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**Preparation of a global legally binding instrument
on mercury**

**Existing country-specific or regional monitoring efforts relating
to fish and marine mammals in the food supply**

Report by the secretariat

1. At its first session, held from 7 to 11 June 2010, the intergovernmental negotiating committee to prepare a global legally binding instrument on mercury agreed on a list of information that the secretariat would provide to the committee at its second session to support its further deliberations. Among other things, the secretariat was requested to provide a report on existing country-specific or regional monitoring efforts relating to fish and marine mammals in the food supply, including information on the scope of testing (for example, geographic scope, whether marine or freshwater species were involved, and the number of species and specimens tested) and the frequency of testing (for example, one-time or continuing, monthly or annual). The present report responds to that request.

I. Sources of information

2. To gather information relevant to the present report, through a letter of 6 July 2010 the secretariat requested Governments to provide information. The responses received are available on the mercury negotiations website¹ and were taken into consideration in developing the present report. The report also draws upon materials and information previously submitted to the secretariat.

3. Internet searches show that numerous data have been published on mercury levels in fish by Governments, academic institutions and non-governmental organizations. These data are, however, most often not collected in the context of any systematic monitoring programme. The great quantity and diversity of such studies available worldwide make it extremely difficult to provide an exhaustive and comprehensive summary of the work undertaken. Consequently, only information submitted was considered in the present report.

* UNEP(DTIE)/Hg/INC.2/1.

¹ www.unep.org/hazardoussubstances/Mercury/Negotiations/INC2/tabid/3468/Default.aspx.

II. Monitoring efforts relating to fish and marine mammals in the food supply

4. Twenty Governments responded to the call for information. Their submissions, in addition to relevant information submitted by 11 Governments for the committee's first session, have been summarized in the table found in the annex to the present report. The information in the table does not necessarily constitute a full picture of the situation regarding monitoring efforts in the countries listed, as it reflects only the information submitted. The table has not been formally edited.

5. As a preliminary remark, when analysing information provided on country-specific or regional monitoring efforts relating to fish and marine mammals in the food supply, one is struck by the high heterogeneity of the monitoring efforts in place. The generation, and the level of detail, of the monitoring data depend on the availability of human and financial resources for conducting the monitoring programmes, and often, therefore, on the level of development of the country or region concerned. In addition, the perceived or acknowledged level of exposure of the population as a result of national consumption patterns or geographic specificities – for example, for countries in the Arctic – appears to be a determining factor in the level of development and complexity of the monitoring programmes.

6. The information submitted illustrates the variety of approaches used in fish and marine mammal monitoring systems. In general, two systems are employed. The first is what may be described as a “food safety approach”, where the monitoring system focuses on commercial fish or fish destined for export or import. The second is what may be described as an “environmental surveillance approach”, which is intimately connected to health issues, but with a broader spectrum in terms of specimens sampled and test areas. In some cases a combination of the two approaches is used. The choice of approach of course relies to a great extent upon the institution responsible for the monitoring scheme. Such approaches affect the monitoring methodology (specimens captured in their natural environmental versus specimens sampled from the market), in addition to the geographic scope, the most obvious illustration being monitoring of imported fish, which does not reflect contamination of national waters. This issue should be kept in mind when comparing approaches.

7. Based on the information available, the following tentative observations may be made:

(a) A number of developing countries have indicated that a lack of technical and financial capacity has prevented them from supporting monitoring efforts at the national or regional levels;

(b) The relatively few responses to the secretariat's call for information may indicate that most countries lack country-specific or regional monitoring efforts relating to mercury levels in fish and marine mammals in the food supply, or a full and comprehensive picture thereof. Such conclusions may, however, need confirmation through further follow-up with Governments;

(c) In a few developing countries, monitoring activities originate from national mercury assessments undertaken with the support of the United Nations Environment Programme (UNEP);

(d) Some developing countries, especially those for which fish export represents an important commercial activity, have implemented monitoring programmes for the surveillance of exported fish. A few countries mentioned that, for fish exported to markets in developed countries, the surveillance is intended to secure trade by satisfying those markets' requirements.

