HELLENIC PETROLEUM

WEST PATRAIKOS LEASE AREA

ENVIRONMENTAL REPORT 2019

Contents

WEST PATRAIKOS LEASE AREA – ENVIRONMENTAL REPORT 2019

HSE Policies & System, Environmental Studies and Implementation

1. Introduction

During the course of 2019, HELPE West Patraikos Exploration and Production of Hydrocarbons S.A. (HELPE Patraikos), acting as the Operator in the "West Patraikos" Lease Area, implemented a series of HSE policies, systems and Environmental Studies, which are presented in this document.

HELPE Patraikos 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. Upon entering the second (2nd) exploration phase and before drilling the first (1st) exploration well, currently a matured target, HELPE Patraikos is committed to prepare and submit an Environmental Baseline Survey (EBS Stage 2), which shall cover the site of the first exploration well including as well as the prospect area of the geological target. This report (EBS Stage 2), shall address the existing physical, biological and socioeconomic environment and sensitivities of West Patraikos Gulf area and provide any updated information or newly published relevant data that might have not been covered through the Environmental Baseline Report Stage 1. Upon completion, submission and approval of the EBR - Stage 2, HELPE Patraikos shall prepare and submit to Competent Authorities an Environmental and Social Impact Assessment (ESIA) and the Environmental Management Plan (EMP) related to the drilling of the first (1st) Exploration Well in "West Patraikos" Lease Area.

The EBS - Stage 2 and the ESIA Studies currently being prepared and planned to be submitted within 2020

The Environmental Baseline Survey (EBS - Stage 2) part of which are the Geohazards Site Survey and the Environmental Sampling Habitat Assessment already completed in collaboration with the Hellenic Centre for Marine Research (HCMR) and RPS Ltd. during November 2018, are carried out by the HCMR.

HELPE Patraikos in collaboration with the Geodynamic Institute of National Observatory of Athens is carrying out since October 2018 the Seismicity Monitoring Program of the W. Patraikos Gulf and the adjacent areas. This program was ongoing during 2019 and expected to continue throughout 2020 cover the drilling campaign.

Another scientific program currently running in W. Patraikos is the one the monitoring& recording of critical environmental biodiversity indicators. This was established by HELPE Patraikos in collaboration with Nature Conservation Consultants (NCC), MOm the Non-Governmental Organization for the protection of the Monk Seal and Biotopia is in progress for 2019 and it is anticipated to continue throughout 2020 cover the drilling campaign.

2. HSE Studies and Reports

2.1. Geohazard Site Survey and Environmental Sampling Habitat Assessment

In November 2018, HELPE Patraikos conducted a Geohazard and Environmental Survey, with the ultimate goal to drill with high safety standards and with the outmost respect to the environment and local communities.

During the four weeks research cruise with the R/V Aegeon, a variety of data was acquired in order to assess potential geological hazards in the Patraikos Block and build a reliable environmental base-line report (geochemistry, bio-communities, and hydrography).

These Surveys included the following:

Shallow profiler Data Acquisition,

Seabed Survey,

Environmental sampling and

Habitat Assessment Baseline survey.

The surveys' scope of work covered the whole prospect and subsequent drilling operations. A survey area of 14km x 9km area was selected providing coverage over the prospect and anchoring for any well area across the perimeter of the prospect. Environmental habitat and baseline sampling was completed within the aforementioned limits of the prospect area as well as on sampling stations across the coastal areas.

The objectives of the study were:

To identify any seabed obstructions that may affect anchoring.

To establish water depths and seabed conditions.

Identify and delineate any internationally protected or sensitive habitats at the well site and across the coastal areas and identify any areas of environmental interest, which could be affected by anchoring or drilling.

To record with the ROV monitoring and recording any features of interest for the purpose of identification of benthic habitats and communities.

Identify and establish Environmental Baseline conditions.

To assist in the identification of all geo-hazards and geological conditions related to anchoring and installation of a semi-sub drilling rig or drillship and subsequent drilling operations from the acquired data. This assessment will focus on any probable shallow drilling hazards and it will not include an assessment of the deeper drilling hazards, as these are covered by the 3D geophysical survey already acquired.

