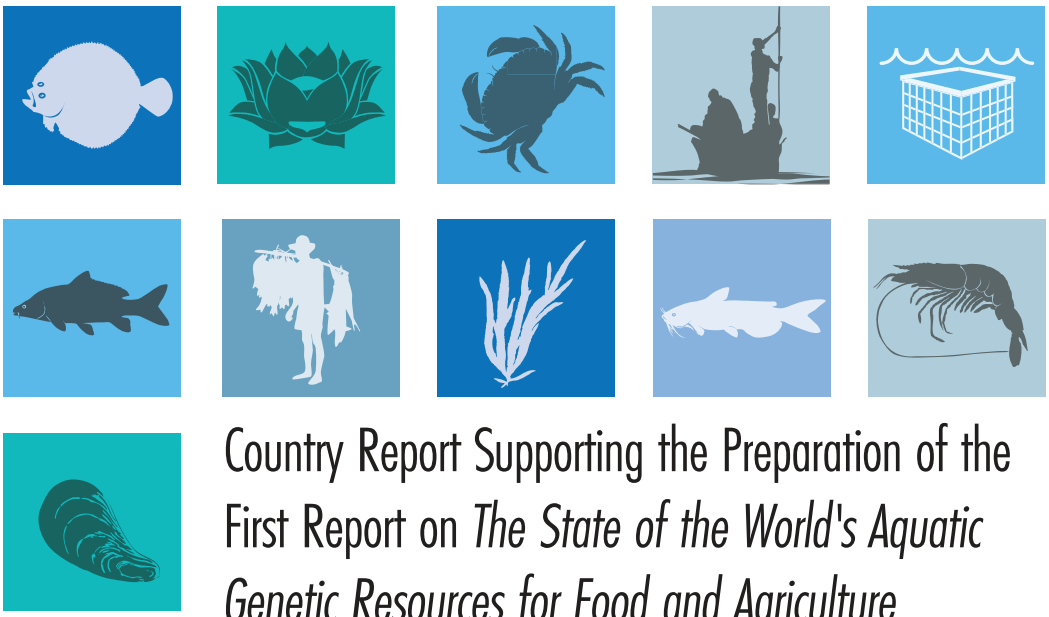
Food and Agriculture Organization of the United Nations

COUNTRY REPORTS

Germany



Country Report Supporting the Preparation of the First Report on *The State of the World's Aquatic Genetic Resources for Food and Agriculture*

Food and Agriculture Organization of the United Nations

COMMISSION ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE

Questionnaire for the Preparation of Country Reports for *the First State of the World's Aquatic Genetic Resources for Food and Agriculture*

COMMISSION ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE

INSTRUCTIONS FOR COMPLETING THE DYNAMIC GUIDELINES

How do I complete the dynamic guidelines?

1. You will require Adobe Reader to open the dynamic guidelines. Adobe Reader can be downloaded free of charge from: http://get.adobe.com/uk/reader/otherversions/. Use Adobe Reader Version 10 or higher.
2. Open the dynamic guidelines and save it (save as a pdf) on your hard drive.
3. Please rename it <name of your country>.pdf.
4. You may forward the dynamic guidelines to stakeholders you would like to involve or inform by e-mail. You may also print and/or save the dynamic guidelines.
5. It is advisable to prepare textual responses (including any formatting such as bullet points) first in a separate document and then to copy and paste them into the form. Please use font Arial 10. Acronyms and abbreviations should be avoided if possible. If included, they must be introduced (i.e. written out in full) the first time they are used. Note that the text boxes are expandable. Once text has been entered, the box will automatically enlarge to make its content fully visible when you click outside its border. To delete a row you have added, click on the "X" on the far right of the table
6. When you have finished completing the dynamic guidelines, click the "Submit form" button at the end of the form and send the completed dynamic guidelines to Devin.Bartely@fao.org; Matthias.Halwart@fao.org; and ruth.garciagomez@fao.org.
7. This should automatically attach the document to an email that you can then send. Otherwise, please attach the completed dynamic guidelines manually to an e-mail and send it to Devin.Bartely@fao.org; Matthias.Halwart@fao.org; and ruth.garciagomez@fao.org.
8. A letter confirming official endorsement by relevant authorities should also be attached to the email.
9. You will receive a confirmation that the submission was successful.

Where can I get further assistance?
If you have any questions regarding the dynamic guidelines, please contact
Devin.Bartely@fao.org; Matthias.Halwart@fao.org; ruth.garciagomez@fao.org

Several websites provide useful information on aquatic species that can be consulted for proper species names and for information on aquatic genetic resources: AlgaeBase, Aquamaps, Barcode of Life, Census of Marine Life, FishBase, Frozen Ark, GenBank, Global Biodiversity Information Facility, International Union for Conservation of Nature, National Institutes of Health Database on Genomes and Bioinformatics, Ornamental Fish International, SealifeBase, Sea Around Us, and World Register of Marine Species.

How, by whom and by when must the completed dynamic guidelines be submitted?
Once officially endorsed by the relevant authorities, the completed dynamic guidelines should be submitted (click the "Submit form" button on the header banner) by the National Focal Point. **Completed dynamic guidelines should be sent by December 31st 2015.**

www.algaebase.org
www.aquamaps.org
www.barcodeoflife.org
www.coml.org
www.fishbase.org
www.frozenark.org
www.genbank.org
www.gbif.org
www.iucn.org
http://discover.nci.nih.gov/
www.ornamental-fish-int.org
www.sealifebase.org
www.seaaroundus.org
www.marinespecies.org

I. INTRODUCTION

At its Thirteenth Regular Session, the Commission noted that the preparation of a country-driven *State of the World's Aquatic Genetic Resources for Food and Agriculture* would provide countries with opportunities for assessing the status of their aquatic genetic resources for food and agriculture and enhancing the contributions of aquatic genetic resources to food security and rural development. Additionally the process of producing Country Reports will assist countries in determining their needs and priorities for the conservation and sustainable use of aquatic genetic resources for food and agriculture, and will help raise awareness among policy-makers.

II. COUNTRY REPORTS

As with the other sectors, *The State of the World's Aquatic Genetic Resources for Food and Agriculture (SoWAqGR)* will be compiled from Country Reports. It is recognized that guidance is necessary in order to assist countries in completing those reports under a common framework. The Country Reports will become official government documents submitted to FAO.

