Proposal for a Pilot Programme for Measuring the Pollutant Contamination of Biota / Fish in the Rhine Catchment during 2014 / 2015

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July 2014

Reason for the proposal

The present proposal for a "**First Joint Analysis Programme on the Pollutant Contamination of Biota (Fish) in the Rhine Catchment"** claims **to largely cover the legal requirements of European water law and of food law and health legislation at the same time.**

The present proposal is to be understood as an attempt of the administrations in charge of water management/water protection to achieve comparable results concerning the contamination of fish/biota for the entire catchment in future and to develop the required analytics within a reasonable framework considering work and expenses.
A coordination of this proposal with the different authorities in charge in the states of the Rhine catchment concerned will take place after the completion of this proposal, as not all bodies concerned in the different states participated in its drafting.

The following Directives and Regulations have been taken into account for this proposal:

(1) Commission Regulation (EC) no. 1881/2006 of 19 December 2006 setting maximum levels for certain contaminants in foodstuffs (Official Journal of the European Union of 20 December 2006, L364/5)
(2) Commission Regulation (EU) No 1259/2011 of 2 December 2011 amending Regulation No 1881/2006 as regards maximum levels for dioxins, dioxin-like PCBs and non dioxin-like PCBs in foodstuffs
(3) Commission Regulation (EU) No 589/2014 of 2 June 2014 laying down methods of sampling and analysis for the control of levels of dioxins, dioxin-like PCBs and non-dioxin-like PCBs in certain foodstuffs and repealing Regulation (EU) No 252/2012 (Official Journal of the European Union of 3 June 2014, L164/18)
(4) Directive 2008/105/EC on environmental quality standards in the field of water policy ("WFD Priority Substances Daughter Directive"/ "Biota standard").
(5) Chemical Monitoring of Sediment and Biota under the Water Framework Directive, Guidance Nr. 25; (European Union 2010)
(6) Directive 2013/39/EU of the European Parliament and of the Council of 12 August 2013 amending Directives 2000/60/EC and 2008/105/EC as regards priority substances in the field of water policy

At present, a Guidance Document is being drafted at EU level on (6) which will complete the paper at hand (among others with respect to the variability of data, statistical coverage and preceding screening-examinations). When implementing the pilot programme and future monitoring programmes, this Guidance Document which is expected to be accomplished rapidly, must equally be taken into account.
The "Report on the Pollutant Contamination of Fish in the Rhine Catchment"[1] presents the results of on-going and accomplished investigations in the Rhine bordering countries during 2000 to 2010.

[1] ICPR report no. 195, see www.iksr.org - documents/archive - Technical reports German, French, Dutch and English

This report had pointed out that the contents of ubiquitous substances such as dioxin-like polychlorinated biphenyls (PCB), dioxins and furans in some fish, in particular eel in the Rhine and in some of its tributaries almost everywhere exceeded the total highest values permissible under foodstuffs legislation. Therefore, some states have issued restrictions for fishery, fish marketing, ceding fish free of charge and / or fish consumption. More comparable results would allow the states in the Rhine catchment to e.g. draft transboundary consistent recommendations for consumption for the public.

Experts from national control and inspection of foodstuffs and environmental analytics have participated in the drafting of the report at hand and agreed that the results may be put side by side, but that they cannot be compared.

In future, a comparable and reliable data basis concerning the treatment of the contamination in biota/fish in the Rhine river basin may only be achieved by means of a "Joint Analysis Programme". Such a coordinated approach would imply great added value for environmental and water management authorities as well as for foodstuff and health authorities.

Thus,

- the different legal obligations of the states could be complied with,
- technically coherent investigations can be coordinated in the entire river basin,
- cost-effective investigations can be carried through (win-win) and
- comparable results can be achieved at a high level.

It is recommended to implement the pilot programme if possible in 2014 and / or in 2015.

Criteria for a "First joint analysis programme on the contamination of biota (fish) in the Rhine catchment"

1. Network of representative monitoring stations or river sections

A network of representative monitoring stations or river sections aimed at the coordinated surveillance in the Rhine catchment should established analogous to the Rhine monitoring programmes "Biology" and "Chemistry".

