### **APPENDIX 6C**

Fish and Fishing Review Report

#### Appendix 6C Fish Report

#### Table of Contents

1	BAC	KGROUN	D INFORMATION	3
	1.1 1.2 1.3 1.4	SOURCES REGULAT 1.2.1 1.2.2 1.2.3 COMMERI CONTRAC ESTIMATE	OF INFORMATION ORY BODIES AND LICENSING Fishing Licence Requirements Sturgeon Fishing Licensing Commercial Fishing Licence Requirements and Reporting CIAL (FIELD) ACTIVITY IN THE AZERI-CHIRAG-GUNESHLI AND SHAH DENIZ CT AREAS AND ADJOINING AREAS OF THE CASPIAN SEA E OF THE SCALE AND NATURE OF UNREGULATED FISHING	3 4 4 5 5
2	METH	IODS OF	FISHING AND EQUIPMENT USED	10
	2.1 2.2 2.3	COMMER LOCATION FISHING T SEA 2 3 1	CIAL FISH SPECIES NS OF COMMERCIAL ACTIVITY OF FISH VESSELS FECHNIQUE AND EQUIPMENT USED IN THE AZERBAIJAN SECTOR OF CASPIAN Fishing Vessel Types	10 13 15
		2.3.2 2.3.3 2.3.4	Historical Fishing Methods Current Fishing Methods Scientific Research Using Trawl Fishing	16 16 16
3	SOCI	AL AND I	ECONOMIC ADVANTAGES	25
	3.1	TOTAL EC 3.1.1 3.1.2 3.1.3 3.1.4 3.1.5	CONOMIC VALUE OF FISHING ACTIVITIES Operating Costs and Gains from Fishing Vessels Value and Species of Fish Delivered to the Shore Level and Importance of Employment on Fishing Fleet Level and Importance of the Onshore Markets and Sales Process Level and Importance of Employment Onshore	25 25 25 25 25 25 25
	3.2	ECONOMI AREA	C VALUE OF FISHING ACTIVITIES WITHIN THE VICINITY OF THE SD CONTRAC	т .26
4	REFE	RENCES		27

#### List of Tables

TABLE 1.0 – FUNCTIONS OF REGULATORY GOVERNMENT BODIES
TABLE 2.0 - SPECIFICATIONS FOR NATIONAL FISHING VESSELS HAVING PERMIT FOR COMMERCIAL FISHING IN THE SOUTHERN CASPIAN (INCLUDING THE ACG AND SD CONTRACT AREAS), 2009 DATA1
TABLE 3.0 - FISHING VESSELS OF LEGAL ENTITIES AND INDIVIDUALS THAT CURRENTLY DO NOT HAVE PERMITS FOR COMMERCIAL FISHING, 2009 DATA <sup>1</sup>
TABLE 4.0 – FISH CAUGHT BY EACH LEGAL ENTITY AND INDIVIDUAL IN 2009
TABLE 5.0 - FISH SPECIES COMPOSITION IN THE ACG AND SD CONTRACT AREASAND ADJACENT AREAS OF THE CASPIAN SEA1AND ADJACENT AREAS OF THE CASPIAN SEA1
TABLE 6.0 - CHANGE OF THE RATIO OF VARIOUS KILKA SPECIES (%) CAUGHT IN THE AZERBAIJAN SECTOR OF CASPIAN SEA IN 2005-2009114
TABLE 7.0 - TECHNICAL PARAMETERS OF SCIENTIFIC-RESEARCH VESSEL "ALIF GADZHIYEV" AND EQUIPMENT (INSTRUMENTS) ON BOARD

# TABLE 8.0 – COORDINATES OF SECTIONS AND TRAWL SAMPLING STATIONS IN THE SOUTHERN CASPIAN 20

#### List of Figures

FIGURE 1 MAP OF AZERBAIJANI SECTOR OF CASPIAN SEA9
FIGURE 2 SHAD, STURGEON AND MULLET MIGRATIONS ROUTES11
FIGURE 3 KILKA AND BELUGA MIGRATION ROUTES11
FIGURE 4 CONE-SHAPED NET – KEY FEATURES18
FIGURE 5 SCIENTIFIC RESEARCH VESSEL "ALIF GADZHIYEV"
FIGURE 6 LOCATION OF SAMPLING STATIONS21
FIGURE 7 THE TRAWL STATIONS IN RELATION TO THE SD CONTRACT AREA SUBSEA INFRASTRUCTURE
FIGURE 8 CLOSE UP OF TRAWL STATIONS '1E' AND '1D' AND THE SD1 PIPELINE24
FIGURE 9 AMENDED TRAWL STATIONS AT 1D AND 1E24
FIGURE A1 BEAM TRAWL
FIGURE A2 GENERAL VIEW OF MIKHOV'S BOTTOM TRAWL
FIGURE A3 MEDIUM-SIZE FISH TRAWLER CRT-40031
FIGURE A4 MEDIUM-SIZE FISH TRAWLER CRTR
FIGURE A5 SEINE BOAT CO-300
FIGURE A6 SEINE BOAT PC-300
FIGURE A7 FREEZER VESSEL

# **1** Background Information

#### **1.1 Sources of Information**

Information presented in this review, prepared by Professor Mehman M Akhundov (Doctor of Biological Science), has been taken from the following sources:

- Governmental bodies of the Azerbaijan Republic responsible for the control and regulation of commercial fishing in the Azerbaijan sector of Caspian Sea;
- Fishing fleet of legal entities and individuals carrying out commercial fishing in the Azerbaijan sector of Caspian Sea; and
- Azerbaijan Scientific-Research Institute of fishing industry (AzerNIIRKh) of the Ministry of Ecology and Natural Resources (MENR) of the Azerbaijan Republic.

#### 1.2 Regulatory Bodies and Licensing

The following are regulatory governmental bodies of the Azerbaijan Republic that control commercial fishing activity in the Azerbaijan sector of Caspian Sea:

- State Marine Administration (SMA);
- Ministry of Emergency Situations (MChS);
- Department on Protection and Reproduction of Aquatic Bioresources (DPRAB) of the Ministry of Ecology and Natural Resources (MENR);
- Marine Transport Police (MTP) under the Ministry of Internal Affairs (MIA); and
- State Frontier Police (SFP).

Functions of regulatory governmental bodies are outlined in Table 1.0.

#### Table 1.0 – Functions of Regulatory Government Bodies

Regulatory Government Body	Function
SMA	Issues documents regarding identity/ownership of vessel, crew composition, country where the vessel is registered.
MChS	<ul> <li>Checks technical condition of vessel, issues technical passport for the vessel:</li> <li>For small vessels control is carried out by specific inspectorate of MChS; and</li> <li>For large vessels permits are issued by the Shipping Register of Russian Federation that has representation office in Baku.</li> </ul>
DPRAB-MENR	<ul> <li>For vessels with relevant documentation issued by SMA and MChS, DPRAB-MENR:</li> <li>Issues official permit and determines quota for fishing (licence) for specific vessel; and</li> <li>Undertakes inspection to confirm compliance with volume and species composition of bioresources (fish) caught by the vessel with the official permit issued by DPRAB-MENR.</li> </ul>
МТР	<ul> <li>For vessels with relevant documentation issued by SMA, MChS and DPRAB-MENR, MTP:</li> <li>Checks vessel activities correspond with its functionality and technical status;</li> <li>Confirms whether the vessel is intended for fishing or other purposes, e.g. for transportation of dry cargo;</li> <li>Checks whether the vessel is a passenger vessel or tank vessel (liquid cargo), or some other; and</li> <li>Confirms whether it holds an official permit (licence) from DPRAB-MENR for fishing - without such documents MTP would not allow the vessel to sail.</li> </ul>

Regulatory Government Body	Function
SFP	<ul> <li>For vessels with relevant documentation issued by SMA, MChS and DPRAB-MENR, SFP:</li> <li>Checks with what purpose the vessel sails off; and</li> <li>Whether it holds an official permit (licence) from DPRAB-MENR - fishing of bioresources (fish) within the 10-mile fishing zone it controls - without these documents SFP would not allow the vessel to sail.</li> </ul>

#### **1.2.1 Fishing Licence Requirements**

To obtain a licence for fishing of bioresources (i.e. a fishing licence) legal entities or individuals need to apply to the DPRAB of the MENR with the following documents:

- A copy of the relevant by-law;
- Registration certificate;
- Certificate issued by tax inspection;
- Documents specifying vessel's owner (legal entity or individual); and
- Technical documentation regarding vessel condition (register).