The following questionnaire is the suggested format for the preparation and submission of Country Reports. The questionnaire has been prepared by FAO to assist in the preparation of Country Reports contributing to the SoWAqGR Report. It has been designed to assist countries to undertake a strategic assessment of their aquatic genetic resources for food and agriculture.

The scope of the first State of the World's Aquatic Genetic Resources for Food and Agriculture, and therefore the emphasis in the Country Reports, is farmed aquatic species and their wild relatives within national jurisdiction.

Country Reports should:

- become powerful tools for improving the conservation, sustainable use and development of aquatic genetic resources for food and agriculture, at national and regional levels;
- identify threats to aquatic genetic resources, gaps in information about aquatic genetic resources and needs for the strengthening of national capacity to manage aquatic genetic resources effectively;
- inform the development of national policies, legislation, research and development, education, training and extension concerning the conservation, sustainable use and development of aquatic genetic resources for food and agriculture;
- contribute to raising public awareness about the importance of aquatic genetic resources for food and agriculture;
- complement other national reporting activities on the conservation, sustainable use and development of aquatic genetic resources.

Timeline and process

In line with the overall process, as established by the Commission, the Director-General of FAO sent a Circular State Letter on 19 April 2012 to countries requesting them to identify National Focal Points for the preparation of Country Reports by 31 December, 2015.

The following steps are recommended in preparing the Country Report, using a participatory approach:

- Each participating country should appoint a National Focal Point for the coordination of the preparation of the Country Report who will also act as focal point to FAO. National Focal Points should be communicated to the Secretary, Commission on Genetic Resources for Food and Agriculture (cgrfa@fao.org) immediatly.
- Countries are encouraged to establish a national committee to oversee the preparation of the Country Report. The national committee should consist of as many representative stakeholders as practical (representing government, industry, research and civil society).
- The national committee should meet frequently to review progress and consult widely with key stakeholders.

- The National Focal Point should coordinate the preparation of the first draft of the Country Report, which should be reviewed by the national committee. The National Focal Point should facilitate a consultative process for broader stakeholder review.
- Following the stakeholder review, the National Focal Point should coordinate the finalization of the Country Report, submit it to the government for official endorsement and transmit it to FAO in one of the Organization's official languages (Arabic, Chinese, English, French, Russian and Spanish) by 31 December 2015.
- The Country Report will be an official government report.
- If countries are unable to submit final Country Reports by the set deadline, preliminary reports of findings should be provided to FAO to contribute to the identification of global priorities for inclusion in the SoWAqGR Report.

QUESTIONNAIRE FOR PREPARATION OF COUNTRY REPORTS FOR *THE STATE OF THE WORLD'S AQUATIC GENETIC RESOURCES FOR FOOD AND AGRICULTURE*

Country report supporting the preparation of

The State of the World's Aquatic Genetic Resources for Food and Agriculture

Country	Germany
Prepared By	Clemens Fieseler
Date	Jan 21, 2016

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I. EXECUTIVE SUMMARY

The Country Report should contain an executive summary of 2-3 pages highlighting the main findings of the analysis and providing an overview of key issues, constraints and existing capacity to address the issues and challenges. The executive summary should indicate trends and driving forces and present an overview of the proposed strategic directions for future actions aimed at the national, regional and global levels.

Please include the Executive Summary here.

The Federal Republic of Germany is made up of 16 federal states known as Laender. Aquaculture and inland fishing, and therefore the conservation and use of that part of aquatic genetic resources which constitutes the focus of this report, belong fundamentally to the remit of the Laender.

With the exception of blue mussel aquaculture, aquaculture in Germany is practiced almost exclusively in freshwater by SMEs (small and medium enterprises). In 2014, almost 21,000 tonnes of food fish were produced by approx. 5,900 businesses. Add to this 5,200 tonnes of mussels produced by 11 marine aquaculture businesses. Fish production was dominated by rainbow trout (52%) and carp (27%). Whereas salmonid production takes place in so-called cold water systems, carp are usually produced extensively under very natural conditions in so-called warm water ponds.

The breeding process currently used in practical aquaculture in Germany is based solely on the use of positive mass selection. No specific breeding programmes exist. Modern biotechnological methods to improve the performance characteristics of aquaculture organisms are only used to a limited extent.

The catch of fish in lakes and rivers was estimated at around 21,500 tonnes in 2014. By far the biggest share of this can be attributed to recreational fishing. Commercial fisheries landed roughly 3,100 tonnes and thereby significantly less than recreational fishing.

According to Article 43 of the basic regulation establishing the Common Fisheries Policy, the EU member states are obliged to draw up a multi-year national strategy plan for the development of aquaculture. This plan was completed for Germany in June 2014 and sent to Brussels. The following essential strategic goals were laid down in it:

• Conservation, stabilisation and expansion of existing aquaculture production capacities
• Increase in the production of fish and other aquaculture products in a sustainable manner ("growth")
• Maintenance of pond landscapes and recommissioning of disused ponds as a special form of aquaculture with its typically extensive economy and twin function for the fishing industry and common good (nature conservation, visual landscape, hydrological balance).

In this regard, the Federal Republic of Germany is seeking strong growth in the production of freshwater as well as marine aquaculture.

Inland fishing and aquaculture are governed on regional, national and/or EU level by provisions from the areas of water resources, animal welfare, veterinary matters, nature conservation and the protection of endangered species. The protection of endangered species and nature conservation are included in the fishing laws of the Laender under the specific purposes of fishing.

Hardly any risks for biodiversity, water pollution and fish stocks emanate from commercial inland fishing. It has not contributed to the extinction of fish species or the depletion of stocks, nor has it had other negative effects on biodiversity, but it did make a decisive contribution towards ensuring through stocking activities, for example, that species such as eel are still to be found at all in many inland waters in Germany.

The environmentally damaging effects of aquaculture, which is practiced mainly extensively in Germany, are relatively low. Due to their degradation potential, carp ponds in particular often act as nutrient traps and contribute towards improved water quality. They usually provide valuable living space for various animal and plant species. The run-off water from trout ponds is subject to official restrictions within the scope of approval procedures covered by water law. The quantity of water permitted to be drawn off for the purpose of breeding fish is restricted under water law.