Criteria:

- ✓ Depending on the length of the section of the Rhine: 1 to 3 monitoring stations (downstream important agglomerations (settlements and industry).
- ✓ Taking into account "variations" (e.g. main stream / oxbow lake)
- ✓ Eventually per section: 1 to 2 monitoring stations each in the big Rhine tributaries in sufficient distance to the outlet into the Rhine (e.g. 5 km before the outlet).

Annex 1 lists the monitoring stations for biota according to the indications of the authorities in charge. The choice of monitoring stations and river sections is based on the Rhine monitoring programme "Chemistry"; however, monitoring stations are not always identical, as the fish monitoring programme also takes into account further criteria.
The map in Annex 1 shows the monitoring stations proposed for fish/biota and the network of monitoring stations of the international Rhine monitoring programme "Chemistry".

2. Sampling

Sampling may be done by electrofishing, fishing with nets or fyke-nets.

Period
In order to grant a seasonal comparability of samples and to avoid the spawning period (April to beginning July), samples are to be taken **between July and November** during **an analysis year to be determined.**

Extent of random samples
At least 10 fish of one fish species per monitoring station (required for reasons of statistical reliability); samples should be as homogenous as possible (i.e., conspicuous fish should be sorted out).

Quality Assurance
Qualified sampling is decisive for the result of the surveillance. Therefore, samplers must be sufficiently trained. The sampling protocol must be strictly followed.

3. Choice of fish species

For the first analysis campaign, the following fish species should be taken into account:

- ✓ **Roach**
- ✓ **Perch**
- ✓ **Chub**
- ✓ **Bream**

If possible, and in order to increase the comparability of results along the course of the Rhine, at least two species should be analysed per monitoring station.

These fish species were chosen, as their age category and during the season of sampling they behave as sedentary fish and these species are abundant in large parts of the Rhine catchment, so that monitoring results will be well comparable along as long stretches as possible.

The analysis of eel which has so far partly been usual is not explicitly proposed within this analysis programme, as the mostly high contamination of this fish species is sufficiently known from former investigations (see ICPR report no. 195), the stock is endangered (see ICPR report no. 207) and sampling is not always possible at reasonable expenses. Furthermore, there does not exist any applicable relationship between age and length of eel and their age is often difficult to determine or can only be determined in laboratory analysis.

If eel will nevertheless be included into the investigations - e.g. for reasons of comparability with long-standing analysis series - each individual eel should be used for as many analysis as possible, so that a maximum of knowledge may be gained by killing as few individuals as possible and thus avoiding to further decimate the stock.

Table 1: Selected fish species for a coordinated monitoring programme on the contamination in the Rhine catchment

Fish species	Pro	Contra
Roach (*Rutilus rutilus*)	wide spread; comparability given with ICPR study in 2000	rare in the High Rhine; decreasing in some sections of the Rhine; little contact with sediments, low to average fat content

Fish species	Pro	Contra
Perch (*Perca fluviatilis*)	wide spread, partial comparability with regional studies	locally rare, low fat content
Chub (*Leuciscus cephalus*)	wide spread	locally rare; low to average fat content
Bream (*Abramis brama*)	wide spread; long life-time; intensive contact with sediments	locally rare; average to high fat content

4. Age class, length class and documentation

For comparability reasons, i.e. in order to limit the bandwidth of pollutant concentrations determined at one monitoring station as much as possible, it is important that the age classes of the analysed fish are as comparable as possible.
Fish of the age class of about 3 years are proposed, the matching sizes of which are indicated in Table 2. As the age of the fish can only be determined with the help of their scales and gill covers, the age class is "translated" into a length class. Table 2 indicates the length classes representative for 3 year old fish.