To complete all survey operations with zero Health, Safety or Environmental incidents.

The survey was conducted in two phases the first one was the Geophysical Study (completed in 14 days) and the second one was the Environmental Sampling (completed in 8 days).

Geophysical Study

This Study is mostly focused on the examination of the seafloor and near-seafloor geological hazard issues.To this aim, 78 lines were surveyed using a SIG sparker sub bottom profiler & side scan sonar, a single and a multibeam echosounder and a combined deep-towed Chirp Sub Bottom Profiler. The total length of the survey lines was 921.95 km.

More specifically, the survey has been conducted along 64 lines trending N-S at 150 m spacing and 14 lines trending E-W at 1000 m spacing.

The deep-towed Chirp profiler has been replaced by a pinger (3.5 kHz) during the course of the survey.

Four (4) more lines across the western slope and nine lines across the eastern slope were surveyed with multibeam, sparker and pinger. All slope lines were slightly extended in respect to the initial plan, in order to acquire the sub-seafloor structure below the lower parts of the slopes. One line more has been added on the northern part of the eastern slope.

In addition, using a ROV with HDD video camera and USBL positioning, seabed video and video screenshots were acquired and have finally verified the absence of protected or other sensitive habitats including Posidonia meadows.

ROV transects:

Two (2) 500 m long transects in N-S and E-W direction centered on the well location

Four (4) 500 m long transects at 500 m and 1000 m distance North and South of the well location

One (1) 1500 m long transect across the southern, shallow part of the eastern slope

One (1) 1000 m long transect across the northern, shallow part of the eastern slope

SUMMARY OF SURVEY RESULTS

The summary of the survey results deal with the shallow geology of the West Patraikos Basin and any geological hazards that can be determined based on seabed and shallow geophysical survey data and core results and it's limited to the shallow soils section. Some characteristic results concerning the following:

Bathymetry:

The survey area comprises a narrow, N-S trending narrow basin developed between the margin of Cephalonia and Ithaki Islands on the west and the shallow shelf of West Patraikos Gulf on the East. The basin's axis deepens very gently from 310 m to 340 m depth towards

North. The edge of the eastern shelf occurs at 100-130 m depth. The eastern slope dips westwards with less than 10^0. Maximum dip values up to 30^0 have been observed locally, along a narrow zone off the shelf edge. The depth of the seafloor at the well site is 307 m and the seafloor's slope is 1^0 towards West.

Seabed character: Mud to sandy mud sediments prevail on the seafloor of the survey area.

Seabed features: pockmarks, trawling scars

Trawling marks occur over the entire area indicating intensive fishing effort with trawlers. The vast majority of the trawling marks runs NW-SE. Trawling marks running NE-SW and N-S are evident as well.

Pockmarks occur in the southeastern part of the survey area. Their dimensions do not exceed 10 m in diameter and 1-2 m in depth. No fluid seeping has been observed.

Obstructions:

No obstructions or any kind of obstacles has been observed on the seafloor.

Slope failures:

Two prominent slope failure deposits have been mapped at the southern and northern edges of the survey area. As each one of these deposits have been imaged and studied on only one seismic line, it is not possible to determine reliably their nature, e.g. slump, gravity flow, other. Therefore we use the general term Mass Transport Deposit (MTD) for both of them. Both MTDs identified lie over 3 km away from the area of interest for drilling and do not impact the location.

Shallow gas (In relation to the well):

The nearest discrete possible pocket of gas noted in the sparker data, lies 880m WSW at 140 m below the seafloor and corresponds to RPS interpretation of shallow gas from 2D HR and 3D seismic. The nearest pocket of possible shallow gas interpreted using 2DHR seismic data and 3D Seismic data by RPS, lies 280 m SW and is not visible as a gas hazard in the sparker data. It lies at ~128 m below the seafloor.