With regard to the chemical quality of natural surface water, there have been some decisive improvements since the 1970s. The decline in the input of pollutants went hand in hand with a decrease in the contamination of fish and other aquatic organisms. For this reason, most of the fish in many inland waters only contain the examined pollutants in quantities below the guidance or limit values stipulated in the regulations on maximum pollutant and residue levels, if available, or they lie below the detection limit. Increased contamination with nutrients often causes considerable problems for bodies of water, however.

In particular migratory obstacles, structural changes to the waters and nutrient contamination impair the biodiversity of the fish fauna. Above all migratory fish species and fish species which are adapted to the specific conditions of riparian zones are among the most endangered freshwater fish species today. The negative development of stocks of European eel, for which various causes are presumed, is a particular problem.

In recent years, efforts to resettle threatened or extinct fish species have been intensified. The most prominent example of this is the "Lachs 2000" salmon project.

The in situ conservation and resettlement of wild fish populations has also depended for a long time on the reproduction of broodstock caught in the wild (and/or direct descendants from a water catchment area) and the rearing of stocking fish in hatcheries.

There are virtually no publicly owned gene banks for AqGR in Germany. Breeding stocks of aquaculture species are maintained almost exclusively by private farming businesses.

The negative effects of non-indigenous fish species have been kept within strict limits up to now. It has also been seen that although many fish species find suitable living conditions in Germany, they can only reproduce to a limited extent, if at all.

The release of non-indigenous species is prohibited by the laws of the Laender. Where stocking measures are concerned, it is sometimes explicitly prescribed that the fish must originate from regional waters.
On the basis of various research projects on Germany's AqGR, the genetic diversity of the most important wild and breeding fish is being recorded and an answer is being sought to the question of whether and where genetically distinguishable populations and/or breeding stocks exist and how they can best be preserved.
In Germany, there is no legislation which restricts access to genetic resources in accordance with Article 15 of the Convention on Biological Diversity (CBD) or the Nagoya Protocol. The Nagoya Protocol and its national implementation will, however, make access to AqGR from other countries more difficult as users in the EU/Germany have had due diligence and reporting obligations imposed on them which involve a lot of bureaucracy and which will lead to sanctions in the event of non-compliance.

Capacities to increase the performance of food fish by means of modern genetic methods and make them useable in everyday practice hardly exist in German aquaculture. There is a certain amount of international scientific cooperation in this area, but it would have to be intensified significantly overall to close the big gap that exist in German aquaculture in this regard.

II. INTRODUCTION

The main objective of the Introduction is to present an overview that will allow a person who is unfamiliar with the country to appreciate the context for the Country Report. The Introduction should present a broad overview and present background information from your country on farmed aquatic species, their wild relatives and culture based fisheries. Detailed information should be provided in the main body of the Country Report. Countries may wish to consider developing their Introductions after completing the main body of their Country Reports.

Please write the overview here

Aquatic genetic resources (AqGR) comprise all genetic resources that live in water and are of current or potential value for productivity and sustainability in commercial and recreational fishing and aquaculture. This can in principle include bony and cartilaginous fish, crustaceans, molluscs and other invertebrates, aquatic microorganisms (algae), aquatic plants, amphibians, reptiles and marine mammals.
The thematic focus of this report is placed on the AqGR which are produced in German aquaculture and their original species which live in the wild. The AqGR farmed in German aquaculture are to be listed along with the availability and utilisation of genetic data and the production trends and breeding status for these species. The availability and utilisation of genetic data are also to be outlined for the so-called "wild relatives" of the listed species along with the ecosystems in which the species are to be found. In addition to this, trends in fishing yields and possible changes in the habitat of the species are to be marked out for commercially caught wild species.
The FAO defines "aquaculture" (FAO 2008) as the rearing of aquatic organisms in inland and coastal regions with at least one stage of development under conditions controlled by the breeder. Aquaculture implies intervention into the development or rearing process of cultivated organisms, such as selective breeding, regulated stocking, feeding, protection from predators etc. These measures serve above all else to increase production. Another feature of aquaculture as opposed to fishing is that the organisms produced in the former are the property of the companies, whereas this only applies to organisms that end up on board a fishing vessel. The cultivated aquatic organisms originate from various taxonomic groups and comprise above all fish, crustaceans, molluscs and plants (macro and micro algae as well as higher plants).
It has to be pointed out in this regard that aquaculture in Germany is often seen as a part of inland fishing. The mussel farming industry in the North Sea, which by definition has to be allocated to aquaculture too, is often regarded as an area of coastal fishing, on the other hand. The reasons for this vague terminology are to be found among other things in the responsibility of the Laender for the field of aquaculture. Accordingly, the term "aquaculture" is hardly ever used explicitly in any of the fishery laws of the Laender.

State structure, responsibilities
The Federal Republic of Germany is made up of 16 federal states. Part of the remit of the national government is to distribute tasks to the various state levels (local government, Laender, national government). The distribution of tasks and legislative competences are anchored in the constitution. According to the division of powers prescribed by constitutional law, fundamental responsibility for the fulfilment of governmental duties lies with the Laender unless the constitution stipulates or permits otherwise (Art. 30 GG – Basic Law). This applies to legislative as well as administrative powers, where financing responsibility fundamentally follows the performance of tasks (Art. 104a GG). The Laender fulfil and finance their tasks at their own responsibility.
Where there is concurrent legislation, the federal government has legislative power over deep-sea and coastal fishing (see Article 74 Para.1 No.17 of the Basic Law); these powers are integrated into EU Common Fisheries Policy. Fishery supervision in the Exclusive Economic Zone (EEZ) outside the 12-mile limit and on the high seas is practiced by the federal government. The Federal Ministry of Food and Agriculture (BMEL) is responsible for fishing policy in the marine area.
In matters of water management as well as environmental and nature conservation, responsibility lies with the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB). These include among other things the Federal Water Resources Act and Federal Nature Conservation Act, which also include the implementation of international and EU obligations, such as the EU Water Framework Directive, EU Protection of Species Regulation and the

FFH and Bird Protection Directive.
The Laender have sole legislative responsibility for inland fishing and aquaculture and they also implement the regulations on coastal and inland fishing. Within the 12-mile limit, the authorities responsible in line with the law of each of the Laender supervise fishing in the course of the implementation of common fishing law. Aquaculture, and thereby the maintenance and utilisation of the AqGR relevant to aquaculture too, belongs fundamentally to the tasks of the Laender. The national government only has limited responsibility here. It supports the Laender essentially by structuring the outline legal conditions and where necessary by performing coordination functions, and it represents Germany internationally. On top of this, it promotes research by funding individual measures through specific promotion programmes. The feasibility of the measures outlined in this report depends on each respective budget situation as well as parliamentary approval (budgetary powers of parliament).
The maintenance and sustainable utilisation of aquatic genetic resources is therefore not an independent field of politics and law, it depends to a great extent on the regulations contained in fishing, environmental and nature conservation and consumer protection policy (BMELV 2010).