Table 2: Representative length classes of about 3 year old fish for the fish species to analyse[2]

Fish species	Length class, for information
Roach (*Rutilus rutilus*)	20 +/- 2 cm
Perch (*Perca fluviatilis*)	19 +/- 2 cm
Chub (*Leuciscus cephalus*)	22 +/- 2 cm
Bream (*Abramis brama*)	20 +/- 2 cm

In order to be able to calibrate the individual monitoring stations, it is recommended to have a laboratory determine the age class with the help of scales and gill covers within a joint monitoring campaign.
It is equally recommended to also analyse big specimen of the species mentioned and caught during sampling in order to determine, whether potential fish for human consumption respects the limits under food law.[3]

Documentation: Fat contents (total fat), length, weight, sex, age, conspicuousness etc. should in all events be documented for each single fish, as this will be important when interpreting results.

[2] If eel are to be sampled, silver eel should be avoided and the sampled specimen should be 50 to 60 cm long.
[3] Some EQS for biota according to WFD are exclusively or partly based on human exposition.

5. Examined parts of fish

Taking into account the law on foodstuff, the edible parts of the fish must be examined. Furthermore, the muscle and fat tissue represents an important share in the weight of the entire fish and most contaminants accumulate in this tissue.

The EQS for biota according to WFD have been determined for two assets worth protection: human health and the ecosystem (secondary poisoning), however, in both cases, the most critical value for determining the relevant asset of protection was decisive (see Table 3). For substances, for which the ecosystem is the most critical asset of protection (including secondary poisoning), the Guidance Document no. 25 recommends measuring whole fish.

In order to reduce expenses, it is all the same recommended to measure all substances **in the filet (muscle tissue without skin but with subcutaneous fat tissue).**[4]

Table 3: Analysed substance/groups of substances

Asset of protection	**Substance / group of substances**
Human health	Hexachlorobenzene, ∑ dioxins/ furans/ dl-PCB, fluoranthene, heptachlor and heptachlorepoxid, PFOS, PBDE (∑ BDE 28, 47, 99, 100, 153, 154), PAH (among others B(a)P)
Ecosystem (secondary poisoning)	Hexachlorobutadien, mercury, dicofol, hexabromcyclododecan

6. Composite samples / single samples

For fish with length classes indicated in Table 2, the **analysis of composite samples** is preferred, as, in this size of fish, pollutants are rather evenly spread and this kind of analysis is distinctly less onerous. However, composite samples can only be made of one species, one size class, one location and one point of sampling.

Single samples[5] are required, when fish of consumable size are included, and which are in excess of the length classes indicated in Table 2.

[4] Within the pilot project, the Netherlands are planning for additional monitoring of some substances, which priority asset of protection is the ecosystem (e.g. HCBD, Hg, dicofol and HxBrCD) in the muscle tissue as well as in the rest of the fish tissue. By summing up the results, the pollutant content can be determined in the entire fish and the respect of the EQS for biota may be checked.

[5] If eel were to be analysed, single samples would be obligatory.

7. Choice of substances and substance groups to be measured

Table 4 lists the substances, which must be measured due to legal obligations, that is, they represent the minimal list of substances.

Table 4: Proposal for a list of pollutants to be measured within a first coordinated monitoring programme on the contamination of fish

Substance	CAS. No.	Fish species and parts of fish	Legal basis	Maximum contents resp. EQS biota	Unit
Σ dioxins/furans + dl-PCBs	n.a.	All	Directive /2013/39/EU	0.0065	µg/kg FW
Σ dioxins / furans	n.a.	all	EU Regulation 1259/2011	0.0035	ng WHO PCDD/F-TEQ/ g FW
Σ dioxins/furans + dl-PCBs	n.a.	Muscle tissue of freshwater fish except for wild eel	EU Regulation 1259/2011	0.0065	ng WHO-PCDD/F-PCB-TEQ/ g FW
		Wild freshwater fish caught and their products, excluding diadromous fish species		0.0065	ng WHO-PCDD/F-PCB-TEQ/ g FW
		Muscle tissue of wild eel and its products		*0.010*	*ng WHO PCDD/F-PCB-TEQ/ g FW*
Σ (ICES-6): PCB 28, PCB 52, PCB101, PCB 138, PCB 153, PCB 180	n.a.	Muscle tissue of freshwater fish except for wild eel	EU Regulation 1259/2011	75	ng/g FW
		Caught wild freshwater fish and their products, excluding diadromous fish species		125	ng/g FW
		Muscle tissue of wild eel and its products		*300*	*ng/g FW*
hexachlorobenzene	118-74-1	all	Directive /2013/39/EU	0.01	mg/kg FW
hexachlorbutadiene	87-68-3	all	Directive /2013/39/EU	0.055	mg/kg FW
mercury	22967-92-6	*Muscle tissue, among others of eel, pike*	EU Regulation 1881/2006	1.0	mg/kg FW
		Fishery products and muscle tissue of other fish	EU Regulation 1881/2006	0.5	
		all	Directive /2013/39/EU	0.02	mg/kg FW

