

Annexes

Annex I List of contributing authors and organisations

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Annex II

Detailed scoring tables

Environmental issues	Score	Weight %	Environmental concern	Weight averaged score
1. Modification of stream flow	0	-	Freshwater shortage	1
2. Pollution of existing supplies	2	-		
3. Changes in the water table	0	-		

Criteria for Economic impacts	Raw score	Score	Weight %
Size of economic or public sectors affected	Very small Very large 0 1 2 3	1	-
Degree of impact (cost, output changes etc.)	Minimum Severe 0 1 2 3	0	-
Frequency/Duration	Occasion/Short Continuous 0 1 2 3	1	-
Weight average score for Economic impacts		1	

Criteria for Health impacts	Raw score	Score	Weight %
Number of people affected	Very small Very large 0 1 2 3	1	-
Degree of severity	Minimum Severe 0 1 2 3	1	-
Frequency/Duration	Occasion/Short Continuous 0 1 2 3	1	-
Weight average score for Health impacts		1	

Criteria for Other social and community impacts	Raw score	Score	Weight %
Number and/or size of community affected	Very small Very large 0 1 2 3	0	-
Degree of severity	Minimum Severe 0 1 2 3	0	-
Frequency/Duration	Occasion/Short Continuous 0 1 2 3	0	-
Weight average score for Other social and community impacts		0	

Environmental issues	Score	Weight %	Environmental concern	Weight averaged score
4. Microbiological	0	-	Pollution	1
5. Eutrophication	0	-		
6. Chemical	1	-		
7. Suspended solids	0	-		
8. Solid wastes	1	-		
9. Thermal	0	-		
10. Radionuclide	1	-		
11. Spills	1	-		

Criteria for Economic impacts	Raw score	Score	Weight %
Size of economic or public sectors affected	Very small Very large 0 1 2 3	2	-
Degree of impact (cost, output changes etc.)	Minimum Severe 0 1 2 3	1	-
Frequency/Duration	Occasion/Short Continuous 0 1 2 3	1	-
Weight average score for Economic impacts		2	

Criteria for Health impacts	Raw score	Score	Weight %
Number of people affected	Very small Very large 0 1 2 3	1	-
Degree of severity	Minimum Severe 0 1 2 3	1	-
Frequency/Duration	Occasion/Short Continuous 0 1 2 3	1	-
Weight average score for Health impacts		1	

Criteria for Other social and community impacts	Raw score	Score	Weight %
Number and/or size of community affected	Very small Very large 0 1 2 3	0	-
Degree of severity	Minimum Severe 0 1 2 3	0	-
Frequency/Duration	Occasion/Short Continuous 0 1 2 3	0	-
Weight average score for Other social and community impacts		0	

III: Habitat and community modification

Environmental issues	Score	Weight %	Environmental concern	Weight averaged score
12. Loss of ecosystems	1	-	Habitat and community modification	1
13. Modification of ecosystems or ecotones, including community structure and/or species composition	1	-		

Criteria for Economic impacts	Raw score	Score	Weight %
Size of economic or public sectors affected	Very small Very large	1	-
Degree of impact (cost, output changes etc.)	Minimum Severe	0	-
Frequency/Duration	Occasion/Short Continuous	1	-
Weight average score for Economic impacts		1	
Criteria for Health impacts	Raw score	Score	Weight %
Number of people affected	Very small Very large	0	-
Degree of severity	Minimum Severe	0	-
Frequency/Duration	Occasion/Short Continuous	0	-
Weight average score for Health impacts		0	
Criteria for Other social and community impacts	Raw score	Score	Weight %
Number and/or size of community affected	Very small Very large	0	-
Degree of severity	Minimum Severe	1	-
Frequency/Duration	Occasion/Short Continuous	1	-
Weight average score for Other social and community impacts		1	

IV: Unsustainable exploitation of fish and other living resources

Environmental issues	Score	Weight %	Environmental concern	Weight averaged score
14. Overexploitation	3	-	Unsustainable exploitation of fish	2
15. Excessive by-catch and discards	1	-		
16. Destructive fishing practices	1	-		
17. Decreased viability of stock through pollution and disease	0	-		
18. Impact on biological and genetic diversity	2	-		

Criteria for Economic impacts	Raw score	Score	Weight %
Size of economic or public sectors affected	Very small Very large	2	-
Degree of impact (cost, output changes etc.)	Minimum Severe	2	-
Frequency/Duration	Occasion/Short Continuous	2	-
Weight average score for Economic impacts		2	
Criteria for Health impacts	Raw score	Score	Weight %
Number of people affected	Very small Very large	1	-
Degree of severity	Minimum Severe	1	-
Frequency/Duration	Occasion/Short Continuous	1	-
Weight average score for Health impacts		1	
Criteria for Other social and community impacts	Raw score	Score	Weight %
Number and/or size of community affected	Very small Very large	2	-
Degree of severity	Minimum Severe	2	-
Frequency/Duration	Occasion/Short Continuous	2	-
Weight average score for Other social and community impacts		2	

V: Global change

Environmental issues	Score	Weight %	Environmental concern	Weight averaged score
19. Changes in the hydrological cycle	0	-	Global change	0
20. Sea level change	0	-		
21. Increased UV-B radiation as a result of ozone depletion	0	-		
22. Changes in ocean CO ₂ source/sink function	0	-		