Landscape and climate
The Federal Republic of Germany (hereinafter referred to as "Germany") is situated in Central Europe and takes up an area of 357,114 km^2. Nine countries border on Germany, which also has natural borders with the North Sea and Baltic Sea to the north and the Alps to the south. It lies in the temperate climate zone. Germany is split up geographically into seven main regions. The North German Plain extends from the islands and marshes of the North Sea over the Young Drift and Old Drift areas to the lowland basins. It comprises glacially formed flat landscapes laced with rivers and covered with moraines, lakes and moors. It is bordered on its southern edge by the loess hills, much of whose geological substrate is covered with fertile loess soils. This is followed to the south by the western and eastern Central Upland Range which is formed by Tertiary, Cretaceous and Jurassic sediments. The Mesozoic cuesta was formed from the 5 km deep rift valley of the upper Rhine river, where the crystalline underground was lifted up and from where the sediment-covered surface falls away to the south-east. The Alpine foothills lie to the south of the river Danube and consist of powerful sediment from the Tertiary and Mesozoic periods. A narrow portion of the Northern Limestone Alps (German Alps) forms Germany's southern border. Altitude increases from the north-west to the south-east. The north-west German lowland lies only a few metres above sea level and some of the areas which lie below this level have to be protected by dykes. The central uplands reach heights of 600 to just under 1,500 metres and the German Alps rise up to almost 3,000 metres; this is also where Germany's highest mountain, the Zugspitze (2,962 metres above sea level) is to be found. The country's longest rivers are the Rhine (865 km), Weser (744 km), Elbe (727 km) and Danube (647 km in Germany). Lakes, rivers, canals and close coastal waters make up approx. 2.4% (8,576 km^2) of the surface of Germany. Of this area, roughly 5,200 km^2 are used for commercial inland and recreational fishing and aquaculture.

Germany's geographic location in the temperate zone has a decisive influence on its climate, which is marked by frequent weather changes and precipitation in all seasons. In most regions, half to two-thirds of annual precipitation falls between the months of May and September. Starting from the north-west and moving towards the east and south-east, a gradual transition from an oceanic to a more continental climate can be noticed. Daily fluctuations as well as seasonal temperature differences are not subject to extremes (with the exception of high mountain areas). The average annual temperature lies at around + 7 to + 9°C and annual precipitation amounts to an average of 600 - 800 l/m^2 in the west, 500 - 600 l/m^2 in the east and well below 450 l/m^2 in some areas. In areas of the northern Alps and higher central uplands where weather fronts tend to get trapped, precipitation can increase and average temperatures can decrease significantly. Snow can often fall and lie over longer periods in the higher central uplands and Alps.

Population
Germany currently has a population of roughly 82.5 million, around 20.6 million of whom live in rural districts. With 232 inhabitants per km2, Germany lies in sixth place in the population density statistics among the 30 OECD member states (OECD 2007). The population density of the 439 administrative districts and independent municipalities ranges from 40 to 4,000 inhabitants per km2, a difference of 1 to 100. The population in general is relatively evenly spread over the entire area. Germany is one of the countries with the lowest values in the index of regional population concentrations, lying in fifth place among 29 OECD countries. This means, for example, that no city accounts for more than 5% of the total population (BBR, 2001b). 82% of the population lives in urban communities. Over 60% of the area is taken up by rural communities, but only 18% of the population lives there (BBSR 2010).

Structure of aquaculture in Germany
All aquaculture businesses in Germany are SMEs (small and medium enterprises). They are often run by families who work in all production stages of the value-added chain, from breeding to marketing. The maintenance of aquaculture stocks in Germany is therefore primarily in the hands of small aquaculture businesses. The breeding of stocking fish to support and replenish wild stocks is also carried to a great extent by businesses of this kind.
The farming systems used in German inland aquaculture can be divided up into four main types: warm water ponds, cold and warm water systems and netcages. Warm water ponds are understood to be shallow ponds which are usually between 0.7 and 1.5 metres deep, have no continuous flow of water and warm up quickly during the vegetation period. Ponds of this kind are artificially built standing waters designed especially for the farming of thermophilic carp. In addition to carp, the main fish species, various secondary species such as tench, pike and pike-perch are also produced in warm water ponds. Carp farming constitutes the second most important production form in German freshwater aquaculture. For many years now, the production of salmonids in cold water systems has been the decisive growth factor in German aquaculture (Brämick et al. 2013). Cold water systems are production waters with a permanently regulated flow of oxygen-rich,

uncontaminated water which remains cold in summer. The farming equipment can be laid out in several ways and can include earth or concrete ponds, runnels or flow channels. In addition to warm water ponds, several thermo-philic fish species are also reared in so-called recirculation systems (RAS) with heated water. The distinguishing feature of most of these technical systems is the almost complete recirculation and multiple usage of the production water, which is enabled by mechanical and biological water treatment equipment. In addition to eel, mainly African sharptooth catfish (Clarias gariepinus), wels catfish (Silurus glanis), common carp (Cyprinus carpio) and sturgeon (Acipenser spec.) were reared in warm water systems in 2013 according to Brämick et. al 2014. Net pens constitute another production system. According to the Federal Statistical Office (2015), a total of 103 tonnes of fish were produced in 18 netcage systems in Germany in 2014. The reported systems are used above all for the rearing of food trout. Fifteen of these systems are located on inland waters and three in the marine area.

As can be seen in Tab. 1, most warm water ponds and/or ponds for rearing carp are located in the states of Bavaria, Saxony and Brandenburg. The federal states with the highest trout production are Bavaria, Baden-Württemberg, North Rhine-Westphalia and Lower Saxony. Recirculation technology is particularly widespread in Lower Saxony and Mecklenburg-Western Pomerania.