An application for a fishing licence should specify:

- Vessel name;
- Requested volume (quota) and fish species composition (kilka, grey mullet, herring, ordinary/small fish<sup>1)</sup>; and
- Area (including coordinates) of planned activities.

#### 1.2.2 Sturgeon Fishing Licensing

Licences for catching sturgeon (*Acipenseridae*) are only issued for scientific-research activities (where a quota applies), as well as for the artificial reproduction for sturgeon farms. Two documents are required; namely a special permit and fishing licence. The scientific-research vessel (SRV) "Alif Gadzhiyev" is used for catching sturgeon, with numbers limited by the scientific quota. Every year two Caspian expeditions are carried out to assess sturgeon populations using this vessel (during summer and winter). These two scientific expeditions are organized by the AzerNIIRKh to assess:

- Population numbers (i.e. abundance);
- Field reserves and distribution of sturgeons in the Azerbaijan waters of Caspian Sea, changes in distribution; and
- Ratio of various sturgeon populations in Azerbaijani waters of the Caspian Sea.

In addition to the special permit and licence for sturgeon fishing associated with scientificresearch purposes, permission is also granted by AzerNIIRKh for fishing at two nearshore stations during the year at Nabran (Yalama-6, Middle Caspian) and Narimanabad (Southern Caspian). In addition, special permits and fishing licences are also issued every year, in March-April, to legal entities or individuals, for the purpose of artificial reproduction of sturgeons so that fish farms have an adequate quantity of sturgeon breeding stock.

<sup>&</sup>lt;sup>1</sup> The main focus of commercial fishing is kilka

#### **1.2.3** Commercial Fishing Licence Requirements and Reporting

To control commercial fishing, DPRAB-MENR issue:

- A special permit, and
- A fishing licence.

The name of the vessel and name of person responsible for fishing are indicated in these documents, which are issued after the legal entity or individual (i.e. the applicant) has paid a fee to a DPRAB dedicated account intended to provide compensation for the use of biological resources. At the end of each year this money is transferred from the DPRAB dedicated account to the Environment Protection Fund under MENR. Permit and fishing licence are issued to the applicant for a period from the day of his application by DPRAB-MENR to the end of the current calendar year. These documents authorise the applicant to carry out fishing in accordance with the licence conditions. DPRAB also issues official notification to the Agency for the Protection of Aqueous Bioresources (a Department of DPRAB), and copy of this notification is provided to the successful applicant.

At the end of each month the legal entity/individual is required to submit a report detailing the results of their fishing activities to DPRAB. According to the Law of the Azerbaijan Republic on fishing (1998), representatives of DPRAB (Agency for Protection of Aqueous Bioresources Department) have the right to be present during fishing and to check relevant documents.

#### 1.3 Commercial (Field) Activity in the Azeri-Chirag-Guneshli and Shah Deniz Contract Areas and Adjoining Areas of the Caspian Sea

Currently the following legal entities and individuals carry out commercial fishing in the Southern Caspian including the Azeri-Chirag-Guneshli (ACG) and Shah Deniz (SD) Contract Areas which are located within the western section of the Southern Caspian:

- Closed joint-stock company (ZAP) "Khazarbalig" ("Khazarbalig" MMM);
- Closed joint-stock company (ZAO) "Khazar-Shay Company" ("Khazar-Shay Company" MMC);
- Closed joint-stock company "Baku marine fishing harbor" ("Baku Deniz Balig Limani" MMC);
- Commercial company "Globus-5" ("Globus-5" IKF);
- Closed joint-stock company "Gartal" ("Gartal firmasi" MMC);
- Closed joint-stock company "Caspian Fish Co Azerbaijan";
- Open joint-stock company (OAO) Z.Tagiyev Fish curing plant;
- Individual A. Mamedov;
- Individual A. Guliyev; and
- Individual R. Gasanov.

Currently, in accordance with the permits issued by regulatory bodies discussed in Section 1.2 above, 25 vessels registered in Azerbaijan carry out commercial fishing in the Southern Caspian including the ACG and SD Contract Areas. These vessels, which all operate under annual permits, issued from the beginning of the calendar year, and their technical specifications are listed in Table 2.0.

# Table 2.0 – Specifications for National Fishing Vessels Having Permit for Commercial Fishing in the Southern Caspian (Including the ACG and SD Contract Areas), 2009 $Data^1$

Legal Entity/Individual	Vessel Type and Name <sup>2</sup>	Vessel Displacement (Tonnes)	Powerplant output (kWt)	Deadweight (Tonnes)	Fishing Equipment Used	
Legal Entities						
ZAO "Khazar Shav	LTV "Shay-1"	86.01	165	57	Cone-shaped net	
Company	LTV "Shay-2"	86.01	165	54	Cone-shaped net	
company	LTV "Shay-3"	86.01	165	54.08	Cone-shaped net	
	LTV "Shay-5"	86.01	165	54	Cone-shaped net	
740 "Baku marine	LTV "Mardakan"	86.01	165	57	Cone-shaped net	
fishing harbor"	LTV "Tebriz"	86.21	165	56.86	Cone-shaped net	
normig narbor	SB "Akhmedli"	85.04	110	38	Cone-shaped net	
	MFT "Lenkoran baligchisi"	723	852	414	Fish pump	
	MFT "Namig Hafizoglu"	722	852	414	Fish pump	
Commercial company "Globus- 5"	LTFV-50 "Antaris"	190	232	70	Cone-shaped net	
ZAO "Gartal"	LTV -29	81	132	54	Cone-shaped net	
74P "Khazarbalia"	SB "Dolphin"	85.04	110	38	Cone-shaped net	
	SB "Shusha"	86.01	166	54	Cone-shaped net	
	SB "Fortuna"	85.04	110	38	Cone-shaped net	
	LTV "Shans"	86	165	31	Cone-shaped net	
	LTV "Dalga"	85.02	166	54	Cone-shaped net	
	LIV "Bayaz"	86.01	166	54	Cone-shaped net	
ZAO "Caspian Fish Co Azerbaijan"	LTEV-50 "Shahriyar"	189	232	73	Cone-shaped net	
OAO Z.Tagiyev Fish curing plant	SB "Nardaran"	85.04	110	38	Cone-shaped net	
Individuals			·			
A Mamaday	SB "Khazar"	78	110	26	Cone-shaped net	
A. Marriedov	LTV "Kompas"	86.3	165	54	Cone-shaped net	
	LTV "102"	86	165	31	Cone-shaped net	
A. Guliyev	LTV «Mirmohammed -96"	86.01	166	54	Cone-shaped net	
D. O. J. J.	LTV "Sir"	86.03	165	54	Cone-shaped net	
R. Gasanov	SB "Gobustan"	85.04	165	38	Cone-shaped net	
Notes: 1 – DPRAB, Closed joint-stock company (ZAP) "Khazarbalig", "Lenkoran fish plant" 2 – Vessel types: LTV – Lifting Transportation Vessel; LTFV – Lifting Transportation Freezer Vessel; SB – Seine Boat; and MFT – Medium Freezer Trawler Refer to Section 2.3.1 below for further data regarding vessel types						

Cone-shaped nets on the vessels detailed in Table 2.0 are used at a maximum depth of 20 to 90m from the sea surface, and fish pumps are used at a maximum depth of 100-120m.