Criteria for Economic impacts	Raw score	Score	Weight %
Size of economic or public sectors affected	Very small Very large	0	-
Degree of impact (cost, output changes etc.)	Minimum Severe	0	-
Frequency/Duration	Occasion/Short Continuous	0	-
Weight average score for Economic impacts		0	
Criteria for Health impacts	Raw score	Score	Weight %
Number of people affected	Very small Very large	0	-
Degree of severity	Minimum Severe	0	-
Frequency/Duration	Occasion/Short Continuous	0	-
Weight average score for Health impacts		0	
Criteria for Other social and community impacts	Raw score	Score	Weight %
Number and/or size of community affected	Very small Very large	0	-
Degree of severity	Minimum Severe	0	-
Frequency/Duration	Occasion/Short Continuous	0	-
Weight average score for Other social and community impacts		0	

Comparative environmental and socio-economic impacts of each GIWA concern

Concern	Types of impacts								Overall score	Priority
	Environmental score		Economic score		Human health score		Social and community score			
	Present (a)	Future (b)	Present (c)	Future (d)	Present (e)	Future (f)	Present (g)	Future (h)		
Freshwater shortage	1	1	1	1	1	1	0	0	1	4
Pollution	1	2	2	2	1	2	0	0	2	2
Habitat and community modification	1	2	1	2	0	0	1	0	1	3
Unsustainable exploitation of fish and other living resources	2	2	2	2	0	0	2	1	2	1
Global change	0	1	0	0	0	0	0	0	0	5

Annex III

Detailed assessment tables

Concern: Pollution under present conditions / **Issue:** Chemical pollution / **Score given:** 1

Environmental impact indicator	Format	Extent or area covered	Duration and frequency	Reliability	Availability	Source	Explanation or justification how the indicator supports the conclusion made in the Assessment
Volumes of discharges of contaminants into the atmosphere in the Barents Sea (tonnes/year); annual values of wet fallouts of pollutants on the Barents Sea surface (g/m ²).	Tables, reports	The Barents Sea region	1995-1999 annually	High to average (small sample size)	Available in open publications in Russian	MMBI research, published data of the Ministry of Environmental Protection and Natural Resources of the Russian Federation, Roshydromet, scientific literature	Copper, nickel, chromium and lead are believed to be the main pollutants entering the Barents Sea from the atmosphere as a result of the long-range atmospheric transport and from regional sources. Persistent organic pollutants enter the region mainly by long-range atmospheric transport; their concentrations are consistent with levels in other background areas ¹ of the world.
Levels of contaminants in the estuarine parts of the Severnaya Dvina, Pechora, Kola, Pechenga rivers.	Table, report	Estuarine parts of the Severnaya Dvina, Pechora, Kola, Pechenga rivers	1995-2001 annually	High	Available in open publications in Russian	Published data of the Ministry of Environmental Protection and Natural Resources of the Russian Federation, Roshydromet, scientific literature	The prevailing pollutants are heavy metals (mainly copper, nickel and manganese), and organic substances. It should be stressed that the Kola and Severnaya Dvina rivers are the sources of drinking water for the towns and settlements situated within this area, including the largest towns of the region; Arkhangelsk and Murmansk. For this reason, there is a shortage of high-quality fresh drinking water. At the same time the river run-off volumes are low, resulting in heavy metal impacts in the near-shore zone only.
Levels of pollutants in the water and bottom sediments in different areas of the Barents Sea.	Report	The Barents Sea	1988-2000 intermittently investigations	Average	Available in open publications in Russian and English	MMBI Scientific Reports, Roshydromet published data, data of the Murmansk Administration of Hydrometeorological Service, Russian and foreign scientific literature	Despite the Kola Peninsula's metallurgic, mining, smelting and other industries, water and bottom sediment pollution is registered only for the Kola Bay.
Levels of pollutants in biota.	Report	The Barents Sea	1995-2000 intermittent investigations	Average	Available in open publications in Russian and English	MMBI Scientific Reports, Russian and foreign scientific literature	Despite the presence of regional sources of pollution, concentrations of heavy metals in biota are less than MAC ² . Concentrations of chlorinated hydrocarbons in fish and invertebrates are much lower than the allowable limits.

Notes: ¹ Background area = area located significantly far from emission sources. ² MAC – Maximum Allowable Concentration

Concern: Pollution under present conditions / **Issue:** Radionuclides / **Score given:** 1