The mussel farming industry is centred in the North Sea in the Wadden Sea national parks of Schleswig-Holstein and Lower Saxony. Commercial blue mussel farming follows exclusively the on-bottom culture principle. Mussel stocks originate either from the fishing of natural locations or they are acquired with the help of artificial substrates in mussel spat production plants.

According to the Federal Statistical Office (2015), a total of 26,294 tonnes of aquatic organisms were produced for the food sector in 5,977 aquaculture businesses in Germany in 2014. With regard to the production scope, fish made up approx. 80% of total production and molluscs 20 %. Other organism groups such as crabs, macro and micro-algae account for only a negligible proportion of total production. For example 2 t Algae have been produced from two companies in 2014. According BMEL (2014) in Germany mainly brown algae (Saccharina latissima), green algae (Enteromorpha / Ulva) and red algae (Delesseria sanguinea) were cultivated. In the field of microalgae a food approval for the unicellular green alga Chlorella sp. and for the cyanobacterium Spirulina spec. exists.

Of the total of 16 aquaculture species listed in Tab. 1.1, most are freshwater fish species produced mainly in warm water ponds and cold water systems, and to a lesser extent in closed warm water recirculation systems and netcages. Purely saltwater fish species are currently only being produced on a trial basis in German aquaculture (almost exclusively in RAS) and are not included in Table 1.1. for this reason.

The sturgeon and Atlantic salmon included in the list are anadromous migratory fish species which are cultivated almost exclusively in freshwater in Germany. The European eel is a catadromous migratory fish species reared in warm water systems on the basis of catches of glass eels in the wild which are either used as food fish or released at the size required for stocking rivers and lakes.

The species and/or species groups listed in Tab. 1.1 serve mainly food fish production. Species that are only produced marginally and the production of which is currently still at the trial stage are not listed. The exception here is the Atlantic salmon (Salmo salar) which is farmed and reared in aquaculture above all for stocking and reintroduction. There are also a large number of other species which are reproduced aquaculturally for the stocking of recreational fishing waters or for the ornamental fish market. This report focuses essentially on aquaculture species cultivated directly for food production. For this reason, the data listed below also relate only to food fish production.

The species and/or products produced in German aquaculture in 2014 according to the Federal Statistical Office (2015) are shown in Fig. 1. Measured by the production volume, with a share of 61%, salmonids took first place among the fish species produced in German aquaculture in 2014. Fish production was recorded at 20,936 tonnes for 2014. Salmonid production was dominated to approx. 78% by the rainbow trout (Oncorhynchus mykiss). Char, mainly brook trout (Salvelinus fontinalis) and Arctic char (Salvelinus alpinus), have a share of 18% of salmonid production and the brown trout (Salmo trutta) 5%. Carp production made up 25% of the total aquacultural production of fish in 2014. Just short of 75% of all carp are produced in the two federal states of Bavaria and Saxony. With 0.7%, the production share of other cyprinid species such as the tench (Tinca tinca) is small. Eel (Anguilla anguilla) had a 4.4% share of total German aquacultural fish production according to the Federal Statistical Office (2015), African sharptooth catfish 4.2 %, Siberian sturgeon (Acipenser baerii) 1.2 %, wels catfish 0.8% and pike-perch (Sander lucioperca) 0.4%. Other fish species account for a production share of 2.5%. In terms of quantity, German fish production in aquaculture has been strongly dominated for decades by the species rainbow trout and carp.

The blue mussel (Mytilus edulis) and Pacific cupped oyster (Crassostrea gigas) are the only two mollusc species and also the only two purely marine species currently produced in any significant quantities in German aquaculture. Although blue mussel production is subject to strong annual fluctuations in natural occurrence of wild seed, it still exceeds Pacific oyster production many times over. Accordingly, 4,900 tonnes of blue mussels were produced in 2010, for example, as opposed to a mere 80 tonnes of Pacific oysters (FAO 2014). According to the Federal Statistical Office (2015), 5,280 tonnes of mussels were produced in German aquaculture in 2014. This equates to a share of 20% in total German aquacultural production for the year in question. Measured by the production volume, the mussel culture industry, and therefore marine aquaculture as a whole, makes a significant contribution towards German aquacultural production.

Production trends

According to the National Strategy Plan for Aquaculture (BMEL 2014), but for a few exceptions, German aquaculture has been marked by a longer period of stagnation. A variety of impediments – some of which are interlinked in a complex manner – are responsible for this, the most important of which have turned out to be the difficult outline legal conditions and approval practice, deficits in the training and research field, damage by predators and protected species in commercial ponds, difficulties in accessing the globally dominated fish market and general image problems of aquaculture in Germany. Although the development of German aquaculture production (FAO 2014) for fish and mussels in the years 2003-2012 illustrated in Fig. 2 points initially to a significant decline in production over this 10-year period, the apparently severe slump

in fish production in the years 2011 and 2012 is attributable to a fundamentally altered statistical recording method which indicates no real production trend. A survey of production in aquaculture businesses was conducted for the first time in 2011 in line with the provisions of the European aquaculture statistics regulation (EC 762/2008) and the amended agricultural statistics law of the regional statistical authorities and Federal Statistical Office. In line with the new recording method, the quantity of fish (including stocking fish) produced in one year is not longer recorded, as was previously customary, but only the quantity of food fish sold. Differences arise here in particular because the production of stocking fish is no longer adequately recorded by the new aquaculture statistics. Furthermore, the recording basis valid from 2011 is based on direct inquiries in companies entered in the registers of each federal state in line with the fish disease regulation, As the fish disease registers are still being compiled in several federal states, however, it was not possible to record all businesses within the scope of the official statistical survey (Brämick et al. 2013). As a consequence of the new recording method, for example, the fish quantity recorded for Germany in the FAO aquaculture statistics sank from 35,700 tonnes in 2010 to 18,200 tonnes in 2011. Salmonid production alone decreased in the period in question from 21,000 to 10,000 tonnes according to the statistics, and carp production dropped from 9,600 to 5,000 tonnes. Accordingly, from 2011, the figures for German aquaculture production are no longer comparable with those of previous years.

Irrespective of the statistical problems, it can be ascertained that fish production in German aquaculture has stagnated in the last 10 years. While there has been a decline in carp production, there have also been slight increases in salmonid production. Although there has been a relatively sharp rise in the production of fish in warm water recirculation systems, this continues to account for only a small percentage of total production.