In Table 3.0, 19 additional fishing vessels are listed as belonging to various legal entities and individuals. Currently these vessels do not have a permit for commercial fishing for various reasons including technical or commercial issues, however, if they obtain such permits from the regulatory bodies they could potentially operate in the Southern Caspian, including the ACG and SD Contract Areas.

Table 3.0 – Fishing Vessels	of Legal	Entities	and	Individuals	That	Currently	Do	Not
Have Permits for Commercial	Fishing,	2009 Dat	ta <sup>1</sup>			-		

Legal Entities and Individuals	Vessel Type and Name <sup>2</sup>	Vessel Displacement (Tonnes)	Powerplant output (kWt)	Deadweight (Tonnes)	Used Fishing Equipment
Legal Entities					
ZAP	OSA "T.Ismailov"	86.01	166	54	Cone-shaped net
Kilazarbalig	OSA "Khudaferin"	85.04	110	38	Cone-shaped net
	OSA "Azeri"	81	132	54	Cone-shaped net
	OSA "Lenkoran"	85.02	166	54	Cone-shaped net
	OSA "Nizami"	85.04	165	38	Cone-shaped net
	LTV "Osmanly"	86	165	31	Cone-shaped net
	OSA "Sara"	78	110	26	Cone-shaped net
	OSA "Sevryuga"	85.04	110	38	Cone-shaped net
	LTV "Turan"	86.01	166	54	Cone-shaped net
	LTRV "Sultan"	189	232	73	Cone-shaped net
ZAO "Lonkoron	OSA "Yastreb"	85.04	165	38	Cone-shaped net
fish plant"	OSA "Komsomolets"	85.02	166	54	Cone-shaped net
	LTV "Pobeda"	86.21	165	56.86	Cone-shaped net
	OSA "Salyanly"				Cone-shaped net
	LTRV "Narimanabad"	190	232	70	Cone-shaped net
	OSA "Albatros"	85.04	110	38	Cone-shaped net
	LTV "Nasimi"	86.01	165	57	Cone-shaped net
Individuals					
Individual unknown <sup>3</sup>	LTV "Sumgait"	86	165	31	Cone-shaped net
Individual unknown <sup>3</sup>	LTV "Yurd"	86.21	165	56.86	Cone-shaped net
Notes:					

1 DPRAB, ZAO "Khazar-Shay Company, ZAO "Baku marine fishing harbor", Commercial company "Globus-5", ZAO "Gartal", ZAP "Khazarbalig", OAO Z.Tagiyev Fish curing plant, physical persons A. Mamedov, A. Guliyev, R. Gasanov

2 Vessel types:

OSA – Operating with Shipborne Airlift;

LTV – Lifting Transportation Vessel; and

LTRV – Lifting Transportation Refrigerator Vessel.

Refer to Section 2.3.1 below for further data regarding vessel types.

3 Vessels were previously owned by Neftchala fish factory. Current owners not disclosed.

Therefore, in 2009 there were 44 fishing vessels of the Azerbaijan Republic equipped to carry out commercial fishing sailing under the national flag, but in 2009 only 25 vessels obtained the relevant permits to fish.

Fishing vessels that have obtained a fishing licence are required to maintain a logbook where coordinates of the region they have fished are registered. Information about volumes and species composition of fish caught is also documented in the log. Vessel owners/operators have the right to sell caught fish.

In 2009 those legal entities and individuals who obtained licences for fishing in the Azerbaijan Republic and were only permitted to catch kilka caught 811.2 tonnes of kilka. The volumes caught by each legal entity/individual are set out in Table  $4.0^2$ .

#### Table 4.0 – Fish Caught by Each Legal Entity and Individual in 2009

Legal Entities and Individuals	Volume of Fish Caught (kilka, tonnes)		
Legal Entitiy			
ZAO "Khazar-Shay Company	23.7		
ZAO "Baku marine fishing harbor"	548.0		
Commercial company "Globus-5"	20.7		
ZAO "Gartal"	41.4		
ZAP "Khazarbalig"	86.905		
ZAO "Caspian Fish Co Azerbaijan"	26.9		
OAO Z.Tagiyev Fish curing plant	0		
Individual			
A. Mamedov	36.63		
A. Guliyev	16.21		
R. Gasanov	10.728		

Of those legal entities and individuals listed in Table 4.0, the following vessels deliver caught fish (kilka) to Govsany fish plant (Baku), from where fish products are sold to the sales network of the Russian Federation:

- ZAO "Khazar-Shay Company;
- ZAO "Baku marine fishing harbor";
- Commercial company "Globus-5"; and
- ZAO "Caspian Fish Co Azerbaijan".

The majority of fish caught in 2009 by these companies (619.3 tonnes) was packed and sold by Govsany fish plant.

ZAP "Khazarbalig" processes fish at their own enterprise, selling and exporting it themselves. The remaining companies and individuals also process and sell the caught fish themselves, mainly exporting it to the Russian Federation.

#### 1.4 Estimate of the Scale and Nature of Unregulated Fishing

DPRAB-MENR is responsible for the protection of biological resources, including fish resources. The Department for Protection of Aqueous Bioresources carries out its inspection activities in the Azerbaijan sector of Caspian Sea, within the 10-mile zone, in three near shore aqueous zones.

- Sumgait-Khachmaz;
- Absheron-Baku; and
- Salyan-Astara.

The ACG and SD Contract Areas fall under the sphere of activity of the Absheron-Baku division of the Agency for protection of aqueous bioresources. Figure 1 shows the location of the ACG and SD Contract Areas and key features/locations within the Azerbaijani sector of the Caspian Sea.

<sup>&</sup>lt;sup>2</sup> As discussed in Section 2.1 below, kilka account for 75% of fish caught in the Caspian Sea and its associated river estuaries.





As a result of inspections carried out in 2009 regarding protection of fish resources in the Azerbaijan Republic, 103 violations of fish protection legislation were identified, 114 people were prosecuted, 94 were charged with criminal offences, 49 fishing boats were confiscated, in addition to 3,125m of nets, 1,995 "kalada" hooks, 9 outboard motors, 3,224kg of small (ordinary) fish – and 2649kg of sturgeon were also confiscated. The sum of imposed fines was 10,364 AZN. The total sum of fines imposed as a result of court action during this period was 123,554 AZN which was equivalent to 154,442 USD.

In the Absheron-Baku division of the Agency for the Protection of Aqueous Bioresources 31 violations of fish protection legislation were identified and 14 people were brought to justice. Two of these cases were sent to Republican District Courts. Six cases were of criminal nature and were sent to law enforcement agencies, four cases were examined by DPRAB in accordance with administrative procedures.

In 2009 four fishing boats were confiscated, along with 119m of nets, 1995 "kalada" hooks, 2 outboard motors and 2,769kg of various fishes. The sum of claims during this period was 8,309 AZN.

### 2 Methods of Fishing and Equipment Used

#### 2.1 Commercial Fish Species

Areas up to a depth of approximately 100m below sea level in the ACG and SD Contract Areas and in the immediate vicinity of the Contract Areas have been the traditional fishing region in the Southern Caspian since the 1950s. The depth profile of the SD Contract Area extends from approximately 40m to 640m below sea level and for the ACG Contract Area the depth profile extends from approximately 100m to 400m below sea level. Up to 20 fish species can be found in ACG and SD Contract Areas depending on the season. Table 5.0 lists the species recorded.

One of these species is the Goby, which predominantly found in nearshore waters at a depth of no more than 50-75m below sea level, however there are some deepwater gobies that can be found at water depths of 200m to 300m below sea level. Other species, including sturgeon, grey mullet, herring, anchovy kilka and big eyed kilka, migrate across the Southern Caspian region during spring (March-April) and autumn (October-November). During the winter months these species are found wintering near the western shores and southern slopes of the Absheron sill (herring, anchovy and big-eyed kilka). The migration routes and spawning areas of fish species found within the SD Contract Area are shown in Figures 2 and 3.