Environmental impact indicator	Format	Extent or area covered	Duration and frequency	Reliability	Availability	Source	Explanation or justification how the indicator supports the conclusion made in the Assessment
Artificial radionuclide fallout in the Russian Polar North (10 ⁷ Bq/km ² per year) and surface water of the Kola Bay (10 ⁹ Bq per year).	Tables, reports	The Barent Sea region	1986-1993 periodically	High	Available in open publications in Russian	MMBI scientific reports, monograph	A stable decrease of atmospheric fallout of artificial radionuclides is observed.
Input of ⁹⁰ Sr, ¹³⁷ Cs and tritium (10 ⁹ Bq per year) into the Kola Bay with river run-off.	Tables, reports	The Kola Bay and adjacent coastal area	1961-1989 (strontium & cesium) 1986-1993 (tritium) annually	High	Available in open publications in Russian	MMBI scientific reports, monograph	For the period 1981-1993 the input of tritium into the Kola Bay with river run-off decreased by 1.5 times. The input of ¹³⁷ Cs for 1965-1989 decreased by 11 times and ⁹⁰ Sr for 1961-1989 by 1.2 times.
Concentrations of radionuclides in liquid radioactive waste discharged from RTE ATOMFLOT. Total inventory of discharges over time from RTE ATOMFLOT.	Table, reports	The Kola Bay and adjacent coastal area	1989-1994 annually	High	Available in open publications in Russian	MMBI scientific reports, monograph	Discharges from the RTE ATOMFLOT in 1992 of ¹³⁷ Cs and ⁹⁰ Sr into the Kola Bay with the river run-off were 2.1x10 ⁹ and 2.6x10 ⁷ Bq/year respectively. The annual discharge of these nuclides was the largest in 1992, the average year values for 1989-1994 were 1.6x10 ⁷ and 7.6x10 ⁷ Bq/year respectively.
Concentrations of artificial radionuclides in Barents Sea water (Bq/m ³).	Table	The Barents Sea	1990-2000 periodically	High	Available in open publications in Russian and English	Monograph	In the 1990s concentrations of ¹³⁷ Cs, ⁹⁰ Sr and ^{239,240} Pu in surface waters of the Barents Sea varied within the ranges 2-15, 1-7, and 4-8 Bq/m ³ correspondingly, which is consistent with background levels of global radioactive fallout.
Concentrations of artificial radionuclides in bottom sediments of the Barents Sea (Bq/kg).	Reports	The Barents Sea	1990-2000 periodically	High	Available in open publications in Russian and English	MMBI scientific reports, monograph	¹³⁷ Cs and ^{239,240} Pu concentrations in Barents Sea bottom sediments clearly correlate with sediment type and are highest in clay silts deposited in shelf troughs.
Accumulation of artificial radionuclides in marine biota (Bq/kg).	Reports	The Barents Sea	1990-2000 periodically	High	Available in open publications in Russian and English	MMBI scientific reports, monograph	In 1980-1990s the accumulative level of radionuclides in the Barents Sea biota was low, reflecting input from global fallout.

Concern: Pollution under present conditions / **Issue:** Oil spills / **Score given:** 1

Environmental impact indicator	Format	Extent or area covered	Duration and frequency	Reliability	Availability	Source	Explanation or justification how the indicator supports the conclusion made in the Assessment
Oil hydrocarbon levels in the Barents Sea surface waters (mg/l) and bottom sediments (mg/g).	Report, table, scheme	The Barents Sea	1984-1993 annually, since 1993 Periodically	High	Available in open publications in Russian	MMBI scientific research, Roshydromet published data, scientific literature	On average, the level of oil contamination is not high and does not exceed MAC (0.05 mg/l). In the western areas the mean long-term concentration of oil products is 0.03 mg/l, and in the eastern areas 0.026 mg/l. The zone of the polar front is distinguished by a chain of areas with an increased concentration, up to 0.05 mg/l. Locally mean annual concentration of oil hydrocarbons may reach 0.46-1.13 mg/l. Oil hydrocarbon levels in bottom sediments varies within a wide range (202-2 176 mg/g) and is on average 676 mg/g.
Oil hydrocarbon concentration in surface waters (mg/l) and bottom sediments (mg/g) of the coastal and southeastern areas of the Barents Sea (the Pechora Sea).	Report, schemes	The Kola Bay, the coastal areas of the Kola Peninsula, the Pechora Sea	1990-2000 annually for Kola Bay, episodically for other areas	High	Available in open publications in Russian and English	MMBI scientific research, Roshydromet published data, scientific literature	Coastal waters, especially the Kola Bay, are the most polluted waters, caused by activities of local sources, which discharge petroleum products into the marine environment. The concentration of oil hydrocarbons can reach three and more MAC. Oil hydrocarbon levels in bottom sediments of Kola Bay might reach 1 280 mg/g dw.
PAH concentrations in bottom sediments (ng/g) in different areas of the Barents Sea.	Report, schemes	The open sea of the Barents Sea, the Kola Bay, the coastal area of the Kola Peninsula, the Pechora Sea	1990-2000 Periodically	Average	Available in open publications in Russian and English	MMBI scientific research, Roshydromet published data, scientific literature	ΣPAH levels in bottom sediments in the central part of the Barents Sea average 110 ng/g, reaching their highest value of 10 812 ng/g in the Kola Bay area.