According to Brämick et al. (2013), the conditions for carp farming have generally deteriorated in Germany in recent years. In addition to the burden that has to be shouldered in connection with losses caused by cormorants and the koi herpes virus, the increasingly poor demand for carp as a food fish is also having a negative effect. The first company closures were registered over the last few years due to the increasingly difficult outline economic conditions in the carp farming industry. This development not only has an economic and socio-cultural component but also an ecological one, because once they have been decommissioned, pond areas also lose their function as a habitat for an outstanding biodiversity of flora and fauna.

In salmonid production, there have been constant technical and technological improvements in the installations and equipment in recent years, according to Brämick et al. (2013). This development has also been supported by the financial promotion of investments enabled by promotion programmes such as the European Fisheries Fund (EFF) by means of which businesses were modernised with a constant increase in the level of automation, at least among larger producers.

Over the last few years, Brämick et al. (2013) also recorded an increase in the production of fish in warm water recirculation systems. The quantity of fish produced in systems of this kind was just short of 2,000 tonnes in 2012 or roughly 6% of total production in German aquaculture. The increase in interest in the production of fish in warm water systems is also reflected in the number of warm water systems in operation in Germany, which has been growing continuously for several years. The main motivation for many plant operators is the increase in the feed-in tariff for electricity from biogas plants enabled by the German Renewable Energy Act (EEG) which comes into effect if the heat generated during electricity production is used for the production of fish, for example. There was also a bonus if a farm used its own liquid manure in the biogas plant, thus providing a source of income which to a great extent did not depend on the success of the fish farm, but this bonus no longer exists. The main fish species produced in warm water systems include sturgeon, pike-perch, African sharp-tooth and wels catfish, seabass (Dicentrarchus labrax), tilapia, whiteleg shrimp (Litopenaeus vannamei), yellowtail kingfish (Seriola spp.), gilt-head bream (Sparus auratus) and other marine species.

The conspicuously severe fluctuations in mussel production are caused above all by natural fluctuations in the occurrence of blue mussel wild seed. Under the assumption of average growth and development conditions and an optimum supply of mussel spat, a theoretical yield potential of up to 40,000 tonnes a year of blue mussels can be estimated for the current German farming areas (BMEL 2014).

It is very difficult to identify future production trends for German aquaculture, which has been marked by stagnation for quite some time, even though production trends are given in Table 1.1 for several relevant food fish species. It can be said in synopsis that production in the next ten years is estimated to tend in general towards stagnation or decline, above all where the cyprinid species produced in carp farms, such as carp and tench, are concerned. The slight upward trend seen in salmonid production in recent years could possibly continue in the coming years. If there is a further increase in the number of warm water recirculation plants that go into operation in the next few years, it can be presumed that there will also be an increase in the quantities of the main fish species produced in technical plants of this kind, such as sturgeon, tilapia, pike-perch, African sharptooth and wels catfish. Moreover, there could be further diversification of the range of species produced in Germany in connection with the expansion of warm water recirculation technology.

A new development which could under certain circumstances bring a bit of dynamic back to the German aquaculture sector is the implementation of Art. 34 of the EU basic fisheries regulation (Reg. (EU) 1380/2013). This new basic regulation on EU Common Fisheries Policy (CFP) includes aquaculture for the first time, thereby giving it a much higher status than it has had up to now. Among other things, the EU requested that the member states develop their own “national strategy plans” for the development of this sector and present them to the EU Commission. The National Strategy Plan for Aquaculture in Germany (BMEL 2014) was prepared by the fisheries representatives of the national and regional governments under the auspices of the state of Schleswig-Holstein and presented to the EU Commission in June 2014. This strategy plan basically pursues three objectives and is structured accordingly:

o The detailed reappraisal and presentation of the current situation of German aquaculture including the specific identification and naming of the essential development obstacles

o The formulation of fundamental, generally applicable long-term strategic objectives and the derivation of specific sectoral medium-term growth targets for German aquaculture (strategic planning section) and

o The formulation of the measures required to achieve the strategic objectives.

Of particular interest for the production trends of the coming years in this regard are the quantitative growth targets to be reached by 2020 for each production segment of aquaculture, which were formulated in the National Strategy Plan for Aquaculture. The growth targets for carp farming shown in Tab. 2 aim at stabilising the current production quantities. Particular emphasis is being placed on the maintenance of the ecosystem services provided to nature conservation by carp farming. The plan involves considerable production increases for the other sectors of aquaculture. The establishment of the targets is based essentially on a growth prognosis by the leading economic operators and the estimation of experts from the fishery administrations of the federal states. It is also pointed out expressly in the plan, however, that these objectives were established on the basis of the level of knowledge available at the beginning of 2014 and that they only form an orientation framework for the period up to 2020 which must be reviewed and corrected if necessary no later than with the presentation of the mid-term review at the end of 2017. The qualitative growth objectives set in Tab. 2, which are to be reached by 2020 for each sector of aquaculture in line with the National Strategy Plan for Aquaculture, are very ambitious and it would be a great success in the view of the German aquaculture sector if they could only be achieved in certain areas.

Breeding status of AqGR in Germany

The potential for increasing the performance of food fish through specific breeding activities has remained largely unused in Germany for decades. In practical aquaculture, breeding activities are restricted to the use of positive mass selection. Selection is made mostly for morphological characteristics and growth performance with usually medium to high intensities. As the breeding work is only documented in rare instances, breeding is usually less systematic and is often limited to the selection of optically appealing individuals for breeding (Müller-Belecke et al.2009).

Breeding programmes suitable for aquaculture with the goal of enhancing the performance of food fish by means of modern genetic methods and making them useful in practical applications are virtually non-existent in Germany. Systematic breeding, however, is an essential basis for the conservation and sustainable utilisation of AqGR. It also constitutes an important basis for an internationally competitive national aquaculture. Systematic breeding work that goes beyond positive mass selection is, however, too elaborate and expensive and therefore not feasible for most small-structured aqaculture businesses in Germany.

Modern biotechnical methods applied in aquaculture all over the world to improve the performance characteristics of AqGR are only used in Germany to a small extent and are essentially limited to the production of interspecific hybrids and the alteration of the number of chromosome sets for the production of sterile fish.