# Table 5.0 – Fish Species Composition in the ACG and SD Contract Areas and Adjacent Areas of the Caspian $\text{Sea}^1$

Species Name	Depth of Occurrence					
Acipenseridae family – sturgeons						
Beluga	up to 70m; in autumn and winter up to 100-200m					
Sturgeon, Russian sturgeon	up to 70m; in autumn and winter up to 80-100m					
Kura (Persian) sturgeon	up to 70m; in autumn and winter up to 80-100m					
Kura spiny (bastard) sturgeon	up to 70m; in autumn and winter up to 80-100m					
Kura (Southern Caspian) starred sturgeon (sevryuga)	up to 50m; in autumn and winter up to 75-100m					
Clupeidae family – herring Clupeonella genus (Kessler) – tyulka, or kilka						
Anchovy kilka	In the aqueous areas 100-300m deep, everywhere, mainly in the area of slope-water gyral offshore. In these aqueous areas from the surface to the depths: in summer – up to 40m, in autumn – up to 60-80m, in winter – up to 100-300m.					
Big-eyed kilka	Most deepwater form. slope-water gyral 350-450m deep, everywhere, mainly in the area of slope-water gyral offshore. In these aqueous areas from the surface to the depths: in summer – up to 80 m, in autumn – up to 80-100m, in winter – up to 130-450m.					
Caspian ordinary klika	up to 30-40m					
Alosa Cuvier genus – herring						
Caspian shad	Area of occurrence – the whole sea. From the surface to 30-40m, deeper in winter.					
Big-eyed herring	Area of occurrence – Southern Caspian. From the surface to 30-40m, deeper in winter.					
Volga (black-backed) shad	Wintering in the Southern Caspian to depth 100m and higher					
Black-backed shad Area of occurrence – the whole sea. Wintering in t Southern Caspian to depth 100m and higher						
Cyprinidae family – chubs (carps)	Cyprinidae family – chubs (carps)					
Kutum (Black sea roach) up to 20-50m						
Mugilidae family – Grey mullet						
Golden mullet	Area of occurrence – the whole sea. Up to 400-500m					
Leaping grey mullet	Area of occurrence – the whole sea. Up to 200-300m					
Gobiidae family – gobies	un to 20 50m loss for such that to 20 400 m					
Goby (Knvalynski)	up to 30-50m, less frequent up to 80-100 m					
Cospion goby (chirmon)	up to 30-50m, less frequent up to 80-100m					
Monkey goby (Shirihari)	up to 30-50m less frequent up to 80-100m					
Caspian bighead goby	up to 30-50m					
Knipowitsch goby longicaudata	up to 30-50m less frequent up to 80-100m					
Grimm bighead goby	up to 30-50m					
Knipowitschia Ilijini goby	Pelagic deepwater species, up to 300-400m					
Deepwater goby – Neogobius bathybius (Kessler))	up to 300-500m					
Goby Mesogobius nonultimus (Iljin)	up to 300-400m					
Goby Benthophilus ctenolepidus Kessleri	up to 300-400m					
Goby Anatrirostrum profundorum (Berg)	up to 300-400m					
Notes: 1 Akhundov M.M. Biodiversity of the Azerbaijan sector of Caspian sea. Ichthyofauna. Country report of the Azerbaijan Republic. UNDP/Caspian Environmental Programme200027 p. Derzhavin A.N. Inventory of fresh-water fishes of Azerbaijan. Baku, 1949, 46 p. Derzhavin A.N. Fishes of superclass. Fauna of Azerbaijan. Baku, 1951, pp. 207-248 Derzhavin A.N. Fauna of Azerbaijan. Kura fisheries. Baku, 1956, pp. 28-57 Derzhavin A.N. Kura fisheries. Publishing House of the Azerbaijan Academy of Sciences, Baku, 1956. 535 p. Kazancheev Ye.N. Fishes of the Caspian Sea (ranger) Moscow: Light and Food Industry, 1981168 p. Caspian Sea. Ichthyofauna and field resources. Moscow, 1989. Ragimov D.B. Biology of gobies breeding near the western shores of Middle and Southern Caspian: Statement 2. Transactions (Izvestiya) of the Azerbaijan Academy of Sciences, Series of biological sciences.						

Catch records show that kilka is the predominately caught species of fish, accounting for about 75% of total fish catch in the Caspian and in estuaries of the rivers flowing into the Caspian. At present kilka is most abundant fish present (in terms of biomass) in the Caspian and associated river estuaries with sturgeon as the second most predominate. Fishing in Azerbaijan is carried out mainly in the Caspian Sea, Kura River and inland water reservoirs. Commercial fishing in the Kura River and Caspian Sea includes over 20 fish species. Fishing for sturgeon, solely for the purpose of fish breeding, is carried out mainly in the Kura River, and in the mouth of the Kura estuary. Foraging schools of sturgeon dwell on the western shelf of the Middle Caspian (refer to Figure 1), in the territorial waters of the Azerbaijan Republic. This is where commercial sturgeon stocks originate. Breeding sturgeon located here are at the II and II-III stages of maturity<sup>3</sup>. To the south of the Kura estuary, breeding sturgeon are at the III and III-IV stages of maturity.

Currently, when legal entities and individuals apply for a fishing licence, only kilka is specified in the documents as the objective for fishing, but licences can be obtained for other fish specie including grey mullet and herring. Kilka, which is a key object for commercial fishing, comprises three species:

- Ordinary:
- Anchovy; and
- Big-eyed. .

Besides its commercial value, kilka is the main food source for sturgeon, herring and other predatory fish, as well as for the Caspian seal. This explains why the ACG and SD Contract Areas and adjoining areas include all of the above mentioned fish species and seals, which migrate through these areas.

#### 2.2 Locations of Commercial Activity of Fish Vessels

As mentioned in Sections 1.1, 1.2 and 2.1 of this report, kilka is main object of commercial fishing for vessels in the Caspian Sea, including Azerbaijani waters. Figure 1 above shows the main areas where kilka are fished. The main accumulations of kilka were registered in the Southern Caspian from Oil Rocks to Kornilov-Pavlov bank. In this area ordinary kilka are found between 20 to 40m below sea level, anchovy kilka between 100 to 300m below sea level and big eyed kilka between 130 to 450m below sea level. However, the densest accumulations have been found in the nearshore zone up to 50m below sea level. Commercial fishing for kilka is carried out in the vicinity of the following:

- Oil Rocks;
- Kornilov-Pavlov bank;
- Andreev, Karagedov and Kalmychkov banks;
- GPB bank;
- Borisov bank; and
- The mouth of the Kura estuary.

Andreev bank, located opposite Byandovan cape and approximately 15-20km from the SD Contract Area and 80-90km from the ACG Contract Area, is the closest to commercial fishing area with respect to the ACG and SD Contract Areas. Depending on the season, a maximum

III - Developed (m) / developing (f);

Stages I-IV of maturity takes place at sea. The last stage (V) is observed in mature individuals during spawning in the rivers. Various species of sturgeon living in the Caspian Sea reach these stages of maturity at different ages and body mass. Sturgeon mature and are ready for spawning (stage V) at the following ages:

Starred sturgeon (sevruga)	8- 10 years;
Russian sturgeon	10 - 12 years
Persian sturgeon	12 -14 years;

<sup>&</sup>lt;sup>3</sup> Sturgeon undergo five stages of maturity, namely:

I - Immature;

II - Developing or resting (m) / maturing virgin or resting (f);

IV - Embryos fully formed and developed for reproduction; and

V - Mature.

of 15 fishing vessels commercially fish in the Southern Caspian at any one time on the route from Oil Rocks to Kornilov-Pavlov. Fishing is carried out during the whole year with the exception of May and June when kilka are spawning and migrate to the Northern and Middle Caspian. During this period kilka do not shoal and therefore fishing is not productive. During the winter, commercial fishing is carried out at a depth of 60-80m below sea level, and in the summer at a depth of 30-40m below sea level. At these depths the main fish caught are ordinary kilka species.