8. In countries in which a monitoring programme is in place, the following observations may be made:

(a) A number of developed countries have provided information on comprehensive and continuous country-specific or regional monitoring programmes relating to mercury levels in fish and marine mammals in the food supply, where data have been gathered over substantial periods of time. The data gathered are often used to support the development of local and regional fish (and/or marine mammal) consumption advisories, to protect vulnerable populations from mercury exposure;

(b) The mercury monitoring activities can be part of a broader monitoring programme, such as for heavy metals;

(c) The frequency of testing is in most cases annual. Monthly testing was very seldom reported, and was generally associated with monitoring addressing a specific area of concern. The frequency of testing for food safety purposes was seldom specified;

- (d) Monitoring efforts are in most, if not all, cases a combination of a continuous testing programme and one-time studies focusing specifically on a geographic area or species;
 - (e) Countries may have a combination of local, regional, national and transboundary efforts, involving a range of authorities;
 - (f) The number of samples varies by species, but is in many cases in a range of 10–20 specimens;
 - (g) A range of supplementary data, such as age, length, mass and sex, for each specimen is also reported;
 - (h) In coastal countries having reported data and with a monitoring system in place, the programme always covers marine species, including fish, marine mammals and shellfish;
 - (i) In cases of monitoring for food safety, testing also focuses on fish preparations;
 - (j) Countries using a comprehensive set of monitoring tools often also report the existence of a comprehensive, internet-based data collection system.
9. In countries in which no monitoring programme is in place, the following observations may be made:
- (a) Several developing countries recognize the importance of fish contamination and suspect that their populations may have been exposed through their diets, the absence of monitoring programmes and the little data available notwithstanding;
 - (b) Several developing countries report one-time studies often focused on specific areas of concern. Some were performed with the support of UNEP under the Global Mercury Partnership. Some studies mentioned date back to the 1980s or 1990s;
 - (c) One regional initiative was reported in Latin America, with a special focus on persistent organic pollutants.

III. Other relevant initiatives

10. The Global Mercury Assessment² conducted by UNEP in 2002 includes a chapter on exposure through diets of fish and marine mammals and on submitted data on mercury concentrations in fish. Examples of mercury concentrations in fish and/or shellfish in various regions of the world, as submitted by Governments, were provided in a table.³ Although this data collection dates back to 2002, it does provide information complementing the country information summarized in the annex to the present report. The table specifies the fish and shellfish species monitored and the year of sampling, provides bibliographic references and states the mercury concentration, trophic and contamination level for over 30 geographic locations worldwide (including several not covered in the annex to the present report). Finally, among the needs expressed by a number of countries in their submissions to UNEP, the report reveals the need for assessment and monitoring of mercury levels in various media including biota (such as fish, wildlife and humans) and assessment of the impacts of mercury on humans and ecosystems, including impacts from cumulative exposures to different mercury forms.

11. Upon the request of the Codex Alimentarius Commission, the Food and Agriculture Organization of the United Nations and the World Health Organization (WHO) convened a joint expert consultation on the risks and benefits of fish consumption, from 25 to 29 January 2010 in Rome, to provide scientific advice on how to consider the risks and benefits of fish consumption. The request was driven by growing public concern at the presence of chemical contaminants in fish. This concern has become more apparent in recent years, as the multiple nutritional benefits of including fish in diets have become increasingly clear. The evolving science in this field has led to questions about how much fish should be eaten, and by whom, to minimize the risks of chemical exposures and maximize the health

2 The Global Mercury Assessment was presented to the Governing Council of UNEP at its twenty-second session, in 2003. The key findings of the assessment supported the Council's conclusion that there was sufficient evidence of significant global adverse impacts from mercury and its compounds to warrant further international action to reduce the risks to human health and the environment from mercury. The Governing Council decided that national, regional and global actions, both immediate and long-term, should be initiated as soon as possible to protect human health and the environment through measures that would reduce or eliminate releases of mercury and its compounds to the environment.

3 Table 4.5, p. 67.

benefits. National authorities have been faced with the challenge of communicating complicated and nuanced messages to consumers and also with questions regarding the regulation of maximum levels of these chemical contaminants in fish and other foods.