Current status of the in situ conservation of AqGR

In regional German aquaculture, which is structured in small segment, various locally adapted breeding populations which are characteristic of AqGR in Germany arose through traditional breeding work. The danger of a loss of AqGR in aquaculture exists above all through the closure of spawning fish farms or entire businesses. For this reason, the conservation of AqGR in aquaculture is linked to a very special extent with the continuation of traditional breeding establishments.

Where the related wild species are concerned, which occur and are used almost exclusively in inland waters, ecologically effective factors such as migratory obstacles, structural alterations of the waters and contamination with nutrients constitute the most severe influencing variables. Due to changes in and/or degradation of the spawning habitats, the in situ conservation of many wild fish populations in German lakes and flowing waters has also depended for a long time on the reproduction of spawning fish caught in the wild (or their direct descendants from a water catchment area) and the rearing of stocking fish in hatcheries. Over the last few decades, however, considerable efforts have been made to improve the water and structural quality of these bodies of water, with the result that many fish stocks have been secured again by natural means.

Individual populations of grayling (Thymallus thymallus) in particular, but other species too, are endangered locally and regionally through severe predation by fish-eating birds, especially cormorants.

Current status of the ex situ conservation of AqGR

There are no publicly owned gene banks for AqGR in Germany. Breeding strains of aquaculture species are maintained privately on-farm. If the fish breeders in question give up their breeding work and convert to other procurement sources for their stocking fish, these AqGR are usually lost.

There are also several spawning fish farms for wild fish in which AqGR are secured on-farm. Cryo-conserved sperm is also kept in stock for several particularly endangered species, such as the Atlantic sturgeon (Acipenser oxyrinchus) and European sea sturgeon (Acipenser sturio).

Research, education and training in the field of AqGR

According to the German Agricultural Research Alliance (DAFA 2014), there are approx. 30 research institutions in Germany that involve themselves with aquaculture and other topics. The overall research capacities for the field of aquaculture are very low, however. There are hardly any alliances to date between research institutions of this kind. According to DAFA, it is not to be expected that project-specific seed funding of the customary magnitude will help German aquaculture research achieve international competitiveness or bring about any drastic changes.

Academic training in the utilisation of inland waters for fishing is available at several universities in Germany. In addition to specialisation in the field of fisheries biology or aquaculture at various German universities, there is a special course of study in Fisheries Science and Aquaculture at the Life Sciences faculty of the Humboldt University in Berlin in which it is possible to earn a Bachelor or Master of Science degree in line with international standards. Roughly 10 graduates complete this course every year, more than half of whom then find employment outside Germany. A Masters course in Aquaculture has been established at the University of Rostock and a longer term perspective has been added to the chair for Marine Aquaculture at the University of Kiel (Brämick et al. 2013). There are also courses of study at other universities which deal with sub-areas of the conservation and utilisation of AqGR.

Vocational training to become a fishery technician is currently offered at three vocational training schools in Germany and covers the specialised areas of fish farming and breeding, lake and river fishing and offshore and coastal fishing. Student numbers for these qualified professions have been in decline in recent years.
Supraregional training courses and further training measures on various aspects of fishing, as well as the upkeep and utilisation of waters, are essential components of basic and advanced training in fishery. Over 200 events of this kind were registered in the reporting year with a total of almost 10,000 participants from almost all federal states (Brämick et al. 2013).

National AqGR special programme
In the national "Aquatic genetic resources" programme, the Federal Ministry of Food and Agriculture has in place a working programme for the conservation and sustainable use of fish, shellfish and crustaceans in Germany. It is the result of the work of a panel of experts made up of representatives of fisheries administration, research institutions and associations. Under the overarching aspect of sustainability, this special programme serves above all the purpose of ensuring that the diversity of aquatic genetic resources can be maintained and utilised in the long term on the basis of scientific evidence. The programme describes the current situation in the area of coastal fishing and fishing on the high seas as well as the area of freshwater fishing in lakes and rivers, recreational fishery and aquaculture. In addition to the objectives, the legal framework conditions, the current and future measures, and the involved actors are also listed.
With this special programme, the Ministry meets the obligation laid out in the Convention on Biodiversity (CBD) to promote the conservation and sustainable utilisation of agrobiodiversity in Germany. The BMEL tasked the Expert Committee on Aquatic Genetic Resources with the organisation, implementation and continuation of the programme. Sixteen members were appointed to this committee, most of whom had already collaborated in the preparation of the programme as members of the panel of experts. The members competently represent the fields of coastal and deep-sea fishing, lake and river fishing and aquaculture, including the economical, cultural and ecological aspects, while also representing the responsible or affected national and regional authorities, specialised associations and organisations, science, trade and industry in organisational matters. The committee is supported by a secretariat located at the Information and Coordination Centre for Biodiversity (IBV) at the Federal Office for Agriculture and Food (BLE).

Synopsis
According to WEDEKIND 2014, it can be established in synopsis that aquaculture in Germany is a traditional area of agriculture. Thanks to decades of development, there is a high level of training and knowledge. Observing high environmental standards, aquaculture provides safe and high-quality products produced at a high technological level. Marketing is structured mainly on a regional basis as this produces far more value added than selling to the wholesale market. German aquaculture is innovative in many areas, with many of these innovations coming from the industry itself as well as application-orientated research.
There are fundamentally good prerequisites for an increase in aquacultural production in Germany. The fact that no expansion is currently taking place is explained by restrictions brought about by numerous outline legal conditions on the one hand and economic reasons with a high level of competitive pressure through imported aquacultural products on the other.

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III. MAIN BODY OF THE COUNTRY REPORT

Aquaculture, culture-based fisheries and capture fisheries, have differing importance among countries. The structure of chapters in each Country Report will reflect those differences. Countries which do not have a well-developed aquaculture sector but where wild relatives of farmed aquatic species are located, should report on these resources. Countries should decide how to prioritize the coverage of their Country Reports depending on their aquatic genetic resources.

Chapter 1: The Use and Exchange of Aquatic Genetic Resources of Farmed Aquatic Species and their Wild Relatives within National Jurisdiction

The main objective of Chapter 1 is to provide annotated inventories of aquatic genetic resources (AqGR) of farmed aquatic species and their wild relatives.