Anchovy and big-eyed kilka stay in the ACG and SD Contract Areas, mainly during winter. During autumn-winter months a relationship can be seen between the distribution of herring and kilka, (food source for herring) and the distribution of zooplankton (food source for kilka). Herring spend winter in the Southern Caspian, from Chilov Island to Astara, mainly near the western shores and southern slopes of the Absheron sill<sup>4</sup>. Herring and kilka in the ACG and SD Contract Areas are generally found mainly in winter, at depths up to 50-100m, but can sometimes be found at depths of 130-300m below sea level. However, vessels equipped with cone shaped nets predominately fish from 60-80m below sea level, while vessels equipped with fish pumps catch fish at 100-120m below sea level.

Invader plankton-feeding comb jelly *Mnemiopsis leidyi*, has diminished food reserves in the Caspian Sea, consuming large quantities of zooplankton, so that the situation is almost catastrophic for organisms which feed on zooplankton and throughout the food chain. With the appearance of *Mnemiopsis leidyi* in the Caspian Sea kilka reserves have reduced. Volumes of caught fish overall in the Caspian basin have reduced from 271 thousand tonnes in 1999 to 54 thousand tonnes in 2003<sup>5</sup>, i.e. a 5-fold decline. Recently kilka began feeding on zooplankton *Acartia*. Predominance of *Acartia (clausi+tonsa)* within the structure of modern zooplankton instead of *Eurythemora, Limnocalanus and Calanipeda*, leads to a change of biochemical composition of food consumed by Caspian kilka (mainly the anchovy kilka).

During recent years, the distribution and abundance of kilka has changed; while they can be found throughout the Azerbaijan sector of the Caspian Sea their concentrations have reduced due to the *Mnemiopsis* invasion. Prior to the last 4 to 5 years the average volume caught by the cone-shaped nets of the Azeri commercial fleet was 5.8kg and 11.3kg per hoist in the Middle Caspian and Southern Caspian, respectively. From 2002 to 2004 the majority of fish caught was the anchovy kilka representing 63.4-83.5%, the share of ordinary kilka was 14.6-28.6% and that of big-eyed kilka 0.2-2.8%. However, during the last 4 to 5 years (Table 6.0), compared to the previous years, the percentage share of ordinary kilka caught increased significantly (4-5 times) (up to 69.9% in 2009), whilst big-eyed kilka practically disappeared from the catch (0.7% in 2009). Major accumulations of kilka were observed in the Southern Caspian from Oil Rocks to the bank of Kornilov-Pavlov, whereas most dense accumulations were observed in the nearshore zone (at depths up to 50m).

Voor	Species of Kilka (% Caught)					
redi	Anchovy	Ordinary	Big-eyed			
2005	75.2	22.0	2.8			
2006	63.4	36.25	0.35			
2007	20.9	78.1	1.0			
2008	34.1	65.3	0.6			
2009	29.4	69.9	0.7			
Notes: 1 DPRAB						

# Table 6.0 – Change of the Ratio of Various Kilka Species (%) Caught in the Azerbaijan Sector of Caspian Sea in $2005-2009^1$

<sup>&</sup>lt;sup>4</sup> Kazancheev, 1981

<sup>&</sup>lt;sup>5</sup> Sedov et al., 2004

Thus, commercial fishing from vessels in the Azerbaijan sector of Southern Caspian during the last 4-5 years has changed as follows:

- 1. There has been a reduction in the abundance of anchovy kilka (which is now found at relatively shallow depths up to 50m during the summer months, whereas previously it was caught at a depth 80-120m), and a corresponding reduction of caught fish volumes; and
- 2. Fishing vessels have become more active at relatively shallow sea depths (30-50m), which results in increased catch volumes of ordinary kilka (which usually stays at relatively shallow depths and is also called "nearshore kilka").

Recently, in connection with the invasion of comb jelly *Mnemiopsis leidyi* and changes in the trophic structure of Caspian Sea, adult fish dominate within the catch and the proportion of young fish is very small. Commercial fishing for kilka is currently carried out predominantly in the areas of Oil Rocks, banks of Kornilov-Pavlov, Andreev, Karagedov, Kalmychkov, GPB, Borisov, sea area near Kura river mouth. Results from recent analysis at Borisov, Karagedov banks and Oil Rocks show that fishing at depths of not more than 70-80m shows that the anchovy kilka caught most recently have been mainly of adult size groups. Young kilka were very rare or even absent. This trend has become especially evident since 2001. Shortages of young kilka within the fish catch indicate that from 2001 to present, reproduction of kilka has been low. The appearance of the invader, comb jelly *Mnemiopsis leidyi* in the Caspian Sea during 1997-1998, which eats kilka roe, was one of the reasons attributed to the reduction of the proportion of young kilka in the catch. While the main cause in the reduction of kilka has been the result of comb jelly *Mnemiopsis leidyi*, excessive fishing (over fishing) also negatively affects kilka reproduction.

# 2.3 Fishing Technique and Equipment Used in the Azerbaijan Sector of Caspian Sea

As shown in Section 1.2 and Table 2.0 above, almost all fishing vessels of the Azerbaijan fleet use cone-shaped nets (LTV, SB, OSA and LTRV type vessels) and only two vessels use fish pumps (MFT "Lenkoran baligchisi" and MFT "Namig Hafizoglu"). An overview of the fishing equipment used on the vessels in the Southern Caspian Sea is provided below. Appendix A provides further details.

The Azerbaijani fishing fleet is of high importance in the national fish industry. Fish caught from vessels is processed on board and transported to the shore. The vessels are designed for commercial fishing and there are many types of commercial fishing vessels including trawlers and seine boats.

### 2.3.1 Fishing Vessel Types

#### **Fish Trawlers**

Fish trawlers are designed for offshore fishing, mainly with the use of trawls, however occasionally drift nets or similar are used. No trawler vessels permitted to fish commercially for kilka in Azerbaijani waters employ the use of trawl fishing techniques. The use of trawl fishing methods is employed by scientific research vessels only. Several types of fish trawlers exist: large fish trawlers (BRT), medium fish trawlers (CRT) and small fish trawlers (MRT).

#### Seine Boats

Seine boats are also used in the Caspian Sea. Seine boats are designed for purse-seine (seine-net) fishing, however when necessary, they can be used for other types of fishing.

The following methods of commercial fishing are currently used:

- Fish entanglement within the net linemeshing fishing gear;
- Fish filtering from water fish trawling gear (trawler nets);
- Trays and pickups;
- Fishing with the use of traps –fixed fishing gear;
- Fishing with the use of hooks fishing hooks/tackle; and
- Special fishing methods electric fishing, fish pumps, fishing wheels, etc.

Appendix A provides figures showing both trawler and seine fishing vessels.

#### 2.3.2 Historical Fishing Methods

In earlier years herring drift nets were used in the Southern Caspian (the hanging net length was 30m, hanging net heights were 6.55 and 4.15m, respectively). The main target for drift fishing was herring. Drift fishing for herring was used in the Caspian Sea in the 1940s and 1950s. Depending on the arrangement, stationary nets can be bottom and pelagic nets. In terms of design, there could be ordinary single-walled nets, nets with vertical walls, frame nets, double-walled nets, triple-walled nets and combined gill (rough) nets. However, due to a large inadvertent catch (known as a by-catch) of young sturgeons and following the recommendations of scientists, drift fishing in the Caspian was banned in 1962.