Concern: Pollution under future conditions / **Issue:** Chemical pollution / **Score given:** 1

Environmental impact indicator	Format	Extent or area covered	Duration and frequency	Reliability	Availability	Source	Explanation or justification how the indicator supports the conclusion made in the Assessment
Air pollution changes over the Barents Sea associated with long-range atmospheric transport.	Table	The Barents Sea drainage basin	1995-1999 annually	High	Available in open publications	Survey/Review of the environment pollution in the Russian Federation for the year 2000. Roshydromet, Moscow, 2001.	On the basis of several years' monitoring data, there is nothing that suggests an increase of the atmospheric pollution over the Barents Sea water area from the Russian territory due to long-range and regional transport of sulfur and nitrogen compounds, heavy metals, or persistent organic pollutants.
The presence of contaminants in the Severnaya Dvina, Pechora, Kola, Pechenga rivers, in the Kola Bay, the Barents and White Seas.	Expert assessment	The Barents Sea drainage basin	Intermittent	Low	Available in open publications	Main regulations of the Murmansk Region development strategy for the period until 2015. Main directions of the strategy of socio-economic development of the Northwestern Federal Region of the Russian Federation for the period until 2015.	According to the plans for the development of the regions of the Russian Federation included into the Barents Sea region, considerable changes are not expected in the levels of heavy metals and persistent organic pollutants in the rivers flowing into the Barents Sea, or in Barents Sea itself.

Concern: Pollution under future conditions / **Issue:** Radionuclides / **Score given:** 1

Environmental impact indicator	Format	Extent or area covered	Duration and frequency	Reliability	Availability	Source	Explanation or justification how the indicator supports the conclusion made in the Assessment
Self-purification of marine waters.	Report	The Barents Sea region	1986-2002 periodically	High	Available in open publications in Russian and English	Monograph	High biological productivity together with thermohaline, hydrodynamic and lithodynamic factors leads to self-purification of the system so that cumulative impact from radionuclides on marine ecosystems is negligible.

Concern: Pollution under future conditions / **Issue:** Oil spills / **Score given:** 1

Environmental impact indicator	Format	Extent or area covered	Duration and frequency	Reliability	Availability	Source	Explanation or justification how the indicator supports the conclusion made in the Assessment
Barents Sea waters.	Report	The Barents Sea	Increasing cases of accidents	High	Available in open publications in Russian	MMBI scientific research, scientific literature	With increasing oil and gas activities on the Barents Sea shelf, the contamination of the waters of the Barents Sea will increase. The degree of increase in contamination will depend on reliability of the technologies used.

Concern: Unsustainable exploitation of fish under present conditions / **Issue:** Overexploitation / **Score given:** 3

Environmental impact indicator	Format	Extent or area covered	Duration and frequency	Reliability	Availability	Source	Explanation or justification how the indicator supports the conclusion made in the Assessment
Reductions in quotas, catches and stocks of commercially valuable fish for the last 30 years, vessel-quota, annual catch of commercial fish in tonnes.	Data, tables, diagrams, graphs, report	Barents and Norwegian Seas	Data for more than 20 years	High	Free	State Statistics, documents of the Joint Norwegian- Russian Fisheries Commission, scientific prognoses, reports and publications	Stable reductions of catches of cod, haddock, capelin and other commercially valuable fish during the last 30 years.
More than one species is exploited beyond MSY or VAC.	Data, tables, diagrams, graphs, report	Barents and Norwegian Seas	Data for more than 20 years	High	Free	State Statistics, documents of the Joint Norwegian- Russian Fisheries Commission, scientific prognoses, reports and publications	According to the experts' assessments, main commercial species are overfished by approximately 20%.

Concern: Unsustainable exploitation of fish under present conditions / **Issue:** Excessive by-catch and discards / **Score given:** 2

Environmental impact indicator	Format	Extent or area covered	Duration and frequency	Reliability	Availability	Source	Explanation or justification how the indicator supports the conclusion made in the Assessment
30-60% of catches consist of by-catch and discards into the sea.	Explanatory text	The Barents Sea	Data for more than 20 years	Low	Free	Scientific reports and publications	Data on the by-catch and discards are not adequately reflected in the official statistics. They can be judged on the basis of experts' assessments and scientific publications, indicating a wide prevalence of this phenomenon.

Concern: Unsustainable exploitation of fish under present conditions / **Issue:** Destructive fishing practices / **Score given:** 2

Environmental impact indicator	Format	Extent or area covered	Duration and frequency	Reliability	Availability	Source	Explanation or justification how the indicator supports the conclusion made in the Assessment
1-10 cases of sea bottom trawling take place annually.	Report	Barents Sea	Data for more than 20 years	High	Free	State statistics, scientific prognoses, reports and publications	There is a stable decrease in catches of cod, haddock, capelin and other commercially valuable fish during the last 30 years. The by-catch of other species, which are discarded into the sea, is possible.
Increased overcapacity of the fishing fleet significantly exceeding TAC.	Report, data, table	Barents Sea	Data for more than 20 years	High	Free	State statistics, scientific prognoses, reports and publications	The capacity of the fishing fleet exceeds TAC by a factor of 3-4. According to the experts' assessments, the main commercial fisheries are overfished approximately by 20%.

Concern: Unsustainable exploitation of fish under future conditions / **Issue:** Overexploitation, Excessive by-catch and discards, Destructive fishing practices / **Score given:** 2

Environmental impact indicator	Format	Extent or area covered	Duration and frequency	Reliability	Availability	Source	Explanation or justification how the indicator supports the conclusion made in the Assessment
Decreased fish stocks and quotas.	Report	Barents Sea	Till 2020	Low, due to scientific uncertainty and the lack of financial resources for monitoring	Free	Long-term prognoses, scientific reports and publications	The stocks and catches of commercially valuable species will continue decreasing in the nearest years if considerable amendments to the quotas management are not introduced and the methods of setting of TACs are not clarified, and/or political decisions on the fishers employment are not made.