12. The purpose of the expert consultation was to provide a framework for assessing the net health benefits or risks of fish consumption that would assist Governments to prepare advice for their own populations. The output is intended to provide guidance to national food safety authorities and the Codex Alimentarius Commission in their work on managing risks, taking into account the existing data on the benefits of eating fish. The full report is expected to be published later in 2010. The experts recommended the following series of steps to minimize risks in sensitive populations that Governments should take better to assess and manage the risks and benefits of fish consumption and more effectively communicate with their citizens, of which point (d) is of relevance to the present report:

- (a) Acknowledge fish consumption as an important food source of energy, protein and a range of essential nutrients and part of the cultural traditions of many peoples;
- (b) Emphasize the benefits of fish consumption in reducing coronary heart disease mortality (and, at the same time, the coronary heart disease mortality risks of not eating fish) for the general adult population;
- (c) Emphasize the neurodevelopment benefits to offspring of fish consumption by women of childbearing age, particularly pregnant women and nursing mothers, and the neurodevelopment risks to offspring of such women not consuming fish;
- (d) Develop, maintain and improve existing databases on specific nutrients and contaminants, particularly methylmercury and dioxins and dioxin-like polychlorinated biphenyls, in fish consumed in their region;
- (e) Develop and evaluate risk management and communication strategies that both minimize risks and maximize benefits from eating fish.

13. A guidance document for estimating exposure to mercury to identify populations at risk was developed jointly by UNEP and WHO in 2008.⁴ This guidance is intended to assist countries concerned about the potential national impacts of mercury pollution to identify specific populations or subpopulations that may be at risk. It aims to provide guidance on estimating exposures to mercury through biomonitoring and to methylmercury using data on dietary fish intake. It gives an overview of mercury toxicity, exposure pathways and health and environmental impacts, in addition to available reference levels. It also provides an overview of assessments of mercury exposures for some specific exposure scenarios, including hot-spot exposures. It can be used as a reference tool for conducting research or investigations regarding mercury exposure. The executive summary of the guidance document is available as document UNEP(DTIE)/Hg/INC.2/19, while the full document is available as document UNEP(DTIE)/Hg/INC.2/INF/3.

14. Another initiative of relevance is the work currently being undertaken by the Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection. The Joint Group is a body established in 1969 that advises the United Nations system on the scientific aspects of marine environmental protection. At present, it is jointly sponsored by nine United Nations organizations with responsibilities relating to the marine environment, including UNEP.

15. There is a significant gap in knowledge on the sources, releases, transformations and fate of mercury in the aquatic environment. The Joint Group has offered to support UNEP activities to tackle mercury by undertaking a study relating to this area. The scope of the study is to gather and present information on human-caused and natural sources and their releases of mercury to the aquatic environment; to describe possible control options; to describe physical and chemical forms of mercury emitted to the environment and aquatic and oceanic pathways of mercury (transport and fate); and to describe uptake and transport of mercury and mercury compounds by biota in aquatic environment, including current case studies. In addition, the study will present information on monitoring and evaluation efforts currently being undertaken (for example, assessment of monitoring methods, sources of monitoring data and a compilation of mercury transport models for the marine environment). The study is expected to be published in December 2010.

⁴ www.who.int/foodsafety/publications/chem/mercury/en/. The document is also available on the mercury website.

IV. Possible considerations for the committee

16. The committee may wish to take note of the information gathered to date, and to consider its relevance to the negotiation process, bearing in mind the limitations of the data made available by Governments.

Annex

Summary of information submitted by Governments

The information contained in the table does not necessarily constitute a full picture of the situation regarding monitoring efforts in the countries listed, as it reflects only the information submitted. Blank boxes in the table indicate that no information regarding the issue was indicated and/or easily available.

Country	Existence of monitoring programme	Geographic coverage	Species marine/freshwater	Number of samples	Frequency (annual/monthly/ continuing/ one-time)	Additional information
Information submitted for the second session of the intergovernmental negotiating committee						
Burundi **	No monitoring programme in place. One-time study in 1994. The absence of financial and technical means prevents the country from undertaking monitoring activities.	Local (Lake Tanganyika)	Freshwater species		One-time (1994)	Source: Sindayigaya E., Van Cauwenbergh R., Robberecht H., Deelstra H. Copper (1994), <i>Zinc, manganese, iron, lead, cadmium, mercury and arsenic in fish from lake Tanganyika, Burundi</i> . Sci Total Environ. 1994, 144, 103-115.
Cambodia **	No monitoring programme in place. One-time study in 2006.	Phnom Penh Siem Reap Sihanoukville	Marine and freshwater species	89 fish and seafood samples	One-time (2006)	Source: Shunichi Honda, Mineshi Sakamoto, Sarun Sambo, Siv Kung, Ty Sotheavun (2006), <i>Current Mercury Level in Cambodia -with Issue on Waste management in Current Issue on Mercury Pollution in the Asia-Pacific Region</i> , 28-29 November 2006 Conference Hall, Minamata Disease Archives National Institute for Minamata Disease Minamata City, Kumamoto, Japan, pp.91-104. (link)