#### 2.3.3 Current Fishing Methods

Currently most fishing vessels in the Azerbaijan sector of the Southern Caspian use coneshaped nets for kilka fishing with the use of electric light. Electric fishing is widely used and was developed by Professor P.G. Borisov. Later, developing this method further, I.V. Nikonorov and others used fish pumps, attracting fish with electric light. The high efficiency of new fishing methods has resulted in significant improvements in the volume of fish caught and the proportion of kilka caught within a haul with the use of electric light reaches up to 80%. Fishing for kilka in the Caspian Sea with the use of subsea electric light is most important as kilka are attracted to the light and gather near the catching devise. Later, centrifugal fish pumps and then airlifts were used for fishing. All three types of fishing are used on the Caspian i.e.:

- Cone-shaped purse nets;
- Centrifugal fish pumps; and
- Airlift.

Light attracts all three species of kilka; however anchovy kilka makes up the major share of commercial catches when fishing in water depths of 80-120m below sea level. Anchovy kilka lives in the open water of the Middle and Southern Caspian, avoiding low salinity water, while ordinary kilka are found in shallower nearshore waters (30-50m). In summer commercial populations of kilka are found all along the western and eastern coast of Caspian Sea, up to the Northern Caspian. The largest commercial populations of ordinary kilka can be found from the Mangyshlak peninsular to Kenderli Bay in the east and in the area of Makhachkala in the west. Regions especially rich with ordinary kilka in the southern part of the sea are Kianly-Turkmenbashi on the eastern coast, southwards from Salyan – Pirsagat on the western coast (Azerbaijan territorial waters). In these areas kilka is found in large quantities in winter as well.

Fishing for kilka is carried out the year round (with the exception of May and June) from seine boats PC-300, specially re-equipped for kilka fishing in the Caspian Sea. Earlier commercial fishing was carried out mainly from refrigerator vessels such as "Druzhba" and "Zelenodolsk". Vessels of "Druzhba" type are 57.2m long, 9m wide, displacement 850 ton and deadweight 180 ton. They operate with the use of two diesel-generators, 300 horsepower (h.p.) each, their cruising capacity is 20 days. These vessels were gradually replaced by vessels of "Zelenodolsk" type, which are 55.35m long, 9.5m wide, displacement 985 ton and deadweight 305 ton. They are operated with the use of two diesel-generators, 400 h.p. each. The vessel is intended for fishing and fish freezing. Later this business was supported with the introduction of new vessels of "Caspian" type. To attract kilka to fishing gear 500-1000 watt

electric lamps are used, providing ordinary white (colourless) light. These lamps have well insulated special sockets, preventing water entry to their bases. Lamps are fixed to the fishing gear with their bulbs being oriented upwards. When fishing from PC-300 type vessels, cone pickups are used, and vessels of "Druzhba" and "Zelenodolsk" type are equipped with fish pumps and airlift.

#### Cone Shaped Nets

All cone-shaped nets comprise six net trapeziums. The cone-shaped net for Caspian kilka consists of webbing of two kinds: in the upper part webbing is made of 20/12 thread with 30millimetre (mm) net-mesh, the bottom part is made of 34/9 thread, with 8mm net-mesh. The ferrule (i.e. hoop) diameter is usually 2.5m. The general appearance of cone-shaped nets is shown in Figure 4. Fishing is carried out with two nets, alternately from two sides of the vessel. The nets remain at the fishing depth horizon for 0.5-10 minutes depending on the concentration of fish populations. The rate the net is pulled out of water is typically 0.3-0.4 metes per second (m/s). As stated within Section 1.3 above cone shaped nets are used at a maximum depth of 20 to 90m below the sea surface.

#### Fish Pumps and Airlift

In 1948 N.S. Fershtut suggested using fish pumps for Caspian kilka fishing. This method was improved by I.V. Nikonorov. For this technique one or two fish pumps of HP-150 type are installed on the vessel. A vacuum (suction) hose is used which corresponds in length to the desired depth at the fishing location. Two strong lamps are attached at the end of the suction hose, on its side. After the underwater electric lights are switched on, the kilka approach the hose and are sucked into it and delivered to the deck of the vessel. Fishing is undertaken without the participation of fishermen and is quite efficient if the concentration of fish populations are high enough. Fish pump units RBU-100, RBU-150 and RBU-200 are used for kilka fishing (the code numbers indicate the suction hose diameter in mm).

The pump or pumps are installed on the vessel deck and the suction hose is thrown overboard and lowered into water in a place where kilka are concentrated. Rubber hoses are usually used, which are smooth inside and corrugated outside. They can be lowered to any depth up to 150m. The end of the suction hose is turned upwards and is equipped with a catching device, consisting of a suction nozzle with a guarding ferrule (hoop). Slings are connected the ferrule and to a hoist rope and winch. Electric lamps (usually white light) are fixed to the sides of suction nozzle. Lamp capacity is 1.0-1.5 kilowatts (kWt). When the lamps are switched on, kilka will approach the catching device and are sucked in by the pump and delivered to the deck. This process is continuous and does not require pulling and lowering of fishing gear. Fishing efficiency is 50-60% higher than when cone-shaped nets are used. At the same time the cost of production is reduced and working conditions improved. Commercial fishing for kilka using fish pumps began in 1955. In the 1970s production of kilka in the Caspian Sea reached 423 thousand tonnes, and 80% were caught with the use of fish pumps. However, a major disadvantage of kilka fishing with the use of fish pumps and light is that large quantities of fish damaged by rotating parts of equipment. To address this, special pumps were introduced known as airlifts. Airlifts includes a corrugated hose, which is lowered from the vessel to a depth where kilka are concentrated. The technique used and organization of fishing with the use of airlifts is the same as with the centrifugal fish pumps. The advantage of this method is that the kilka is not damaged as lift pumps are used at relatively shallow depths (20-40m) and a lower level of pressure is required. Therefore the majority can be used for preservation. Fish pumps can be used up to a maximum depth of 100-120m.



#### Figure 4 Cone-Shaped Net – Key Features

1 – Electric lamp; 2 – Ferrule (hoop); 3 – Electric cable; 4 – Wale;
5 – Weight; 6 – Lead; 7 – Metal rings; 8 – Tightening rope;
9 – Cross-piece; 10 – Hoist rope; 11 – Slings.

### 2.3.4 Scientific Research Using Trawl Fishing

Trawl fishing in the Caspian Sea is used for scientific-research purposes only (twice in a year – in winter and summer) to assess abundance and distribution of sturgeon and other fish. Depending on the purpose of the study, variable-depth and variable size trawls are used. A 9m trawl surveys at depths of up to 10m while the 24.7m Mikhov's trawl is used for depths in excess of 10m below sea level. Both the 9m trawl and 24.7m Mikhov's trawl are used in the Northern and Middle Caspian. As the Southern Caspian sampling stations are located at larger depths the 24.7m trawl is used.

Scientific Investigations are carried out using following vessels:

- "Issledovatel Kaspiya"; and
- "Alif Gadzhiyev".

Investigations are carried out from the vessel "Issledovatel Kaspiya" belonging to Russian Federation. Trawl surveys using the 24.7m bottom trawl of the vessel "Issledovatel Kaspiya" are carried out outside the 12-mile zone of the Turkmenistan and Kazakhstan sectors of the Caspian Sea, and also in the Northern Caspian, in the territorial waters of the Russian Federation. In 2007 and 2008, using a permit issued by the Ministry of foreign Affairs of the Azerbaijan Republic, the "Issledovatel Kaspiya" was used in the Azerbaijani sector of the Caspian Sea.

Since 2002, Azerbaijan annually undertakes two offshore expeditions (summer and winter) in the Middle and Southern Caspian with the purpose of assessing the following with regard to sturgeon:

- Abundance;
- Commercial reserves and distribution of sturgeon;
- Specie composition and the abundance of the biomass of plankton and macrozoobethos; and
- Identification of changes in distribution and proportion of population of various species of sturgeons.