ENVIRONMENTAL CONSIDERATIONS:

No outcrops of environmental interest (e.g. corals or reefs) have been observed in the survey area.

Environmental Sampling

Environmental habitat and baseline sampling was completed within the limits of the prospect area. The survey strategy of the Environmental Sampling included the following:

Sediment and benthos sampling:

Four (4) box core stations at 50 m, 100 m, 250 m and 500 m distance North of the well location

Four (4) box core stations at 50 m, 100 m, 250 m and 500 m distance South of the well location

Two (2) box core stations at 50 m and 100 m distance West of the well location

Two (2) box core stations at 50 m and 100 m distance East of the well location

One (1) box core station on the Reference Site

Ten (10) box core stations in the broader West Patraikos area

Water, zooplankton, suspended matter & oceanographic parameters sampling:

One (1) station at 50 m North of the well location

One (1) station on the Reference Site

Fourteen (14) stations in the broader West Patraikos area

The main Methods and Analyses that have been used are as follows:

Visual investigation of the near-well seafloor – habitat assessment

Environmental seabed sampling – benthic macro-fauna communities

Oceanographic parameters: hydrography and currents

Water column: nutrients

Water column: trace metals in the dissolved phase and in suspended particulate matter

Water column: plankton distribution

Water column: hydrocarbons in seawater

Seafloor sediment geochemistry and recent sediment accumulation rate

Hydrocarbons in seafloor sediments

Hydrocarbons in transplanted mussels

Bio monitoring of heavy metals with transplanted mussels and native species in the west Patraikos gulf

SUMMARY OF SURVEY RESULTS

Visual investigation of the near-well seafloor – habitat assessment

The most striking characteristic of the seafloor along all the ROV transects is the very dense network of scars produced by the trawling gears. The analysis of the HDD videos recorded

during the ROV dives shows a muddy seafloor, with long and 20-40 cm deep trawling scars and irregular mounts of mud dislocated by the odd doors of the trawler.

No corals or any other sensitive habitats have been observed of the seafloor.

Environmental seabed sampling – Benthic macro fauna communities

Depth is the main factor structuring benthic communities in the West Patraikos study area. The structure of the macro-benthic community is similar to what is expected for undisturbed deep-sea habitats. The habitats identified in both the wider region, and the well site, are mainly bare sediments, with well-oxygenated clay substrates without noteworthy structural features.

With regards to the Ecological Quality Status of the circa-littoral stations in the wider Patraikos Gulf, they are classified as being in a "Good" status, with low levels of human pressures. Based on the percentage of the sensitive taxa and despite the lower abundances, the bathyal stations in the wider Patraikos Gulf are classified as being in a "High" ecological status.

All stations at the near-well area are found to be under low or no human pressure at all and are classified as having either a "Good" or "High" ecological status.

Oceanographic parameters: hydrography and currents

In November 2018 the water column displayed stratified conditions with a pycnocline extending from 80 to 120 m, while the upper 20 to 50 m were practically homogenized.

The deep layers (200-to-400 m) in the northwest part of the study area indicated a rather isolated environment in terms of water exchange with neighboring areas.

Low-salinity water due to possible admixtures with river run-off from the mainland were detected in the northeast part of the study area.

A combination of an anticyclonic (clockwise) and two cyclonic (anticlockwise) structures drive the circulation above the pycnocline. Currents are rather strong, 30-50 cm/sec) compared to measurements in other Hellenic near-coastal areas. The circulation below the pycnocline in the northern part of the study area seems to be reversed into an anticlockwise one.

Marine optics

The optical parameters of c_p (particle beam attenuation coefficient) and VC (particle volume concentration) determined during the cruise in November 2018 are considered as normal with respect to the time of sampling, especially considering that a period of heavy rainfall occurred, which contributed to the increase in particulate matter concentration and thus local increase of turbidity.

Water column: nutrients

The concentration of Dissolved Oxygen (DO) in the West Patraikos Area was found relatively high. Lower DO concentrations were observed at the isolated deep layers of the sampling area as the result of the oxidation of organic material accumulating there.