Conversion factors: 1 mg = 1,000 µg = 1,000,000 ng ----1 kg = 1,000 g = 1,000,000 mg

EU Regulation 1881/2006: COMMISSION REGULATION (EC) no. 1881/2006 of 19 December 2006 setting maximum levels for certain contaminants in foodstuffs

EU Regulation 1259/2011: COMMISSION REGULATION (EU) No 1259/2011 of 2 December 2011 amending Regulation No 1881/2006 as regards maximum levels for dioxins, dioxin-like PCBs an non dioxin-like PCBs in foodstuffs

Directive /2013/39/EU: DIRECTIVE 2013/39/EU of the European Parliament and of the Council of 12 August 2013 amending Directives 2000/60/EC and 2008/105/EC as regards priority substances in the field of water policy

Table 5 lists the EQS for biota according to the EU Directive 2013/39/EU published in the EU Official Journal on 12 August 2013 and valid as of **2018**. At latest from that point on they must be integrated into the monitoring. As of 2021, these substances must be integrated into the management plans for the river basin districts, as of 2027 the good chemical state must be achieved for these substances. For PBDE and PAH the EQS will already apply as of 2015. It is recommended to already take these substances into account when implementing the first common analysis programme 2015 as a pilot project, so that, when assessing the results, selective statements can already be made with respect to these EQS for biota.

Table 5: EQS for biota according to the Directive 2013/39/EU within the framework of revising the EQS Directive and the WFD
Source: Directive 2013/39/EU of the European Parliament and of the Council of 12 August 2013 amending Directives 2000/60/EC and 2008/105/EC as regards priority substances in the field of water policy

Substance	**CAS-No.**	**EQS biota** [µg/kg FW]	**Remark**
Heptachlor(epoxid) (cis- and trans-)	1024-57-3	$6.7\ 10^{-3}$	Plant protection agent and degradation product
perfluoroctanesulphonate (PFOS)	1763-23-1	9.1	Industrial chemical; galvanic processes, extinguishing agent, paper industry, landfill sites among others
hexabromcyclododecan (HBCDD)	3194-55-6	167	Industrial chemical
dicofol	115-32-2	33	Acaricide (spider mite fighting agent) containing remnants of DDT
fluoranthene (a PAH, see below)	206-44-0	30 (crustaceans, molluscs)	Product of incomplete combustion of organic material
polycyclic aromatic hydrocarbons (PAH)	n.a.	5 (crustaceans, molluscs)	benzo(a)pyrene (BaP), benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(ghi)perylene, indeno(1,2,3-cd)pyrene.[6] Among others in tar, mineral oils, car tyres; emissions during the combustion of fossile energy sources
brominated diphenyl ethers (PBDE)	n.a.	0.0085	flame retardant

8. Analytics and evaluation

The analytics and evaluation should correspond to the following specifications:

- ✓ Analysis by an accredited laboratory;
- ✓ Cooperation of the states/federal states with a view to charge as few laboratories as possible;

[6] For the group of PAH, the EQS biota is based on the toxicity of benzo(a)pyrene which should be measured as a marker for the other PAH and the concentration of which should be compared to the EQS.