Trawl surveys are carried out on 11 sections each comprising 5 sampling stations. In total there are 55 sampling stations in the nearshore sea zones, at 10, 25, 50, 75 and 100m depths below sea level. Investigations are carried out on the scientific-research vessel "Alif Gadzhiyev" (Figure 5). The DPRAB approved network of sampling stations, follow the sections perpendicular to the shoreline. The technical parameters of the vessel "Alif Gadzhiyev" and equipment installed on board are presented in Table 7.0.

Table 7.0 – Technical Parameters	of Scientific-Research	Vessel '	"Alif	Gadzhiyev"	and
Equipment (instruments) On Board	1				

Name of Equipment	Grade, Specification of	Country, Year	
(Instrument)	Equipment (Instrument)	of Production	
Scientific-research vessel "Alif	Type: ocean-sea-river	Finland, Turku,	
Gadzhiyev"	Model: 655 (research);	1987	
	IMO № 8422462;		
	displacement: 693 ton;		
	deadweight: 207 ton;		
	length: 45.6m;		
	width: 10.0m;		
	maximum draft: 3.6m;		
	vessel anchoring depth: 175m;		
	POB (persons on board): 23		
	persons;		
	powerplant output: 985 kWt, 1340		
	h.p.;		
	vessel speed: $12.0 \pm 0.2$ knots;		
	cruising radius: 10 000 miles;		
	cruising capacity: 35 days;		
Device for determination of	2D-ACM	USA, 2006	
direction and velocity of sea			
currents up to a depth 1000m			
Bottom grab (sampler) for taking	Van-Veen, sampling area 0.2 m <sup>2</sup>	UK, 2007	
samples of bottom sediments			
Bathometer - sea water sampling	Niskin, volume 10 litre	France, 2004;	
device		UK, 2004	
Field trawl for ichthyologic studies	24.7m (Mikhov's design)	Russia, 2007	
Fry (beam) trawl for ichthyologic	9m	Russia, 2007	
studies			

For a 24.7m trawl at depth over 10m the direct distance between the front edges of the wings (edges of the net) is 17m and 5m on vertical opening (refer to Figure A2). Catching efficiency at depths over 10m for all sturgeon species is taken as 0.1 (i.e. 10% efficiency). Fishing with trawls is not carried out in areas with a rocky sea bottom and where there are other underwater obstructions as this would be dangerous and may result in the inadvertent loss of the trawler.

Coordinates of sections and trawl sampling stations in the Southern Caspian are presented in Table 8.0 below and illustrated in Figure 6

ID	Section	Coordinates	Depth (m) Below
			Sea Level
1A	Pirsagat Cape	$39^{\circ}54' - 49^{\circ}30'$	-10
1B		$39^{\circ}54' - 49^{\circ}49'$	-25
1C		$39^{\circ}54' - 50^{\circ}09'$	-50
1D		$39^{\circ}54' - 50^{\circ}17'$	-75
1E		$39^{\circ}54' - 50^{\circ}25'$	-100
2A	Byandovan Cape	39 <sup>°</sup> 42/ - 49 <sup>°</sup> 32/	-10
2B		39 <sup>0</sup> 42/ - 49 <sup>0</sup> 41/	-25
2C		39 <sup>°</sup> 42/ – 49 <sup>°</sup> 46/	-50
2D		39 <sup>°</sup> 42/ - 50 <sup>°</sup> 02/	-75
2E		39 <sup>°</sup> 42/ - 50 <sup>°</sup> 03/	-100
3A	North-eastwardly Kultuk	39 <sup>°</sup> 33′ – 49 <sup>°</sup> 21′	-10
3B		$39^{\circ}33' - 49^{\circ}37'$	-25
3C		39 <sup>°</sup> 33′ – 49 <sup>°</sup> 48′	-50
3D		39 <sup>0</sup> 33′ – 49 <sup>0</sup> 51′	-75
3E		$39^{\circ}33' - 49^{\circ}52'$	-100
4A	South-eastwardly Kultuk	39 <sup>°</sup> 06′ – 49 <sup>°</sup> 15′	-10
4B		39 <sup>0</sup> 06′ – 49 <sup>0</sup> 21′	-25
4C		39 <sup>°</sup> 06′ – 49 <sup>°</sup> 25′	-50
4D		39 <sup>°</sup> 06′ – 49 <sup>°</sup> 28′	-75
4E		39 <sup>0</sup> 06′ – 49 <sup>0</sup> 31′	-100
5A	Kurinskaya spit	38° 55′ – 49° 09′	-10
5B		38 <sup>°</sup> 55′ – 49 <sup>°</sup> 16′	-25
5C		$38^{\circ}55' - 49^{\circ}20'$	-50
5D		$38^{\circ}55' - 49^{\circ}22'$	-75
5E		38 <sup>°</sup> 55′ – 49 <sup>°</sup> 25′	-100
6A	Lenkoran	38 <sup>°</sup> 45′ – 48 <sup>°</sup> 54′	-10
6B		38 <sup>°</sup> 45′ – 49 <sup>°</sup> 06′	-25
6C		38 <sup>°</sup> 45′ – 49 <sup>°</sup> 11′	-50
6D		38 <sup>°</sup> 45′ – 49 <sup>°</sup> 15′	-75
6E		$38^{\circ}45' - 49^{\circ}17'$	-100
7A	Shahagach	$38^{\circ}35' - 48^{\circ}54'$	-10
7B		$38^{\circ}35' - 49^{\circ}02'$	-25
7C		38° 35′ - 49° 05′	-50
7D		$38^{\circ}35' - 49^{\circ}06'$	-75
7E		38° 35′ - 49° 14′	-100

# Table 8.0 – Coordinates of Sections and Trawl Sampling Stations in the Southern Caspian

Figure 5 Scientific Research Vessel "Alif Gadzhiyev"





Figure 6 Location of Sampling Stations

November 2013 Final Each survey station, located at 10, 25, 50, 75 and 100m depth, is positioned in accordance with earlier established coordinates. Work on each station begins with recording depth (i.e. bathymetry readings), after that standard hydrochemical parameters are determined:

- Water temperature (surface and near-bottom);
- Salinity;
- pH;
- Dissolved oxygen content; and
- Transparency.

Zooplankton samples are then taken with the use of a Juday plankton net, and samples of the comb jelly *Mnemiopsis* are obtained using special net. Samples are taken from the bottom to the surface, one at each station. The nets are pulled in at a speed of 0.3m/s. Samples of bottom sediments are taken with the use of Van-Veen bottom samplers to obtain macrozoobenthos samples. After washing, samples are preserved in 4% formaldehyde (formalin) solution coloured with special dye "Rose-Bengale". After the completion of zooplankton sampling, *Mnemiopsis* and macrozoobenthos trawling of ichthyofauna begins. In the Middle Caspian, trawling is carried out across 4 sections, including 20 stations, and in the Southern Caspian – across 7 sections, including 35 trawling stations. The standard 24.7 bottom trawl of Mikhov design is used. The speed of bottom trawling is 2.5 knots, giving a trawling exposure at each station of 30 minutes.

In addition to the zooplankton samples taken using a Juday plankton net, water samples are taken using Niskin a bathometer, at a distance 3-5m from the bottom of the sea, avoiding contact with the sea floor. By contrast, the Van-Veen bottom sampler reaches the bottom and takes benthic samples from the sea floor. In accordance with the method of investigation, three replicate samples of macrozoobenthos are taken at each station.

None of the seven sections along which bottom trawling is carried out for research purposes in the Southern Caspian coincides with the pipeline routes from the ACG or SD Contract areas to Sangachal Bay. The section from Pirsagat Cape going eastwards (up to 100m depth) is the closest to the SD Contract Area and pipeline routes to the Sangachal Terminal. However, as shown in Figures 7 and 8, trawl stations '1E' and '1D' are located in close proximity to the SD1 export pipeline. Trawl station '1E' is located approximately 2-3km north of the pipeline and trawl station '1D' is located approximately 5-6km south.