Nutrient concentrations were low at the euphotic zone increasing with depth below 100-150 m. The trophic status of the 0-100 m layer of the water column was characterized as oligotrophic, indicating that the study area is not, in general, affected by anthropogenic activities related to nutrient or organic matter inputs.

Water column: trace metals in the dissolved phase and in suspended particulate matter

The concentrations of the metals in the dissolved phase at the near-well stations fall at the lower limits of the measured concentration ranges for all studied metals. Overall, waters to the east and southeast of the well site appear more enriched in dissolved metals. This could be related to many factors such as terrestrial sources of metals from rivers and/or anthropogenic activities on the mainland in addition to seawater circulation and mixing patterns. Surface waters at the southeast, close to Killini, appear enriched in Fe, Mn, Cd, Co, Cu and Ni. Similarly, surface waters off Acheloos estuary show increased concentration of Cd, Co, Cu and Ni. The concentration of dissolved metals increases in bottom waters. The spatial distribution of dissolved Pb and Zn follows a quasi-similar pattern. The levels of priority substances (Cd, Pb, Ni, Hg) at all 12 stations are found well below the Environmental Quality Standards.

All the element contents in the suspended particulate matter are increased in the bottom layers with respect to surface layers. Aluminium, V, Cr, Fe, Ni, Cu and As in the particulate matter showed the same trend, presenting higher values in the bottom water of the east part of the study area. Particulate Pb and Mn exhibited higher values in the bottom water of the west part, whereas particulate Zn and Cd present higher values in the east Patraikos Gulf.

Water column: plankton distribution

The Ionian Sea is also characterized by low nutrient and chlorophyll values as well as low zooplankton biomass. Biomass and abundance values found at the Western Patraikos Gulf are in the same range with previous studies in the Ionian Sea. The ecosystem of the Western Patraikos Gulf can be characterized as healthy and stable due to the high trophic status of the area and the presence of many species and high diversity values.

Water column: hydrocarbons in seawater

Total Petroleum Hydrocarbon (TPH) concentrations varied between 1.2 and 6.7 μg/L (mean: 2.6 μg/L). These values are slightly higher than those considered as background values, but they are within the normal range for seawater in Greek seas. No significant variation among the stations or depths was observed.

Total Polycyclic Aromatic Hydrocarbons (PAH) concentrations ranged from 13.6 ng/L to 81.2 ng/L (mean value: 34.1 ng/L). These values are considered as rather elevated for open sea waters and are comparable to values reported for coastal and estuarine ecosystems. Concentrations of PAH with 4 or more aromatic rings, characteristic of pyrolytic origin, were lower than the petrogenic-origin PAHs. No values exceeded the Environmental Quality Standards (EQS) thresholds.

Seafloor sediment geochemistry and recent sediment accumulation rate

The surface sediments of the West Patraikos area are characterized as clays, with almost uniform distribution of the different grain size fractions. The highest percentages of the clay fraction are found in the northwestern and western stations, which are located in the deepest parts of the study area.

The spatial distribution of all the elements measured is similar, with lower values in the shallower southeastern stations. In the area around the well site the element contents do not show any differentiation.

Compared to the Sediment Quality Guidelines (SQGs):

Cd, Hg, Pb and Zn levels are below the respective Effects Range Lows (ERLs), indicating that adverse effects on bottom-dwelling organisms could rarely occur.

Cu levels were below the Effects Range Medians (ERMs) in 60% of the sampling sites, indicating that adverse effects on bottom-dwelling organisms could occasionally occur.

As and Cr levels were above the respective ERLs but below the ERMs, indicating that adverse effects on bottom-dwelling organisms could occasionally occur.

Finally, Ni levels exceeded the respective ERMs in all sampling sites, indicating that there is a relatively high likelihood of toxicity.

The calculated sediment accumulation rate at the well site area is found 0.11 cm/y.

Hydrocarbons in seafloor sediments

Aliphatic Hydrocarbons (AHC) concentrations ranged from 9.9 μg/g to 16.6 μg/g (mean value 12.8 μg/g), and are comparable to those reported in sediments from other open sea areas in the Mediterranean.