Concern: Unsustainable exploitation of fish under present conditions / **Socio-economic impacts**

	Socio-economic indicator	Format	Extent or area covered	Duration or frequency	Reliability	Availability	Source	Explanation or justification how the indicator supports the conclusion made in the Assessment
Economic impacts Score: 3	Reduced economic returns.	Text, data, table	Northern fishery basin of Russia	More than 10 years	Average	Free	Scientific reports and publications, confidential sources	As a result of complex impact of natural and anthropogenic (overexploitation) factors, quotas for cod (the main fishery) for Russia decreased by 50% in 2002, compared to 1997. The profit of fishing companies and earning of fishers decreased correspondingly by 30-40%.
Health impacts Score: 1	Loss of food sources (e.g. sources of protein) for human or animal consumption.	Report	Russia fishing industry in the Barents and White Sea fisheries	Long-term	Low	Free	Scientific reports and publications	Average human consumption of marine products per person decreased more than twice in 2001, compared to 1990.
Other social and community impacts Score: 2	Loss of employment/livelihood.	Report data, table	Northern fishery basin of Russia	For more than 10 years	Average	Free	State statistics, scientific reports and publications	The reduction of quotas leads to a decrease in the number of fishing vessels and the unemployment. From 1997 to 2001, the number of fishers in the northern basin decreased from 30 000 to 22 000. The employment in fishery decreased from 6-12 months per year to 2-6 months by the year 2001, compared to the early 1990s. The unemployment increased by 50%.
	Conflict between user groups for shared resources including space. Inter-generational equity issues (access to resources).							The number of illegal bargains and conflicts has increased because of increased competition for quotas.

Concern: Unsustainable exploitation of fish under future conditions / **Socio-economic impacts**

	Socio-economic indicator	Format	Extent or area covered	Duration or frequency	Reliability	Availability	Source	Explanation or justification how the indicator supports the conclusion made in the Assessment
Economic impacts Score: 2	Reduced economic returns and potential new employment possibilities.	Text	Barents Sea	Till 2020	Low	Free	Confidential sources, scientific reports and publications	It is expected that some legislative measures and political decisions will be taken, intended to increase control and enforcement in the fisheries, struggle against overexploitation, discards and by-catches, and decrease the unemployment in the fishing industry. Nevertheless, the economic returns in the fisheries sector are expected to decrease.
Health impacts Score: 1	Loss of food sources (e.g. sources of protein) for human or animal consumption.							Human consumption of marine products in Russia per person will not exceed 10-15 kg per year, while the recommended standard is 25 kg.
Other social and community impacts Score: 2	Loss of employment/livelihood.	Prognoses	Northern fishery basin of Russia	Till 2020	High	Free	Scientific reports, publications	There is an expected reduction of the fishery fleet capacity by a factor of 3. It will inevitably decrease the number of fishers by half. It is expected that overfishing and discards will take place, which may increase the overall crisis in the fisheries sector and the unemployment among fishers.
	Conflict between user groups for shared resources including space.							It is expected that crisis in the fisheries will increase the level of conflict between user groups.
	Inter-generational equity issues (access to resources).							

Concern: Unsustainable exploitation of fish under future conditions / **Issue:** Overexploitation, Excessive by-catch and discards, Destructive fishing practices (Finnmark, Norway)

Environmental impact indicator	Format	Extent or area covered	Duration and frequency	Reliability	Availability	Source	Explanation or justification how the indicator supports the conclusion made in the Assessment
Status of fish stocks and quotas.	Text	Barents Sea	Medium- to long-term	Low	Free	Report, official publication	Joint Norwegian-Russian Fisheries Commission has agreed upon a decision-making procedure based on scientific recommendations, restricting the parties when setting TACs for the Barents Sea fisheries.

Concern: Unsustainable exploitation of fish under present conditions / **Socio-economic impacts** (Finnmark, Norway)

	Socio-economic indicator	Format	Extent or area covered	Duration or frequency	Reliability	Availability	Source	Explanation or justification how the indicator supports the conclusion made in the Assessment
Economic impacts Score: 3	Reduced economic returns.	Text, data, tables	Norwegian fishing industry in the Barents Sea fisheries	Medium-term	High	Free	Scientific Reports	Reductions in fish stocks have led to decreased economic returns in the fishing industry.
Other social and community impacts Score: 2	Loss of employment/livelihood.	Text, data, tables	Norwegian fish-processing industry and fleet in the Barents Sea fisheries	Medium- to long-term	High	Free	Scientific Reports	Reductions in fish stocks and market competition have led to a decrease in the number of fish-processing plants and a substantial long-term reduction in the number of fishing vessels and fishers.