Figure 8 Close Up of Trawl Stations '1E' and '1D' and the SD1 Pipeline

Through subsequent correspondence between, BP, the Azerbaijan Fisheries Research Institute and MENR, it as been agreed that trawling operations at 1D and 1E will be suspended from 1 January 2015 for an indefinite period. From this current year (2012), it has also been agreed to move these two test trawling locations further west outside of the SD Contract Area. Figure 9 indicates the new locations for 1D and 1E.



#### Figure 9 Amended Trawl Stations at 1D and 1E

November 2013 Final

# 3 Social and Economic Advantages

#### 3.1 Total Economic Value of Fishing Activities

#### 3.1.1 Operating Costs and Gains from Fishing Vessels

Maintenance and operation costs for one of the 25 currently active fishing vessels with the required permits for fishing (listed above in Table 1.0, Section 1.2) is, on average, about 36 000 AZN (manat) in a year, i.e. 45 000 USD (without seamen wages). Whereas maintenance and operation costs for one of the 19 vessels that failed to obtain permits for fishing and are assumed to be idle at the time of writing (Table 2.0, Section 1.2) is, on average, about 12 000 AZN, i.e. 15 000 USD (without seamen wages). Thus, in 2009 total costs of maintenance and activity of all 44 vessels were 48000 AZN, namely about 60 000 USD (without seamen wages). Both legal entities and individuals would not provide information about their revenues from fishing activity. However, it is clear that revenues from fishing will be the difference between the sum of the profit obtained from the sale of caught fish and the vessel maintenance costs and wages paid to seamen and fishermen.

#### 3.1.2 Value and Species of Fish Delivered to the Shore

Fishing vessels mentioned above (Section 1.2) fish predominately only for kilka. A total 811.2 tonnes of kilka was caught and sold to the retail trade market in 2009.

#### 3.1.3 Level and Importance of Employment on Fishing Fleet

For each of the 25 mentioned fishing vessels that are involved in commercial fishing (Table 1.0, Section 1.2) an average of 6 people are employed, therefore 150 people are employed in total on those 25 vessels overall. The average annual wages of one person is 1,000 AZN, including the twonth downtime in May and June. Therefore fishing generates 150,000 AZN in a year, i.e. 187,500 USD for 150 people in total. On each of the 19 fishing vessels that failed to obtain a permit for fishing and are assumed to be idle at the time of writing (Table 2.0, Section 1.2) 6 people are also employed on average, i.e. 114 people on 19 vessels. Each person has an average annual wage of 900 AZN; giving a total for 114 people of 102,600 AZN, i.e. 128,250 USD. Thus, the annual wages of the 264 people on the 44 national fishing vessels identified during 1 year is about 252,600 AZN, i.e. 315,750 USD.

#### 3.1.4 Level and Importance of the Onshore Markets and Sales Process

In 2009 legal entities and individuals that obtained a permit for fishing in the Azerbaijan Republic were fishing predominately only for kilka. In 2009 legal entities and individuals caught 811.2 tonnes of kilka (see Table 3.0, Section 1.2). The ZAO "Khazar-Shay Company", ZAO "Baku marine fishing harbor", commercial firm "Globus-5" and ZAO "Caspian Fish Co Azerbaijan" (Table 3.0) deliver caught fish (kilka) to Govsany fish plant (Baku), and, from there, fish products are sold to the sales network of the Russian Federation. The major proportion of fish caught in 2009 (619.3 tonnes) by these companies was packed and sold by Govsany fish plant. ZAP "Khazarbalig" processes fish at their own enterprise, then sells and exports caught fish. The remaining companies and individuals also process and sell caught fish themselves, mainly exporting it to the Russian Federation.

#### 3.1.5 Level and Importance of Employment Onshore

415 people are involved in the process of preparing vessels for marine operations, and in fish processing and marketing, each with an average annual wage of 1200 AZN. Therefore, in total 415 people wages totals 498,000 AZN, i.e. 622,500 USD.

# 3.2 Economic Value of Fishing Activities within the Vicinity of the SD Contract Area

It is quite difficult to determine total economic value of fishing activity within the borders of the SD Contract Area, as fishing vessels of legal entities and individuals change their locations depending on the dynamics of kilka populations in the Southern Caspian, which are currently distributed around various offshore banks and other areas as described in Section 2.2 above. However, considering that in winter fishing is carried out at depths of 60-80m below sea level, and in summer – at 30-40m depths below sea level, i.e. at a substantial distance from the ACG and SD Contract Areas and the adjoining parts of the sea including pipeline routes, it can concluded that the impact from the oil-gas operations and hydrocarbon transportation on the social-economic indices associated with fishing in the Azerbaijan sector of the Caspian Sea will be negligible.

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### Appendix A Trawl Fishing

The principle of trawl fishing is that one or two vessels tow special fishing gear along the bottom of the water body or within the water column, and this fishing gear collects fish as it progresses. If fishing is carried out from two vessels it is called pair trawling. When fishing from one vessel the fishing gear is called a trawl, and the fishing is known as trawl fishing. Trawls include bottom trawls and variable-depth (floating) trawls. The principle of operation of pair trawl fishing gear involves a net bag of a special design which is towed through the water body by two identical twin vessels, catching fish as they progress. This type of fishing was used in the 1930s in the Northern Caspian and Azov Sea using seine (purse) nets, was quite successful, and became a major business on the Caspian. However, as a result of the decrease in stocks both in the Caspian and Azov seas, trawl fishing was banned in these regions.

Another type of trawl, spacer trawls, are trawls that are opened horizontally with the use of otter boards attached to the front side of the trawl, at an angle to its direction of movement. These boards expand wings and open the trawl. In terms of horizontal opening trawls, these are sub divided into beam trawls and otter trawls. A beam trawl is shown in Figure A1.



Figure A1 Beam Trawl

1 – Cradle; 2 – Beam; 3 – Bridle; 4 – Wire (drag rope); 5 – Guard rope.

The base of a beam trawl is a solid wooden block with the beam up to 20m long with diameter about 30cm. The average length of the beam is 15-16m. Due to disadvantages associated with beam trawl operation related to the bulkiness of its frame it was necessary to search for more efficient solutions. As a result the so called brace trawl, or otter trawl, appeared.

In practice bottom trawls and variable-depth (floating) trawls are used. Bottom trawls are intended for catching fish that spend the major part of their life cycle at the bottom of the sea or directly near it. Bottom sweep is a variety of bottom trawl and is used mainly for fishing of seed-herring that stays at some distance from the bottom. Variable-depth (floating) or pelagic trawls have been used for fish, which stay within the water column (herring, pilchard/sardine, kilka, etc.). The design of the variable-depth trawl incorporates the absence of square (pocket park) and ground ropes.

Numerous designs of trawls exist that vary in size, cut, accessories etc. The trawl designed by F.M. Mikhov in the beginning of the 1950s has been used most frequently from the vessels of beam (side) trawling and stern trawling. The length of a Mikhov trawl is 24.7m. In 1959 this trawl was upgraded and is currently used on most vessels of beam (side) trawling and stern





1 – Ground rope; 2 – Lower guard rope; 3 – Upper guard rope; 4 – Quarter-rope;
5 – Jamming rope line; 6 – Jamming rope; 7 – Kukhtyl (ball float); 8 – Special "delezhny" sling; 9 – Cod end; 10 – Belly line; 11 – Pocket (purse); 12 – Square; 13 – Lower wing;
14 – Upper wing; 15 – Moth; 16 – Dan leno; 17 – Cable.

Some models of fish trawlers and seine boats are shown in Figures A3 - A7.



#### Figure A3 Medium-size fish trawler CRT-400

Figure A4 Medium-size fish trawler CRTR



#### Figure A5 Seine boat CO-300



Figure A6 Seine boat PC-300



#### Figure A7 Freezer vessel