The concentrations of Polycyclic Aromatic Hydrocarbons (PAHs) varied from 221 ng/g to 1016 ng/g (mean value 475 ng/g). These values are higher than those reported for the open Aegean Sea sediments but they are comparable to those reported in estuarine areas like Strymonas and Evros deltas.

The studied sediments are classified as moderately polluted regarding their PAH levels. The highest concentrations were observed at stations WPG1 and WPG2 located in the proximity of the coast. Fossil fuel sources are a rather significant contributor for the PAHs measured in the West Patraikos area.

Biomonitoring of heavy metals with transplanted mussels and native species

Metal concentrations (Cu, Cr, Ni, Zn, Fe, Mn) were measured on limpets and sea urchin species collected from seven coastal sites.

Metal concentrations from shortfin squid, fish and shrimp samples collected by trawl indicate higher Cu, Zn and Mn concentrations in the soft tissue of the shortfin squids while no differences among species was observed for Ni levels. For Fe, higher concentrations were observed in the flesh of the fish and squids than in the flesh of the shrimps.

Mussel metal concentrations from the field experiment showed lowest mean metal values at station HP9 (Cephalonia island) for all metals except Zn. The metal concentrations in mussels at stations HP8 and HP10 (in the wider marine front area of the Astakos and Kyllini ports respectively) were not always statistically significant higher. A spatial gradient was shown according to the related anthropogenic activities in the region while differences between depths of deployment were negligible in most cases (stations and metals).

Hydrocarbons in transplanted mussels

AHC concentrations ranged from 5.2 μg/g ww to 7.8 μg/g ww. These values were similar to the concentration in the mussels before their transplantation (7.5 μg/g ww) and indicate that

there was no petroleum related pollution. No significant differences were observed between the mussels close to the surface and those close to the bottom.

Total PAH concentrations varied from 16.2 ng/g ww to 22.3 ng/g ww expect the bottom sample in Astakos station, where a clearly higher value (115.5 ng/g ww) was recorded. These values are similar with those measured in mussels transplanted in several coastal areas in Greece and lower than the initial value before transplantation (42.5 ng/g ww), indicating the absence of pollution. On the contrary, the higher value in the bottom sample of Astakos station indicates a moderate pollution at this point.

2.2. Environmental Baseline Survey Stage 2

The purpose of the Environmental Baseline Survey Stage 2 is the collection of data, the survey and evaluation of the environmental condition in the research area in order to:

- ✓ Survey the condition of the environment within the research area before starting any drilling operations.
- ✓ 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

According to Article 12 «**Environmental Protection**» paragraph 14, HELPE Patraikos shall not be liable for any environmental condition or damage existing in the Contract Area prior to the commencement of the HELPE'S operation therein and nothing in this Agreement shall be construed to hold HELPE Patraikos liable in relation to any such pre-existing environmental condition or damage. For this purpose, a baseline report, covering the whole extent of the boundaries of the Lease Area was prepared by HELPE Patraikos, to detail the condition of the environmental parameters and resources at the time prior to operation commencement. The baseline report was submitted and approved by the Ministry of Environment and Energy. Prior to entering the second exploration phase and before the drilling of the exploration well, HELPE is committed to prepare and submit a baseline surbey (Stage 2) which will an area limited around drillable targets. The Report shall address the existing physical, biological and socioeconomic environment and sensitivities of West Patraikos gulf area and provide any updated information or newly published data might not covered in the Environmental Baseline Report Phase 1. The EBS Stage 2 will focus in the area around the drillable targets and will involve detailed sampling and evaluation.