- ✓ The requirements for analysis methods and laboratories according to EU Regulation no. 589/2014 and Directive 2009/90/EC (QA/QC-Directive) are to be respected;
- ✓ Uncertainties of measurement when interpreting the results are taken into account according to legal regulations;
- ✓ Should analysis results with comparable methods exist from earlier analysis (max. 5 years old), these results may be used and taken into account in addition.

Apart from the maximum contents of food regulations of the EC Regulation No. 1881/2006[7] and the EU Regulation No. 1259/2011[8] already existing standards for biota according to the Water Framework Directive[9] must be taken into account during evaluation.

Analysis results should be compared to environmental quality standards within the law on water and maximum values of the law on foodstuffs. Moreover, further statistical evaluations (e.g. Box-Whisker-Plot) should be carried out, in particular if individual fish have been examined.

In some states and some Regulations the measurement uncertainty is subtracted from the individual monitoring values of each substance before comparing with limit values. However, the Rhine bordering states should agree upon these measurement uncertainties for each substance and within the scope of concentrations indicated by the EQS for biota or foodstuff standards.

In order to be able to compare the monitoring data of the different laboratories with each other, uniform methods concerning the approach to measurement uncertainties should be agreed upon. In addition, laboratories should prove with a (vast) analysis of uncertainties that they respect the measurement uncertainties agreed upon.
The European Reference Laboratories (EURL[10]) work on measurement uncertainties. It should be checked whether the EURL recommend values for all substances or what their general recommendation is.

Results should be delivered in a form permitting the introduction into a database. A data mask was developed to this end (see Annex 3).

During evaluation, the number of fish is to be identified, in particular if less than 10 fish were caught at a monitoring station.

[7] Commission Regulation (EC) no. 1881/2006 of 19 December 2006 setting maximum levels for certain contaminants in foodstuffs (Official Journal of the European Union of 20 December 2006, L364/5)
[8] Commission Regulation (EU) No 1259/2011 of 2 December 2011 amending Regulation No 1881/2006 as regards maximum levels for dioxins, dioxin-like PCBs an non dioxin-like PCBs in foodstuffs (Official Journal of the European Union of 3 December 2011, L320/18)
[9] Directive 2008/105/EC on environmental quality standards in the field of water policy ("WFD Priority Substances Daughter Directive"/"Biota standard").
[10] http://irmm.jrc.ec.europa.eu/EURLS

Annex 1: Network of monitoring stations (fishing sections) to determine the contamination of fish (biota) in the Rhine catchment

River km	State / federal state	Water body no.	No. Chemistry monitoring station	Name of the monitoring station	Justification of choice
Alpine Rhine / Lake Constance					
82.2	AT		60	Fussach/Rhine	
3.2	AT		61	Bregenz/Bregenzer Ach	
High Rhine (Rhine km 28-172, Lake Constance - Basel)					
40	D/BW	2-01	5	Öhningen/Rhine	The monitoring station is located upstream the Basel agglomeration.
Upper Rhine (Rhine km 172-530, Basel - Bingen)					
208	D/BW	3-OR1	2	Breisach (Old Rhine)	The monitoring station detects all inputs including the Basel agglomeration.
386	D/BW/F	3-OR5	7	Freely flowing Rhine downstream R. Lauter until mouth of R. Neckar	The monitoring station is located downstream the Basel agglomeration and detects the further inputs from D/BW and FR.
443.3 P	D RLP/BW/HE		11	Worms/Rhine	The monitoring station is located between the mouth of R. Neckar and the R. Main and detects inputs from the Ludwigshafen-Mannheim-Worms agglomeration.
5.1	D/HE		31	Biblis-Wattenheim/Weschnitz	The monitoring station is located at the level of Einhausen-Ost and detects the Weschnitz catchment.
1.1	D/HE		28	Trebur-Astheim/ Schwarzbach	The monitoring station is located near Trebur-Ost and detects the contamination of R. Schwarzbach (worst-case-assessment)
Neckar catchment (river kilometre 428,16, outlet into the Rhine)					
270	D/BW	4-02		non impounded R. Neckar upstream the outlet of R. Fils	
160	D/BW	4-03	8	Impounded R. Neckar downstream the outlet of R. Fils until upstream the mouth of R. Enz	The monitoring station is located upstream the Stuttgart agglomeration.
116	D/BW	4-04	9	Impounded R. Neckar downstream the outlet of R. Enz until upstream the mouth of R. Kocher	The monitoring station detects the inputs of the Stuttgart agglomeration.