Country	Existence of monitoring programme	Geographic coverage	Species marine/freshwater	Number of samples	Frequency (annual/monthly/continuing/one-time)	Additional information
Canada **	Monitoring programmes in place. Canada has many monitoring programmes of fish and marine mammals. The data presented here are from Canada's Northern Contaminants Programme(NCP)	Federal (Yukon, Northwest Territories, Nunavut, Nunavik-northern Quebec, and Nunatsiavut-northern Labrador)	Freshwater species: Arctic char, lake trout, burbot and additional fish including other species, in response to local concerns. Marine species: anadromous arctic char, ringed seal, belugas, polar bear, eggs of thick billed murres and northern fulmars.	Between 10 to 20 of each fish species 10 belugas 20 polar bears Fifteen eggs of each species from each colony.	Annual, as well as one-time studies	<p>Freshwater Inventory and Surveillance of Hg (FISHg) Network (10 fish samples/year from each of two predatory species and one forage species at 17 lakes across Canada)</p> <p>A fish and wildlife monitoring programme, in parallel with the FISHg Network, is collecting forage fish near point sources, such as smelters and electrical power plants, over the 2008-2010 period. In 2008, samples were collected at 43 lakes in the following Canadian provinces: Alberta, Manitoba and Quebec. In 2009, an additional 68 lakes were sampled, and the sample region expanded to include lakes within the province of Nova Scotia. In 2010, sampling is ongoing in 17 lakes across Canada.</p> <p>Food web studies in biomagnification of methyl mercury samples have been ongoing since the late 1990s. In the most recent round of sampling (2008-2009), 5 lakes in Flin Flon (Manitoba), 5 lakes in the Wabamun area (Alberta), and 6 lakes in Kejimikujik National Park (Nova Scotia) have been sampled for mercury levels in phytoplankton, zooplankton, invertebrates, forage fish and top predatory fish.</p> <p>More information on monitoring programmes in individual Canadian provinces can be found here</p> <p>The Canadian submission for the first session of the Committee also included information relevant to monitoring efforts, as follows:</p> <ul style="list-style-type: none"> • Human health risk assessment of mercury in fish and health benefits of fish consumption (link). • Updating the existing risk management strategy for mercury in retail fish (link). • The Canadian Arctic Contaminants Assessment Report (CACAR) (link), third edition expected to be published in September 2011.

Country	Existence of monitoring programme	Geographic coverage	Species marine/freshwater	Number of samples	Frequency (annual/monthly/continuing/one-time)	Additional information
China **	No systematic monitoring has been initiated. Related research has only been done by a small number of scientific research institutes.					The accuracy and effectiveness of the monitoring data need to be further assessed.
Republic of Congo **	No monitoring programme in place. No data is available.					
Costa Rica **	Monitoring programme in place. Analysis of samples from aquaculture and fishing activities.	Imported, exported and nationally consumed products are controlled (food safety surveillance)				www.senasa.go.cr
Estonia **	Monitoring programme in place (National Environmental Monitoring Programme, NEMP)	Baltic Sea 3 open sea areas 16 coastal water bodies	Open seas areas: Baltic herring - Clupea harengus membras, Coastal waters; perch -Perca fluviatilis.	At least from 20 fish from fishery catches	Annually in open sea areas. Annually in 3-4 coastal water areas (6 years rotation).	Further information can be found on the website of the National Environmental Monitoring Programme (NEMP) (link) Information on hazardous substances monitoring in marine fish carried out by the Estonian Marine Institute of the Tartu University can be found here. Several international projects are being performed, usually one-time inventories, such as COHIBA (focus on dangerous substances in the Baltic Sea) (link)
Gabon **	No monitoring programme in place. The lack of appropriate technical structures prevents such monitoring activities. Strong suspicion of fish resources contamination due to the large number of landfills close to water bodies.					
Hungary **	Monitoring programme in place.	Fish available on the market	Marine and freshwater species		Continuous	
Madagascar **	No monitoring programme in place.					Annual fish consumption: 8kg/person (Ministry of fishing, 2009). Important marine and freshwater fishing.
Mali **	No monitoring programme in place.					