An indicative Table of Contents (ToC) of EBS Stage 2 will include the following indicative chapters:

- Introduction
- General Framework of the Elaboration of the Environmental Baseline Report
- Updated description of the Current Condition of the Environment
- Natural and Biological Environment
- Socioeconomic Environment
- Establishment of Environmental Quality Indicators
- Results of the Environmental Monitoring Program executed in 2018 (final report completed)

- Results of the Geohazards Survey Environmental Sampling & Habitat Assessment (final report completed)

The Hellenic Center for Marine Research (HCMR) in collaboration with the University of Patras and University of Thessaly undertook to elaborate the EBR (Stage 2) Study and a kick-off meeting was held on 30th of September 2019 and a first draft is expected to be submitted to HELPE Patraikos by December 2019.

2.3. Environmental and Social Impact Assessment (ESIA) for exploration well(s)

According to the provisions of Article 12 of the Lease Agreement for the «Environmental Protection», HELPE Patraikos shall conduct all Petroleum Operations in a manner, which will assure the protection of environment in accordance with Good Oilfield Practices. Furthermore, HELPE Patraikos shall prepare and submit to the competent governmental authority, an Environmental Impact Study (EIA) for the relevant Petroleum Operations in respect of which an Environmental Impact Assessment (EIA) procedure is required. The EIA shall, as a minimum:

(a) fully comply with the requirements of the EIA legislation in force;
(b) meet the requirements and guidelines set out by SEA; and
(c) be prepared by a third party with adequate expertise in the field of environmental studies, which will be appointed by the Lessee to work on its behalf.

Each project, work, activity or any other part of the Petroleum Operations that is subject to an Environmental and Social Impact Assessment (ESIA), shall commence only after the Terms of Environment (ToE) have been approved. Regarding Environmental Licensing and more specific according to the provisions of Law 4014/2011 «on Environmental licensing of projects and activities, regulation of illegally constructed buildings, with the aim to promoting a better environmental stability», HELPE is obliged to apply for Approval of Environmental Impact Assessment (category A projects subcategories: A1 and A2). Category A includes works and activities, which may cause severe environmental impact because of their nature, size or location. Category A is divided into groups 1 and 2. Exploration and Exploitation Projects are under Category A1.

For activities of both groups of Category A, an ESIA is needed in the form an overall scientific assessment. An Environmental and Social Impact Assessment (ESIA) shall include at least the following minimum matters, which are:

(a) a description of the proposed activities;
(b) a description of the potential affected environment, including specific information necessary to identify and assess the environmental effect of the proposed activities;
(c) an assessment of the likely or potential environmental impacts of the proposed activity and the alternatives, including the direct or indirect cumulative, short-term and long-term effects;

(d) an identification and description of measures available to mitigate adverse environmental impacts of proposed activity and assessment of those measures;
(e) an indication of gaps in knowledge and uncertainty which may be encountered in computing the required information;
(f) a brief and non-technical summary of the information provided under paragraphs (a) to (e) of this section.

Indicatively, the ESIA report will address the following areas:

- Project information
- Policy, legal and administrative framework
- Environmental and socio-economic background
- Impact assessment
- Modelling
- Mitigation & Control Measures
- Environmental Management Plan and Monitoring Program

2.4. Environmental Monitoring for Critical Biodiversity Indicators

HELPE Patraikos in collaboration with the Nature Conservation Consultants (NCC), Non-Governmental Organization for the protection of the Monk Seal and BIOTOPIA have carried out the survey regarding the status of important fauna species in the W. Patraikos area. The following three monitoring stages have been conducted:

- Coastal survey-Monk Seals
- Coastal survey-seabirds in nesting places
- Pelagic surveys

The above monitoring stages involved survey reports, which combined with the existing bibliographic information on the presence of Cetaceans, Seals, Seabirds and Sea Turtles in the wider project area, and identification and mapping of the most sensitive areas. The review of the marine environment significantly helped to update the existing data for the Mediterranean Monk Seal, Cetaceans, Seabirds and Sea Turtle populations, and also other protected and/or threatened species in this particular part of the Ionian Sea, where the project lease area is located. The recording of marine mammals, was made by a MMO team (2 people), which consisted of experienced marine biologists, approved by the JNCC, with previous experience in observing marine mammals in the Hellenic seas.