River km	State / federal state	Water body no.	No. Chemistry monitoring station	Name of the monitoring station	Justification of choice
15	D/BW	4-05	10	Impounded R. Neckar downstream the mouth of R. Kocher until the outlet near Mannheim	The monitoring station detects the further inputs from the BW catchment.
Main catchment (river kilometre 496,63, outlet into the Rhine)					
4 R	D/HE		25	Bischofsheim / Main	km 8.0 upstream of Bischofsheim: The monitoring station detects the global pollution of R. Main upstream its outlet into the Rhine.
1,94 L	D/HE		26	Hanau/Kinzig	Identifies the R. Kinzig catchment
Middel Rhine (Rhine-km 530 - 651, Bingen - Bonn)					
590,3 L	D/RLP		13	Koblenz/Rhine	
Nahe catchment (river kilometre 524,4, outlet into the Rhine)					
7,5 R	D/RLP		19	Grolsheim	The monitoring station identifies the contamination of the entire system of water bodies.
Lahn catchment (river kilometre 137,3, outlet into the Rhine)					
136,0 R	D/RLP		20	Lahnstein	The monitoring station is located in the downstream section. It reflects the pollution of the downstream section.
119,6	D/HE		29	Solms-Oberbiel	The monitoring station is located in the upstream section. It identifies the pollution in the upper section of R. Lahn.
57.5	D/HE		30	Limburg	The monitoring station is located downstream of Limburg. It reflects the pollution upstream the transition to RLP.
Moselle/Saar (river kilometre 581,0 outlet into the Rhine)					
2 – 5	D/RLP		18	Koblenz impoundment	The monitoring station is located near to the outlet into the Rhine and upstream the lowermost downstream barrage. It reflects the pollution of the downstream section.
	D/RLP		14	Impoundment Schoden/Saar	The monitoring station is located in the lowermost barrage in the downstream section and reflects the contamination of the lower R. Saar.
1.75	D/RLP + L		16	Wasserbillig/Sauer	The monitoring station identifies the contamination of the entire system of water bodies.
48.5	L		56	Ettelbruck/Alzette	
230 R	D/RLP + L		15	Palzem	The L monitoring station corresponds to that of RLP.

River km	State / federal state	Water body no.	No. Chemistry monitoring station	Name of the monitoring station	Justification of choice
Lower Rhine (Rhine-kilometre 651-856, Bonn - Bimmen)					
640	D/NRW		32	Bad Honnef to Rhöndorf	The monitoring station is located on the federal state border to RLP and reflects the pollution of the Rhine as it enters NRW.
5.4	D/NRW		37	Opladen/Wupper	The monitoring station is located some 5 km upstream the mouth of R. Wupper upstream a transverse structure permitting up- and downstream fish migration. Due to the distance from the Rhine and due to the weir it must be assumed for this area that the majority of fish present belongs to the permanent fish fauna of R. Wupper.
14.3	D/NRW		38	Mülheim/Ruhr	The monitoring station is located some 3 km upstream the mouth of R. Ruhr upstream the Duisburg weir. The transverse structure does not permit any fish migration. Today, fish may only migrate into R. Ruhr to a limited extend and by passing by the lock. For this reason it is assumed that, upstream the transverse structure, the majority of fish is of Ruhr origin.
3.7	D/NRW		39	Wesel/Lippe	The monitoring station is located some 4 km upstream the mouth of R. Lippe upstream a riffle-pool sequence. Due to the distance from the Rhine and due to the riffle-pool sequence it must be assumed for this area that the majority of fish present belongs to the permanent fish fauna of R. Lippe.
865	D/NRW		35	Kleve-Bimmen bis Emmerich	The monitoring station is located near to the border to the Netherlands and reflects the pollution of the Rhine in the catchment.