Country	Existence of monitoring programme	Geographic coverage	Species marine/freshwater	Number of samples	Frequency (annual/monthly/continuing/one-time)	Additional information
Mauritius **	No systematic state monitoring programme. One-time survey in 2008 by the Ministry of Agro-industry (under the mercury partnership programme).			46 samples	One-time (2008)	Private companies that are involved in exporting fish, mainly tuna, to the EU market, carry out analysis of mercury for each consignment. Bi-annual analysis for mercury in coastal waters by the Ministry of Fisheries.
New Zealand **	Monitoring programme in place. New Zealand Food Safety Authority (NZFSA) (link)	Total Diet Study including analysis of mercury and methylmercury in different fish preparations	Marine and freshwater species	Samples from fish preparations (fish fingers, canned fish, fresh fish, fish in batter)	every five years quarterly assessments of dietary exposure to chemical residues and contaminant elements	In addition, several one-time studies. The NZFSA commissioned a report to quantify residues of total mercury in selected imported fish (2008 – 2009) A selection of academic papers include: Whyte et al, 2009- Human dietary exposure to heavy metals via the consumption of green shell mussels (<i>Perna canaliculus</i> Gmelin 1791) from the Bay of Islands, northern New Zealand. Bekhit et al, 2008- Effect of processing conditions on trace elements in fish roe from six commercial New Zealand fish species Love et al, 2003- Total mercury and methylmercury levels in some New Zealand commercial marine fish species
		Heavy Metal Monitoring Programme* – species from New Zealand's Exclusive Economic Zone	85 species –marine finfish, shellfish, crustaceans and freshwater fish	60 samples of each species	Annually	
Norway **	Monitoring programme in place. National Institute of Nutrition and Seafood Research (NIFES) (link)	National Barents Sea, Norwegian Sea, North Sea, fish farms on the nine coastal regions of Norway, Lakes	Marine species: cod, herring, mackerel, salmon (economically most important species for Norwegian export), mussels farmed salmon Freshwater species: trout, vendace, smelt, perch		Sample frequency depends upon species (annually, except for perch)	Extensive mercury monitoring efforts and independent surveys to assess levels, trends and effects of mercury are carried out by the Norwegian authorities and research institutes. Baseline studies, following a species over its whole distribution area throughout the year, have been undertaken for the Norwegian Spring Spawning herring, the Greenland halibut and are under way for mackerel, cod and saithe.
	Monitoring of Lake Mjøsa	Lake Mjøsa , largest lake in Norway (362 km ²)	Freshwater species: trout, vendace, smelt. Perch	20 individual analyses of each species	Annually except for the perch, since 2003 (data since 1970ies)	One-time study on perch in 2010, in three lakes in southern Norway, two in northern Norway. All lakes without local mercury inputs.
	Norwegian coast		Marine species: cod, flatfish, mussels		Annually since 1980	

Country	Existence of monitoring programme	Geographic coverage	Species marine/freshwater	Number of samples	Frequency (annual/monthly/continuing/one-time)	Additional information
	Norwegian data reported in the Sustained Arctic Observing Networks (SAON) (link)	Arctic - Svalbard and Jan Mayen	Marine food web, seabirds and seabird eggs for human consumption			
Panama **	Several one-time studies.	South Pacific and other Caribbean states	Different species from the Bay of Panama		One-time (1987, 1995, 1996)	Source: Work by Dr. Luis Álvarez E., Lic. Juan A. Palacios, Lic. Vasco Duke and Lic. Antonio Dutary Food safety monitoring envisaged for marine and freshwater species.
Papua New Guinea **	Monitoring programme in place. National Fisheries Authority (NFA) (authority responsible for managing and certifying fish and fishery products for export to the European Union market)		Marine species: tuna			Samplings are sent for analysis to the South Pacific Commission (SPC)
	National Monitoring Plan	Audits targeting all licensed companies confined to waters in the country	Marine species	Over 200 grams of specimen from five samples	Annually (testing occurring 2-3 times a year)	
Peru **	No monitoring and surveillance means have been implemented in the country. The National Programme for the surveillance of water resources (Programa Nacional de Vigilancia de los Recursos Hídricos) evaluates mercury in priority areas, especially where artisanal and small-scale gold mining activities are performed. Source: Mercury Assessment in Peru of 2006	Arequipa Madre de Dios		Shrimps Fish of commercial interest	One-time (2009; 2010)	A number of national and international public and private institutions have conducted studies on this issue. The mercury working group, which is part of the technical group on chemicals within the Ministry of Environment is in the process of compiling and systemizing this information.