Concern: Unsustainable exploitation of fish under future conditions / **Socio-economic impacts** (Finnmark, Norway)

	Socio-economic indicator	Format	Extent or area covered	Duration or frequency	Reliability	Availability	Source	Explanation or justification how the indicator supports the conclusion made in the Assessment
Other social and community impacts Score: 1	Loss of employment.	Reports	Norwegian marine sector	Long-term	Moderate	Free	Official publications, Norwegian Ministry of Oil and Energy, Norwegian Ministry of Fisheries, Finnmark County	There is an expected long-term reduction in the employment of the fishing industry. However, it is expected that increased aquaculture and the drilling for gas in the Barents Sea may reduce the social and community impacts of reduced fishing opportunities.
	Conflicts between user groups for shared resources, including space.	Reports and statements	Norwegian marine sector	Medium-term	Moderate	Free	Official publications, Norwegian Ministry of Oil and Energy, Norwegian Ministry of Fisheries, Finnmark County	It is expected that a more diversified marine activity in the Barents Sea – that is, drilling, fisheries and aquaculture – may increase the level of conflict between user groups, within and between marine sectors.

Annex IV

Certification of fisheries to the MSC Standard

In 1997, the international corporation Unilever in cooperation with WWF established a certification programme for sustainable fisheries, known as the Marine Stewardship Council (MSC). This became an independent non-profit organisation in 1999. The mission of the MSC is the support of the ecologically safe, socially profitable and economically vigorous fishery practices. Unilever is one of the largest producers of frozen fish products selling them under its brands Iglo, Birds Eye, Gorton etc. MSC is working in partnership with the well known auditor firms assessing the candidates for the ecological logo. Those meeting the MSC requirements obtain the ecological certificate. The certificate gives products advantages on the ecologically sensitive market, increases the trust for fishery companies from its potential partners and creditors, creates a positive image, and in the end increases profit.

MSC assesses each fishery against five indicators: fisheries research, quota system, regulatory tools, control systems, and long-term management plan. The effect of fishing on marine ecosystems is also taken into account. These data forms the rating of a fishing company. A fishery that is deemed sustainable is encouraged to seek certification to the MSC Standard. The main principle here is not to reveal the negative features of this or that fishery, which are well known for many, but the orientation on the best fishery practices and best-managed fisheries. Good rating works for the company, its partners and creditors. It also gives priorities in quotas allocation, preferential terms for obtaining credits and subsidies, increases ecological reputation of products through mass media, which contributes to better realisation of products at the world markets, etc.

Certification to the MSC Standard is a rather expensive process, and not every fishing company can afford this. Still, analysts do believe that fisheries, especially coastal ones, have a good potential to be certified (Ozolin'sh & Spiridinov 2001).

Annex V

List of important water-related programmes and assessments

Barents Region Environment Action Program, 1994

Adopted in June 1994 by the Barents Environment Ministers at their First Barents Environment Council Meeting. Declarations of Barents Region Environment Ministers have been made in 1994, 1995, 1997, and 1999.

Arctic Environmental Protection Strategy (AEPS), 1991

- Protect the Arctic ecosystems, including humans;
- Provide for the protection, enhancement and restoration of environmental quality and sustainable utilisation of natural resources, including their use by local populations and indigenous peoples in the Arctic;
- Recognise and, to the extent possible, seek to accommodate the traditional and cultural needs, values and practises of indigenous peoples as determined by themselves, related to the protection of the Arctic environment;
- Review regularly the state of the Arctic environment to identify, reduce and, as a final goal, eliminate pollution.

The five programmes established under the AEPS are:

- **Arctic Monitoring and Assessment Programme (AMAP):**
An international organisation established to implement components of the AEPS. AMAP has responsibilities to monitor the levels of, and assess the effects of, anthropogenic pollutants in all compartments of the Arctic environment, including humans. AMAP is now a programme group of the Arctic Council, and its current objective is “providing reliable and sufficient information on the status of, and threats to, the Arctic environment, and providing scientific advice on actions to be taken in order to support Arctic governments in their efforts to take remedial and preventive actions relating to contaminants”.
- **Conservation of Arctic Flora and Fauna (CAFF):**
The Program for the Conservation of Arctic Flora and Fauna, under the AEPS, was established to address the special needs of Arctic species and their habitats in the rapidly developing Arctic region. CAFF has responsibilities to facilitate the exchange of information and coordination of research on species and habitats of Arctic flora and fauna.
- **Emergency Prevention, Preparedness and Response (EPPR):**
Established as an expert forum to evaluate the adequacy of existing arrangements and to recommend the necessary system of cooperation.

- **Protection of the Arctic Marine Environment (PAME):**
PAME addresses policy and non-emergency response measures related to protection of the marine environment from land and sea-based activities. PAME has responsibilities to take preventative and other measures, directly or through competent international organisations, regarding marine pollution in the Arctic, irrespective of origin.
- **Sustainable Development Working Group (SDWG):**
Established by Arctic Ministers in 1998. The objective is to protect and enhance the economies, culture and health of the inhabitants of the Arctic, in an environmentally sustainable manner.

Arctic Climate Impact Assessment (ACIA)

An international project organised under the auspices of the Arctic Council to evaluate and synthesise knowledge on climate variability, climate change, and increased ultraviolet radiation and their consequences.

International Arctic Science Committee, IASC

IASC is a non-governmental organisation to encourage and facilitate cooperation in all aspects of Arctic research, in all countries engaged in Arctic research and in all areas of the Arctic region. The IASC member organisations are national science organisations covering all fields of Arctic research.