River km	State / federal state	Water body no.	No. Chemistry monitoring station	Name of the monitoring station	Justification of choice
Delta Rhine (Rhine-km 860-1032, Lobith - Hoek van Holland)					
1018 R	NL		42	Maassluis/Rijn	Maassluis is located on the Niewe Waterweg, a water body of little interest from an ecological point of view. In addition, during inventories, too few fish are caught there in order to meet the requirements of the monitoring programme at hand. Therefore, the Haringvliet / Hollands Diep has been chosen as big, ecologically important water body near the coast. Even though, formally speaking it does not belong to the Rhine catchment, 6/7 of its waters originate from the Rhine.
995 R	NL		43	Kampen/IJssel	Shortly downstream Kampen the IJssel has its outlet into the Ketelmeer. The Ketelmeer is important for fishery and from an ecological point of view.
	NL		44	Vrouwezand/IJsselmeer	The monitoring station is located in Lake IJsselmeer. The IJsselmeer is important for fishery and from an ecological point of view.

Legend:
R = right bank
L = left bank
M = middle
P = profile

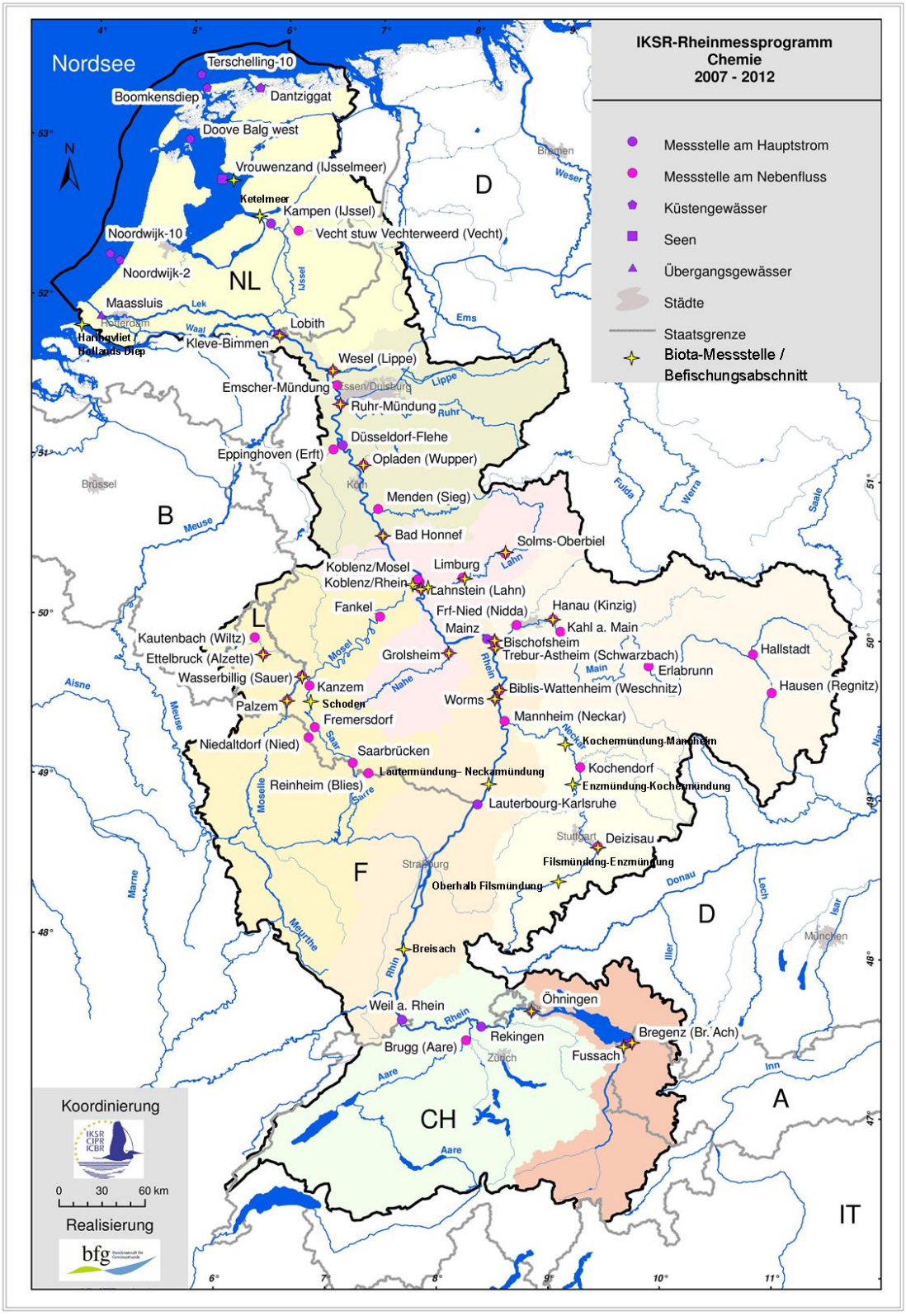
AT = Austria
CH = Switzerland
D = Germany
F = France
NL = Netherlands
L = Luxemburg