Country	Existence of monitoring programme	Geographic coverage	Species marine/freshwater	Number of samples	Frequency (annual/monthly/continuing/one-time)	Additional information
Saint Lucia **	No monitoring programme in place.					Ongoing Caribbean Coastal Community Pollution Project, initiated to develop capacity within the Caribbean for monitoring POPs in the coastal environment and to gather data on the distribution of POPs in marine resources throughout the wider Caribbean region
Sweden **	Monitoring programmes in place. Yearly monitoring of heavy metals No regular monitoring in mammals	National Baltic Sea Lakes	Marine and freshwater species: guillemot eggs, blue mussel, perch, cod, herring	Varies, depending on the species	Annually	Bignert, A., Danielsson, S., Nyberg, E., Asplund, L., Eriksson, U., Berger, U. & Haglund, P. 2010. <i>Comments Concerning the National Swedish Contaminant Monitoring Programme in Marine Biota, 2010</i> . Report to the Swedish Environmental Protection Agency, 156 pages. (link)
United States of America **	Several monitoring programmes in place <i>U.S. Environmental Protection Agency (EPA) (link)</i> - National study of chemical residues in lake fish tissue (one-time 2009) - National rivers and streams assessment (two-years, results in 2011) - National coastal assessment - The Great Lakes fish monitoring program (1980-2006) (link) - EPA's Office of Research and Development (ORD)	Federal and state levels Lakes, reservoirs, national rivers and streams, marine coastal waters, Great Lakes, mid-Atlantic Highlands	Marine and freshwater fish and shellfish species		Continuous and specific one-time research studies Several-year studies as well as reconducted projects	Intensive research and monitoring efforts at State levels. Of 47 states, two tribal agencies, and one Canadian province that responded to a recent survey (percentages refer to proportion of respondents for each question), 94 percent have ongoing fish contaminant monitoring programmes. The average period of record for monitoring is 14 years with 60 percent using largemouth bass as the indicator fish species, 37 percent using walleye, and 33 percent using trout species. MercNet (link) is a national mercury monitoring initiative to establish a national, policy relevant network that measures mercury in the atmosphere, land, water, and biota in terrestrial, freshwater, and coastal ecosystems. Most recent progress includes establishing a MercNet monitoring inventory, including an online meta-database of mercury datasets from the United States and Canada.
	<i>U.S. Geological Survey (USGS)</i> - USGS National water quality assessment programme (NAWQA) collaboration with EPA	Freshwater streams, Several states (lakes, rivers)	Food web			

Country	Existence of monitoring programme	Geographic coverage	Species marine/freshwater	Number of samples	Frequency (annual/monthly/continuing/one-time)	Additional information
United States of America ** (continued)	<i>U.S. Geological Survey (USGS)</i> - National Contaminant Biomonitoring Programme(NCBP) collaboration with US Fish and Wildlife Service	Nationwide			Since 1960s	
	<i>National Oceanic and Atmospheric Administration (NOAA)</i>	Coastal regions and the Great Lakes	Biota: mussels, fish and dolphin			
	<i>U.S. Food and Drug Administration (FDA)</i> (link)	Commercial fish				
	<i>Food Safety and Inspection Service (FSIS)</i>	Domestic and imported catfish	Catfish and catfish products	1500 catfish fillet tissue samples	One-time – exploratory research, baseline study. Monthly collection	
	<i>U.S. Department of Interior, National Park Service (NPS)</i> Western Airborne Contaminants Assessment Project (WACAP) (link)	Freshwater sites/lakes in 8 western US park units	Freshwater species: Salmonid fish (lake trout to westslope cutthroat, brook and rainbow trout)	15 fish per lake	One-time (2002-2007)	
	<i>U.S. Department of Interior, National Park Service (NPS)</i> Acadia National Park (Maine) (link)	11 Freshwater lakes at Acadia National park	Bass, pickerel	One-time (2005)		
	<i>U.S. Department of Interior, National Park Service (NPS)</i> other NPS units	Parks, including around the Great Lakes	Freshwater species: prey and predator fish such as perch and pike	15 to 25 fish per lake	3-year sampling rotation in a selection of parks	