The project team deployed an appropriate research vessel for open sea surveys, as well as an inflatable RIB boat and related equipment for offshore and coastal surveys, in order to identify breeding sites -and congregation sites of Seals, Cetaceans and Seabirds.The survey in 2018 confirmed that the Mediterranean Shag was the main seabird species of conservation concern that were breeding in the Study Area. Its population size within the Coastal Survey Zone was estimated at least to 62 breeding pairs. The vast majority of the population was breeding in the Archipelago of Echinades (Eastern survey area with 33 pairs) and at the islets of the Gulf

of Lefkada (Northern survey area with 24 pairs). The modelling of Mediterranean Shag sensitive areas revealed that they consist of the coastline of the Echinades Archipelago, and the islands of Kalamos, Kastos, Atokos, Arkoudi, Meganisi and surrounding islets, along with the coastal marine waters surrounding these islands and islets, which extend 0.5 nautical miles from the coast. Any future monitoring or mitigation measures for the Mediterranean Shag could sufficiently cover the conservation requirements of the other locally abundant but not threatened species, the Yellow-legged gull.

The present findings in the Coastal Survey for Monk seal breeding sites in the wider project area, in respect to habitat quality and density, annual pup productivity and overall seal presence, indicated that the project area currently hosts an integral part of the Mediterranean monk seal population in the Ionian Sea, and as such, an important part of the overall monk seal population in Greece. Systematic monitoring efforts are necessary in order to gain deeper insights in the demographic parameters of the species in the area, which in turn will enable the exact evaluation of the impact of human activities in the area and the establishment of concrete conservation and precaution measures for the species.

2019

During 2019 complementary baseline surveys of the status of important fauna species included the following Tasks:

- Systematic monitoring of the Mediterranean Monk Seal at breeding sites in the wider project area during August-December 2019.
- Pelagic boat surveys for marine mammals, seabirds and sea turtles in the wider project area using a research vessel. (May 2019)
- Coastal seabird nests survey and telemetry in the wider project area (for locating nesting sites, estimation of breeding population size, monitoring of the species breeding performance and GPS-based telemetry of the Mediterranean Shag (April and May 2019)
- Seabird colony survey in the wider project area for the search for colonies of Scopoli's Shearwater, Yelkouan Shearwater and European Storm-petrel colonies in the wider project area (July 2019).

MAIN CONCLUSIONS OF THE PELAGIC SURVEYS

- All pelagic species which have been identified in the past as having a regular presence in the study area, have been recorded during the present study. Additionally, *Yelkouan Shearwater, European Storm-petrel, Audouin's Gull and Striped dolphin* presence in the project area has been confirmed.
- The presence and abundance of marine species of interest in the Pelagic Survey Area is season-dependent. In general the number of species and their abundance in spring was lower than in autumn.
- There are strong indications that the distribution of seabirds and cetaceans is affected by human activities, such as fisheries & marine aquaculture.
- The interactions among these activities and pelagic species should be taken into consideration in any future management scenario for the study area.

This Monitoring Program and the study constitutes one of the most integrated field expeditions for the systematic recording of cetaceans, seabirds and sea turtles, carried out so far in Greece, combining optical boat surveys, hydrophone transect surveys and aerial transect surveys. In this respect, it represents a significant first step towards a more comprehensive and systematic sampling and spatial mapping effort for the marine mammals and the seabirds in the Greek seas, thus creating a benchmark for the baseline information to be gathered in future similar surveys.

2020

The high-level scientific work of the consortium and the excellent cooperation with HELPE Patraikos enable us to continue our cooperation also during the exploration phase in 2020 in order to establish an Environmental Management Plan.

2.5. Seismicity Monitoring in "West Patraikos"

According to the provisions of the Joint Ministerial Decision (JMD) of August 8th 2013, which has approved the Strategic Environmental Impact Assessment (SEA) for the exploration and production of hydrocarbons in West Patraikos, prior to drilling the exploration well the active tectonics and existing seismicity should be taken into account for the adjacent areas. In the context of the safety for drilling, HELPE Patraikos should adapt, design and operate a detailed monitoring plan for existing seismicity using an efficient seismic network as well as identifying any possible active seismogenic fault-zones in the area.