BW = Bade-Württemberg
HE = Hesse
NRW = North Rhine Westphalia
RLP = Rhineland Palatinate

France will deliver data from the last vast monitoring campaign on the contamination of fish (2011-2012) for the pilot project. France will determine monitoring stations for the next monitoring campaign covering the entire Rhine (2018).

Switzerland will participate in the pilot programme with two monitoring stations yet to be determined and carry out analysis in cooperation with Bade-Württemberg.

Annex 2: Map: Network of monitoring stations of the international Rhine monitoring programme "chemistry" including monitoring stations proposed for fish/biota



Annex 3: Data masks for the biota monitoring programme

Table 1: Information on fishing exercises

Number of monitoring station	Water body	Number of catching location[11]	Name of the biota catching station	Kilometre	Eastern value in UTM	Northern value in UTM	Fishing method	Catching date	Number of fish caught	Fish species	"Chemistry" monitoring station	Fishing carried out by	Remarks
00103	*Rhine*	*4711*	*Bad Honnef*	*640*	*37789*	*561009*	*Electro-fishing*	*05/07/ 2014*	*10*	*Roach*	*0003*	*Martin Muster mann*	*nothing con-spicuous*

Remark: *The examples given in the table are fictitious.*

[11] The number of fishing exercise and the number of the catching location remain internal information

Table 2: Indications on fish sample

Fish identification number	Fish species	Length [cm]	Weight [g]	Age [Years]	Sex	Laboratory sample number	Analysed parts	Remarks
103-12-01	*Roach*	*16.5*	*75*	*3*	*w*	*103/12/01-10*	*left side filet*	*Injured fins*

Remark: *The examples given in the table are fictitious.*

Table 3: Analytical information

Laboratory	Sample no.	Beginning of analysis	Analysed tissue	Method of fat determination	Fat content [%]	CAS-No.	Kind of sample[12]	Name of the substance	Concentration	Unit	Limit of detection	Measurement uncertainty[13]	in interlaboratory tests[14]	Methodical principle[15]	Reference[16]	Remarks
FischLab	*10/12/01-10*	*20.07.*	*left side filet*	*total fat*	*1.9*	*118-74-1*	*pool sample*	*HCB*	*0.008*	*mg/kg*	*0.005*			*GC/MS*		

Remark: *The examples given in the table are fictitious.*

[12] Pool sample or individual sample
[13] Measurement uncertainty, k=2; the measurement uncertainty must be related to the concentration measured; e.g., if concentrations are measured within a scope between 1 and 10, the measurement uncertainty should have been determined in a similar scope.
[14] Date of the last successful interlaboratory test for the substance to be analysed in biota according to the QA/QC-Directive, § 6 2a
[15] e.g. GC-EI-MS, GC-EI-HRMS; GC-ECNI-MS; GC-/MS/MS; atomic fluorescence spectroscopy; direct mercury analyzer
[16] Indication to DIN-, EN-, ISO-standard or literature