Country	Existence of monitoring programme	Geographic coverage	Species (marine/freshwater)	Number of samples	Frequency (annual/monthly/continuing/one-time)	Additional information
Information submitted before the committee's first session						
Brazil	<p>Brazil provided information, in its submission for the committee's first session, of the existence of several studies on releases of mercury into water bodies, recorded in diverse databases in Brazil, particularly that of the National Council for Scientific and Technological Development (Conselho Nacional de Desenvolvimento Científico e Tecnológico), Ministry of Science and Technology, which records published technical and scientific papers.</p> <p>In addition, several projects are currently under development in riparian communities of the Amazon region. Studies involving mercury emissions in water bodies are being conducted in all regions of the country. Several one-time studies have been reported, especially on the Amazon area.</p> <p>The following studies were identified as relevant to fish monitoring efforts:</p> <p>Lacerda and Malm, 2008, <i>Mercury Contamination in aquatic ecosystems; An analysis of critical areas</i>. Estudos Avançados (In Portuguese). v.22 n.63; 22-63 pp.12.</p> <p>Hacon S. et al, 2009, <i>An Overview of the Studies on the Hg contamination in the Amazon along the period 1990-2005 – Achievements and Gaps</i>. Geochimica Brasiliensis (in Portuguese), 23(1) 29-48.</p> <p>Vieira & Alho, 2004, <i>Mercury contamination in the sediment and Snail of the bento Gomes River Basin, MT</i>. Bolletín de Pesquisa e Desenvolvimento / Embrapa Pantanal, ISSN 1517-1981; 58 (in Portuguese), 20 pages.</p>					
		Amazon: nine locations of the Rio Negro basin, differing in water pH, mercury concentrations and dissolved organic carbon	Freshwater species, representative of the food web: herbivorous, detritivorous, omnivorous, and piscivorous.	951 fish samples	One-time	Barbosa A.C., and others (2004). Mercury Biomagnification in a Tropical Black Water, Rio Negro, Brazil. <i>Archives of Environmental Contamination and Toxicology</i> , vol. 45, No.2, pp.235–246.

Country	Existence of monitoring programme	Geographic coverage	Species (marine/freshwater)	Number of samples	Frequency (annual/monthly/continuing/one-time)	Additional information
Chile	<p>The national mercury risk management plan of July 2009, submitted by Chile for the committee's first session, provides some information related to monitoring efforts:</p> <p>The University of Concepción was at the time of reporting finishing a scientific report on mercury contamination of fish and sediments in the Lenga Estuary of Lenga - "Estudio de la Contaminación por Mercurio en peces y sedimentos del Estuario de Lenga (VIII Región-Chile)".</p> <p>The BBVA Foundation (Fundación Banco Bilbao Vizcaya Argentaria (BBVA)) is supporting an investigation into the impact of mercury contamination in areas of ecological importance (link).</p>					
	Public Health School of the University of Chile (Escuela de Salud Pública de la Universidad de Chile)	National	National consumption (Chilean jack mackerel, hake, Chilean mussel, tuna) and for export (salmon, Patagonian toothfish, swordfish, southern hake)	46		Cortes, Sandra and Antonia Fortt (2007). Mercury content in Chilean fish and estimated intake levels. <i>Food Additives & Contaminants</i> , vol. 24, No. 9, pp. 955–959.
Colombia	<p>The concentration of heavy metals in freshwater fish is better known in the basin of the Magdalena river, especially in the Mojana region and in the marshes of the south of the Department of Bolivar, where the levels of contamination by mercury have been studied, due to the development of multiple industrial activities, including gold mining and petrochemical industries. Little, however, is known in the country about the problems generated by the release of heavy metals in rivers and lakes and their impact on fish resources, deterioration of ecosystems and human health.</p> <p>Source: Javier Mancera-Rodriguez, Nestor, and Ricardo Alvarez-Léon (2006). Current state of knowledge of the concentration of mercury and other heavy metals in freshwater fish in Colombia. <i>Acta Biológica Colombiana</i>, vol. 11, No. 1, pp. 3–23. This report provides an overview of existing literature and information on heavy metals, especially mercury concentrations in freshwater fish in Colombia. It sums up available information on eight freshwater fish: <i>Carassius auratus</i>, <i>Oreochromis spp.</i>, <i>Piractus brachyomus</i>, <i>Prochilodus magdalena</i>, <i>Astyanaxfasciatus</i>, <i>Colossoma bidens</i>, <i>Gambusia affinis</i> and <i>Grundulus bogotensis</i></p>					
Czech Republic	Monitoring programme in place. Recently, several studies have been carried out to evaluate the health risks of freshwater fish from monitored areas.	Several locations, including Obříství on Elbe river, close to Neratovice chemical plant	Freshwater species: chub, brown trout		Annually (2003, 2004 and 2007)	<p>Sources: Kružíková K., and others (2008). Mercury and methylmercury concentrations in muscle tissue of fish caught in major rivers of the Czech Republic. <i>Acta Vet. Brno</i>, vol. 77, pp. 637–643.</p> <p>Kružíková K., and others. (2008). Mercury and methylmercury in muscle tissue of chub from the Elbe River main tributaries. <i>Czech J. Food Sci.</i>, vol. 26, No. 1, pp. 65–70.</p>