Arctic Environmental Impact Assessment (ARIA)

The purpose of the project is to develop Guidelines for EIA in the Arctic. A circumpolar ad hoc group, whose task was to evaluate a proposal for an electronic information system supporting arctic EIAs, has recommended that an electronic network on the Internet should be established.

Barents GIT, National Land Survey of Finland

GIT means General Information of Geographic Information Technology within the Barents region. The overall objective of the project is to “produce homogeneous geographic information that can be used for planning and decision-making concerning the environment, land use, natural resources, industry, trade and tourism and transport in the Barents Region. It will also be an important information source for educational institutions at all levels and for all who require a complete and comprehensive picture of and data about the Barents Region. A further intermediate objective for the project is to create an infrastructure for the storage and exchange of geographic information in the Barents Region”.

Research

Barents Sea Impact Study (BASIS)

The Barents Sea Impact Study (BASIS) is a global change research project developed under the auspices of the International Arctic Science Committee (IASC). After a planning phase of five years (1992-1996), a research proposal was submitted in 1997 to the IV Framework Environment and Climate Programme of the European Commission. This proposal was accepted and has received funding for an initial period of two years (1998-1999).

State of the environment

Barentswatch

"Barentswatch 1998" provides extensive and current information on the state of the environment and natural resources of the Barents region. Barentswatch 1998 was published by Svanhovd Environmental Centre in Norway in cooperation with the Norwegian Directorate for Nature Management, the Norwegian Polar Institute, and GRID-Arendal. The publication is available in English, Russian and Norwegian.

Arctic Monitoring and Assessment Programme (AMAP):

State of the Environment Report

During its initial phase of operation (1991-1996), AMAP designed and implemented a monitoring programme and conducted its first assessment of the State of the Arctic Environment with respect to pollution issues. A special group (the AMAP Assessment Steering Group) was established to oversee the preparation of the AMAP Assessment, which is based on input from several hundreds of scientific experts. Two Assessment reports were produced to present the results of the AMAP assessment firstly to decision makers and the general public (the SOAER; full text), and secondly to fully document the scientific basis for the assessment (the AAR). This first AMAP Assessment was presented in 1997.

Major environmental challenges and environmental problems

Summary of environmental problems and challenges in the region, compiled by Finnish Ministry of Trade and Industry and Finnish Ministry of Environment for the Barentsinfo database.

Progress Report on Barents Region Environmental Hot Spots

A report prepared 1998 by the Nordic Environment Finance Co-operation, NEFCO, as a summary of measures taken in the region since 1995.

Global Environment Outlook 2000 State of the Environment: Europe and Central Asia

GEO is:

- A global environmental assessment process, the GEO Process, that is cross-sectoral and participatory. It incorporates regional views and perceptions, and builds consensus on priority issues and actions through dialogue among policy-makers and scientists at regional and global levels.
- GEO outputs, in printed and electronic formats, including the GEO Report series. This series makes periodic reviews of the state of the world's environment, and provides guidance for decision-making processes such as the formulation of environmental policies, action planning and resource allocation. Other outputs include technical reports, a web-site and a publication for young people.

GEF Projects in the region

UNEP-GEF-International Waters

Support to the National Plan of Action in the Russian Federation for the Protection of the Arctic Marine Environment from Anthropogenic Pollution. The project will focus on pre-investment studies of identified priority hot spots with known significant transboundary consequences. Additional activities will include the necessary support in the development of legal, institutional and economic measures.

UNEP-GEF-Biodiversity

An integrated ecosystem approach to enhance biodiversity conservation and minimise habitat fragmentation in the Russian Arctic.

Other actors and initiatives

- European Union and the Northern Dimension;
- European Commission Report on the Northern Dimension, November 1998;
- Conclusions of the Foreign Ministers Conference on the Northern Dimension, November 1999.

INTERREG II

EU programmes in support of development and border region cooperation in the Barents/Arctic area.

Tacis

The Tacis Programme is a European Union initiative to provide grant-financed technical assistance to support the process of transition to market economies and democratic societies in the partner countries of Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Mongolia, Russia, Tajikistan, Turkmenistan, Ukraine and Uzbekistan. Priorities are greater concentration of the assistance to achieve maximum impact, and support for the objectives of the Partnership and Cooperation Agreements (PCAs).

EU and the Barents Region

A document, available also in Russian, published on the EU Tacis site about "the European Union and its neighbours in the North-East". Contains general information about the Barents Region; relations between the EU and the Russian Federation and Norway, respectively; regional cooperation in the Barents region; the scope of EU involvement in the Barents region; and EU support in the Barents region through structural funds (Regional Development Fund, Social Fund, and Agricultural Guarantee and Guidance Fund) and the Tacis programme.

INTERREG IIIB Northern Periphery Programme

The Interreg IIIB Northern Periphery Programme consists of the northern parts of Finland, Scotland, Sweden, Norway, the whole of Iceland, Greenland and Faroe Islands. Northwest Russia is part of the co-operation. The overall objective for Interreg is to prevent national borders from constituting barriers to the balanced development and integration of the European territory. Interreg IIIB concerns cooperation within larger transnational areas. The transnational cooperation between national, regional and local authorities aims to promote a higher degree of territorial integration across large groupings of European regions, with a view to achieving sustainable, harmonious and balanced development in the community and better territorial integration with candidate and other neighbouring countries.

