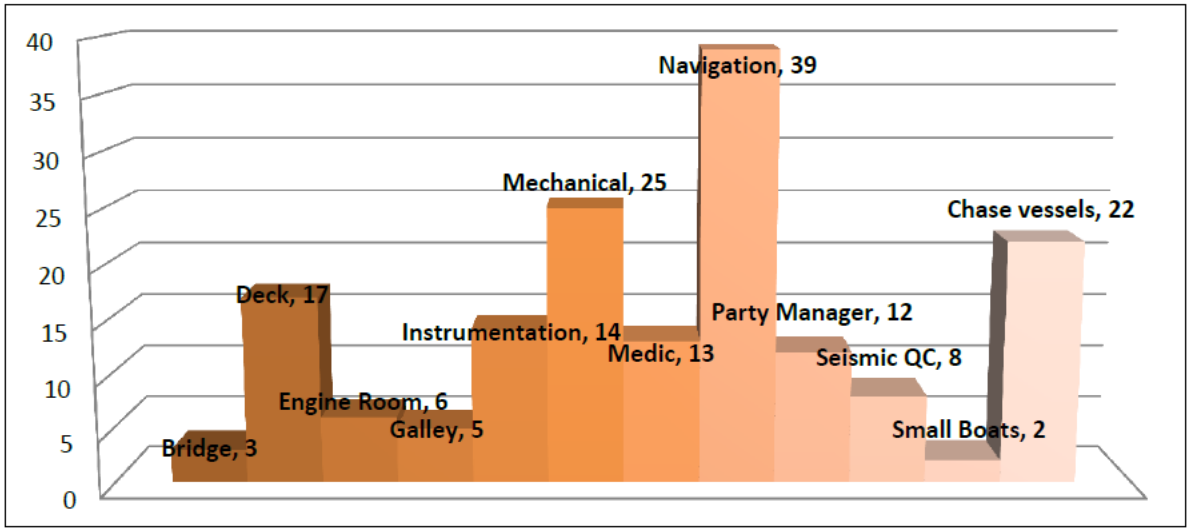


Figure 13 Graph showing the departmental break down of safety observations for the project

5.3. Project Man Hours

Project Man Hours highlights:

- More than 77K man hours on board Polar Empress
- More than 30K man hours on board support vessels (Ocean Dolphin, 7 Stars and 7 Oceans)
- Total man hours during project 106K

Environmental Monitoring Effort:

- 365 hours of MMO effort
- 746 hours of PAM effort
- 430 hours of Acoustic Monitoring

Project HSE Activities highlights:

- 192 hours of emergency drills (emergency towing, fire drill, SOPEP drill etc.)
- 121 hours of operations (crane operations, work boat and fast rescue boat etc.)
- 124 hours of training (fire team, medical team, safety induction tours)

5.4. Corrective Actions during project

CAR No	Title	Risk Rating	Log Date	Action Taken	CAR Type
CPEM-7856FA	Streamer Winch D an Gun Deck - damaged cog wheel on the two motors.	Low	2015-12-10	Inspected the winch. Found bolt laying in the gear rim. The bolt had damaged one cog on each motor. After removing the loose bits, the winch was working OK. The bolt was the same type as the ones on the motor housing. See picture SW - D - 4. No bolts were missing on the two motors on the winch. This bolt must have been there from the installation of the winch. The winch have not been used much, just on and off with the mooring lines.	Asset Failure Report
PPEM-E5BE5B	UPS 1 failure resulting in UPS blackout.	Low	2015-12-10	No seismic gear was deployed when UPS 1 transformer overheated and tripped out both UPS systems causing a blackout on the UPS system. All seismic equipment running on UPS had an uncontrolled shutdown. The engineers were in attendance of the transformer when smoke was emitted from the transformer (assumed to be lacquer / insulation burning off), this briefly set off the fire alarm which was cancelled by the bridge (no muster) due to the situation being under control. UPS 2 running alone - all systems back up and running. UPS 1 requires a new transformer.	Hazard Report
CPEM-6AD3A7	Wide Tow winch stbd side was intermittent moving slowly in and out by itself.	Low	2015-12-27	The lever / hydraulic joystick for stbd WT winch is a little bit stuck. Probably vibration from vessel puts the lever out of position a it don't return to the centre by itself as it should. The lever have been greased regularly and should be in good condition due to age. The winch is always operated with a person monitoring on top deck. All valves are closed when the winch is parked. This lever needs to be replaced with a lever with improved quality.	Asset Failure Report
CPEM-1094CA	Spooling Device, roller - Wide Tow Winch starboard side - auto spooling don't work to starboard side.	Low	2015-12-27	During deployment it was noticed that the spooler for WT stbd side didn't go to stbd side. Reduced function on the PVG valve. Disconnected the PVG valve and adjusted the spooling manually. Will be replaced after the deployment.	Asset Failure Report

6. Summary

The West Patraikos Gulf Marine Seismic Survey was a complex project due to its confined geographical location, the sensitive environmental parameters as well as the dynamic socioeconomic activities prevailing in the area. All activities, technical parameters, legal issues, all involved parties were carefully selected, organized, coordinated and managed to achieve successful project results and maintain positive long term business relations. The following achievements are highlighting the environmental effort throughout the project resulting in a successful execution of the marine seismic survey in West Patraikos Lease Area:

- Zero Environmental footprint
- Fully Compliance with the approved Environmental Monitoring Plan
- High safety standards and positive safety culture on board Polar Empress
- Zero Loss Time Incident (LTI)
- High ambient sound levels due to induced high levels of mechanical noise caused by sea farms industrial activities.
- The generated sound field has been modeled in relation to the oceanographic features (depth/temperature profile, water depth, seafloor characteristics) an Exclusion Zone of 750m has been established. Models were confirmed by EZ tests in the field.
- Seismic noise exposure levels never exceeded the permanent and temporary acoustic loss threshold values of sea mammals.
- Bottlenose dolphins are observed within the operational area, but are observed most often close to the coast, which is demonstrated in sightings recorded by MMO's during this survey.
- Very good relations with local fisheries during the execution of the survey
- During the survey few sightings were recorded. There were six marine mammal sightings, one bottlenose dolphin and five unidentified dolphin or cetacean species.
- The lack of sightings is due to the fact marine mammal presence is low within the operational area generally.
- Common dolphins were once present in higher numbers around the Ionian Islands, but the population has declined over the past decade, due to anthropogenic activities such as fishing.