Country	Existence of monitoring programme	Geographic coverage	Species (marine/freshwater)	Number of samples	Frequency (annual/monthly/continuing/one-time)	Additional information
Ecuador	The national inventory of mercury emissions and mercury-containing products released in August 2008 indicates the existence of reports on mercury concentration in sea and freshwater fish.					
Ghana	Information on levels of mercury in the various environmental areas in Ghana is scanty. Relevant information can be found in the mercury assessment produced by the Environmental Protection Agency.					
		Dumasi area (5 km from Bogoso on the road to Prestea in the Western Region), small-scale gold mining (<i>galamsey</i>) areas	Mudfish, tilapia and catfish		One-time (2001)	Source: Babut, Marc, and others (2001). Part II- Conduct of Surveys on River Systems and Overall Conclusions, UNIDO, US/GHA/99/128 - <i>Assistance in Assessing and Reducing Mercury pollution Emanating from Gold Mining in Ghana - Phase I</i> .
		Dunkwa and Tarkwa areas			One-time (2002)	Source: Adimado, A. A., and D. A. Baah (2002). Mercury in human blood, urine, hair, nail, and fish from the Ankobra and Tano River basins in southwestern Ghana. <i>Bulletin of Environmental Contamination and Toxicology</i> , vol. 68, No. 3, pp. 339–346.
Lebanon	No national mercury assessment or monitoring or evaluation instruments available.					Levels in some species of fish from the Lebanese coast can be retrieved from a number of scientific articles but the majority of them date back to 1985 or before.
Spain	The Spanish agency for food safety (Agencia Española de Seguridad Alimentaria y Nutrición) coordinates an alert network at the national level.	Spatial coverage of available studies and publications do not cover the entire geography				Available studies support the known association between fish consumption and exposure to methylmercury. This conclusion is particularly relevant, Spain being in the group of countries with higher fish consumption per capita.

Country	Existence of monitoring programme	Geographic coverage	Species (marine/freshwater)	Number of samples	Frequency (annual/monthly/continuing/one-time)	Additional information
Turkey	Several monitoring studies including fish samples.	Atatürk Dam Lake Lake Beyşehir Asi River			One-time (2000, 2005, 2008)	Sources : Karadede and Ünlü (2000) determined Hg in water, Sediment and fish samples by AASD in Atatürk Dam Lake. Altındag and Yigit (2005) determined Hg in water, sediment and fish samples by AASD in Beyşehir Lake. Genç et al. (2008) determined Hg concentration in fish samples from Asi River.
Venezuela (Bolivarian Republic of)	<p>Several studies available (extracts available in English and Spanish):</p> <ul style="list-style-type: none"> • Rafael Darío Bermúdez Tirado, <i>Mercury exposure by eating fish from Guri dam: Causes and Effects. Bolivar State. Bolivarian Republic of Venezuela</i>, Editorial Fund from the Experimental University of Guiana (“UNEG”). “Puerto Ordaz”, Bolívar State, Bolivarian Republic of Venezuela (2010). • <i>TP106 Small-scale Gold Mining and Mercury Contamination in the Upper Cuyuní River Basin, Venezuela: An assessment in aquatic biota, river water and sediments</i>, The Society of Environmental Toxicology and Chemistry (SETAC), Abstract Book SETAC North America 29th Annual Meeting, held at the Tampa Convention Center, Tampa, Florida, 16–20 November 2008. • <i>Geochemistry of aquatic ecosystems in the upper Cuyuni River Basin, Bolivar State, Venezuela</i>: RAP High Cuyuní 2008. • <i>Concentration of heavy metals in water, sediment, tissues, muscle, liver and viscera of fish from Lake Valencia, Aragua</i>, Ministerio del Poder Popular para el Ambiente-Dirección General de Calidad Ambiental - Laboratorio Dirección Estatal Ambiental. Estado Aragua. 2001. • <i>Mercury contamination of surface water and fish in a gold mining region (Cuyuni river basin, Venezuela)</i>. 					