Other actors

Barents Secretariat

The Secretariat is maintained by the three Norwegian provinces Nordland, Troms and Finnmark. Its main tasks are to coordinate national priorities and goals within the Barents cooperation; provide a resource centre in the handling of projects; conduct information activities and establish contacts to enhance the general knowledge and understanding of the Barents region; and make regional activities known and accepted. See the Barents Programme, which is the Regional Council's programme for concretising how to achieve the overall goals set up for the regional work and supporting the ongoing changes in the Russian part.

The Barents Sea - a Large Marine Ecosystem (LME)

A Large Marine Ecosystem is a region of ocean space encompassing coastal areas from river basins and estuaries to the seaward boundary of continental shelves and the seaward margins of coastal current systems. It is a relatively large region characterised by distinct bathymetry, hydrography, productivity, and trophically dependent populations.

Russian programmes and projects related to the Barents Sea region

Water resources monitoring programme in the territory of the Murmansk Region (2003)

The programme is carried out by Murmansk Region Natural Resources Commission, Administration of the Dvina-Pechora water basin, Murmansk Region Administration for Hydrometeorology, and Administration of the Murmansk Region. The objective of the program is annual observations of the quality of surface waters on 30 rivers and 10 water reservoirs of the Murmansk Region, as well as in the Kola Bay; biotesting of water sources (Kola River, Pasvik River, sources of drinking water in the Kola and Pechenga Districts).

Assessment of Barents Sea fisheries contamination (1997-2004)

The regional programme is carried out by Murmansk Marine Biological Institute, Polar Scientific Research Institute of Fisheries and Oceanography, and Murmansk Region Natural Resources Commission. The programme is aimed at obtaining systematic data on the current state and tendencies of contamination of Barents Sea commercial fishes and invertebrates, and give prognosis for the accumulation of contaminants.

Federal programme "World Ocean", sub-programme "Investigations of the World Ocean Nature", project "Complex Investigations of processes, characteristics and resources of Russian Seas of the North-European Basin" (2003-2007)

The project is carried out by Murmansk Marine Biological Institute, Russian State Hydrometeorological University, Institute of Oceanography of the Russian Academy of Sciences, Institute of Arctic and Antarctic Research, All-Russian Research Institute of Oceanology, Institute of Water Problems of the North, Zoological Institute of the Russian Academy of Sciences, and State Oceanographic Institute.

The purpose of the project is complex oceanographic, hydrochemical and biological investigations of the Barents, White and Baltic Seas aimed at sustainable exploitation of their marine resources, assessment of their assimilative potential and level of chemical pollution, conservation of their biodiversity.

Federal scientific and technical programme "Investigations and elaborations on the prior directions in the development of science and technologies for civil use", project "Scientific substantiation of the methodology for environmental impact assessment of marine oil and gas exploitation on the marine environment of Arctic Seas" (2002-2004)

The project is carried out by Murmansk Marine Biological Institute with the aim of developing the methodology for the ecological and

geographic analysis and prognosis of the consequences of large projects on marine oil and gas exploitation (Stockman, Prirazlomnoe and other oil and gas deposits in the Barents Sea).

Programme of the Ministry of Economic Development and Trade of the Russian Federation

Project “Meridian” (2002-2003)

The main task of the project, which is carried out by Murmansk Marine Biological Institute, is the development of scenarios for the impact of marine oil and gas exploitation on the ecosystems of the southern part of the Barents Sea.

Annex VI

List of conventions and specific laws that affect water use in the region

- Kirkenes Declaration (1993).
- Rovaniemi Declaration on the Protection of the Arctic Environment (1991).
- North-East Atlantic Fisheries Convention (1963).
- Convention for the Conservation of Salmon in the North Atlantic Ocean (1983).
- Convention on Biological Diversity, Rio (1992).
- OSPAR Convention (1992) Convention for the Protection of the Marine Environment of the North-East Atlantic.
- Berne Convention (1982). It is based on the principle that wild fauna and flora constitute a natural heritage that plays a vital role in maintaining biological balances. The Berne Convention requires 'each Contracting Party to strictly control the introduction of non-native species'.
- Bonn Convention (1983) on the Conservation of Migratory Species of Wild Animals, aims to conserve terrestrial, marine and avian migratory species throughout their range.

EU-Directives and specific laws

- Birds Directive (1979) The Council Directive on Wild Birds (79/409/EEC) concerns not only the protection of wild birds but also their habitats.
- Directive on Genetically Modified Organisms (GMOs) (1990) Council Directive (90/220/EEC) on the 'Deliberate Release into the Environment of Genetically Modified Organisms' (EC 1990).
- Habitats Directive (1992). Aim of the Council Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC) is to contribute towards ensuring biodiversity through the conservation of natural and semi-natural habitats and of wild fauna and flora in the Member States.
- Natura 2000 is designed to establish a coherent European ecological network of Sites of Community Importance (SCIs) in order to maintain the distribution and abundance of threatened species and habitats, both terrestrial and marine.
- Water Framework Directive (2000) 2000/60/EC. A major policy initiative that is currently undergoing a complex and demanding implementation process via the development of a Common Implementation Strategy under the auspices of Working Groups with participants from Member States and the European Commission.
- EU Water Initiative, Johannesburg (2002).