Based on the above, HELPE Patraikos invited the National Observatory of Athens, and particularly the Institute of Geodynamics, to initiate discussions for a possible cooperation on the Seismicity Monitoring Plan for West Patraikos. The Institute of Geodynamics of the National Observatory of Athens (NOA) is one of the oldest experienced and nationally respected Research Institutes in Greece and its main tasks is the continuous 24-hour monitoring of the seismicity of the Greek region and it is the official Service to provide relevant information to the Greek State and to the public.

HELPE Patraikos has reviewed the National Observatory of Athens (NOA) services, capabilities and availability as a contractor for the *"Monitoring and the Recording of Seismicity and the Seismic Hazard Assessment Study"* compilation regarding West Patraikos Lease area. Based on the review of the technical and financial proposal of NOA, HELPE West Patraikos awarded the services for acquiring the Monitoring and the Recording of Seismicity and the Seismic Hazard Assessment Study compilation to the Institute of Geodynamics of NOA, as the most appropriate and official State Agency to perform such a monitoring program.

For the accurate identification of seismically active zones and the estimation of seismic hazards in the wider area of West Patraikos, the daily and detailed mapping of seismicity and micro seismicity in the research area is required. Achieving the required precision in calculating seismicity requires the consolidation of the existing seismograph network infrastructure with the addition of 15 portable seismographs supported by real-time data transmission. The recorded seismicity and micro seismicity as well as older data have been used to estimate the Seismic Hazards. The detailed monitoring program in collaboration with the GI of NOA has already started in autumn 2018 and the 1st Report on existing data & the 2nd Report on the Seismicity Monitoring Program have been completed and submitted by GI to HELPE West Patraikos by early July 2019. Micro-seismic monitoring of the West Patraikos Gulf region during the first half of the program included all the post-seismic sequence of the strong earthquake of Zakynthos Mw6.8, October 26, 2018.

As a first significant result we can mention that last year seismicity monitoring confirmed the desk-top study and review of the historical events ($M \geq 2.5$) in the broader study area for the period between 1912 and 2019 (February) indicating that West Patraikos is an almost non-seismic area. More particularly, although the area was stimulated over an extremely long radius and for a very long time the seismic events which have been recorded during the last year within the narrow study area of West Patraikos were very rare.

2020

The monitoring of the seismicity and micro-seismicity in collaboration with Geodynamic Institute of NOA, will continue throughout the exploration phase in 2020 covering all the pre-drilling monitoring period and until the end of the Exploration Well.

In addition, maps with the seismic sources of the area will be constructed resulting from the combination of geophysical and seismic data and a stochastic modeling of the strong seismic motion from these sources will be made. Calibration of the modeling parameters will be based on actual recordings from accelerators located in the area.

2.6. Oil Spill Modelling

To ensure a quick and proper response, an oil spill model will be developed which will model accurately the spreading of the oil as well as detailed information on a spill's impact on flora, fauna and selected species or habitats.

For this purpose, an oil spill model can form the core in an operational forecast system for oil spill responses. With this tool, the trajectory of an oil slick can be determined as well as its properties under the actual metocean conditions. Such deterministic modelling will give information required to optimize responses and meet national and international regulatory requirements.

The liability of the Oil Spill Model depends on the accuracy of the hydrodynamic data. Hence, current meters will be deployed, which will help to collect data for the sea currents - meaning the velocity and direction - in order to assess the oil spill impacts. Early in 2019 a number of current meters on several locations will be deployed in order to collect a series of data throughout a 12 months period.

Potential oil / hydrocarbon spills will be simulated using a special oil spill modelling package (OILMAP/SIMAP). The comprehensive 3D fate and transport modelling system includes transport and weathering algorithms to calculate the mass of oil components in various environmental compartments (water surface, shoreline, water column, atmosphere, sediments). An oil spill modelling report will be generated which will include the description of the environmental conditions and datasets, the modelling methodology and main modelling results.