Farmed aquatic species

1. Over the last 10 years, has production been: ***Please mark appropriate box.***

- ○ Increasing
- ◉ Stable
- ○ Decreasing
- ○ Stopped
- ○ Still in Research and Development
- ○ Fluctuating
- ○ Not known

2. What is the expected trend over the next 10 years? ***Please mark appropriate box.***

- (●) Increasing
- ( ) Stable
- ( ) Decreasing
- ( ) Stopped
- ( ) Still in Research and Development
- ( ) Fluctuating
- ( ) Not known

3. Is the identification and naming of farmed species, subspecies, hybrids, crossbreeds, strains, triploids, other distinct types accurate and up- to-date? ***Please mark appropriate box.***

- ( ) Yes
- ( ) No
- (●) Mostly Yes
- ( ) Mostly No

Please include any explanation or additional information here.

Char, sturgeon and coregonids are usually pooled together in the report as Salvelinus spec., Acipenser spec. and Coregonus spec.

4. To what extent are genetic data for farmed aquatic organisms

a) Available? ***Please mark appropriate box.***

- ( ) Not at all
- ( ) To a minor extent
- (●) To some extent
- ( ) To a great extent

b) Used in management? ***Please mark appropriate box.***

- ( ) Not at all
- (●) To a minor extent
- ( ) To some extent
- ( ) To a great extent

Please add any explanation here.

The known data sources on the genetics of German breeding fish populations, which were compiled in conjunction with breeding issues, were listed in Tab. 1.1 with details of the source. This list cannot claim to be complete as there are presumably many other different data sources which were published in the "grey literature", for example, or whose origins are even older. Overall, though, it can be assumed that the data situation connected with genetic examinations in the field of aquaculture breeding research in Germany is relatively sparse. In contrast to this, there is more genetic data material on wild populations of species farmed in German aquaculture (see Tab. 1.2) which was collected in connection with ecological issues among other things.
Of the 16 species and species groups listed in Tab. 1.1., genetic data for 10 species were taken from aquaculture stocks or their literature sources. An outstanding literature source in this regard is the work of MÜLLER-BELECKE ET AL. (2009) which for the first time provides an overview of the variety of spawning fish stocks in German aquaculture. In addition to data on the farming environment and breeding activities, a number of morphometric and genetic parameters were determined on the basis of individual fish from selected stocks. Genetic marker studies were conducted on the basis of microsatellite markers on a total of 143 sampled spawning fish stocks of carp, tench, pike-perch, grayling, brown trout, brook trout, rainbow trout and Arctic char. Information on all 484 spawning fish stocks of 35 species collected within the scope of this study can also be accessed via the AGRDEU database at the Federal Office for Agriculture. Users of this database get a good overview of the variety of food fish farmed in Germany. Farming-specific criteria, such as the age of the stock, type of stock management, effective population

size, selection intensity and duration of use can be looked up for every strain. Data on the phenotypical and genetic properties of 163 spawning fish stocks is also available.
In addition to the study by MÜLLER-BELECKE ET AL. (2009), other genetic data on German aquaculture stocks of fish species such as carp were generated by KOHLMANN ET AL. (2003) and KOHLMANN (2005) and on tench by (KOHLMANN ET AL. 2010). The research studies on Bavarian char stocks with which molecular-genetic analysis was used (GROSS ET AL. 2004, REITER R. 2006, WEDEKIND, H. ET AL. 2010) are also worthy of particular mention in this regard. A comprehensive study on rainbow trout genetics in which various German rainbow trout breeding stocks were examined was written by TRAUTNER (2000), and JENNECKENS ET AL. (1999) also dealt with the genetics of tilapia breeding lines.
The AGRDEU database is currently under review. It is to be used in future as a reference database which shows a summary of the level of recording of aquatic genetic resources in Germany. The database is to be restructured in such a way that it can provide information on the breeding fish lines and wild populations of AqGR in Germany for which genetic data are available. The examined stocks are to be entered into the database from the most important genetic studies on AqGR in Germany along with information on the genetic analysis methods used. Once this database has been set up, it will provide a systematic overview of the availability of the genetic data of aquatic genetic resources produced in aquaculture and living in the wild in Germany.

5. To what extent are the aquatic organisms farmed in your country sourced as wild seed or from wild brood stock*?*

Please mark appropriate box.

- ○ Not at all
- ○ To a minor extent
- ◉ To some extent
- ○ To a great extent

Please add any explanation here.

According to the Federal Statistical Office (Schiela, personal statement, 04.07.2014) a total of 16 species of AqGR were introduced to German aquaculture in 2013 through catches in the wild.

For reasons of data protection, the Federal Statistical Office was unable to supply any quantitative data for most of the wild-caught species which were introduced to German aquaculture because many of these species were only reported by 1 or 2 businesses and could therefore be retraced to the production data of the businesses in question. Only the quantities for the European eel and blue mussels could be published.
Broodstock is only obtained from wild populations to any great extent for the European eel and blue mussels. The procurement of broodstock from wild populations is of marginal significance for all other species.
A total of 5,574 kg of wild-caught European glass eels were introduced to German aquaculture in 2013 (Federal Statistical Office 2014). The glass eels are reared in warm water systems for use either as food fish or they are released into rivers and lakes once they have reached stocking size. A total of 4,484 tonnes of blue mussel spat was acquired for the mussel farming industry in 2013. The mussel spat is acquired by placing artificial hard substrates in their natural habitat where the young blue mussels accumulate before being skimmed off onto on-bottom culture areas where they then grow to food mussel size. A total of 6,361 kg of the remaining 14 species were taken from the wild for further breeding in aquaculture.

6. What proportions (%) of breeding programmes and efforts for the genetic improvement of farmed aquatic species in your country are being managed by the public sector (government research, universities etc.), the private sector, and public-private partnerships?

- Percent managed by public sector. **Please Enter Percentage Here** 5
- Percent managed by private sector. **Please Enter Percentage Here** 95
- Percent managed by private /public partnership. **Please Enter Percentage Here** 0

Total 100

Please add any explanation here.

Breeding work in German aquaculture is undertaken almost exclusively by private breeders. Only to a very small extent is breeding work done in public facilities. Public breeding programmes or public-private partnerships which implement breeding programmes and supply producers with broodstock on a large scale do not exist in Germany.

7. To what extent do genetically improved aquatic organisms, including hybrids, crossbreeds, strains, triploids and other distinct types contribute to national aquaculture production in terms of volume ?

Please mark appropriate box.

- ○ Not at all
- ◉ To a minor extent
- ○ To some extent
- ○ To a great extent

8. Please list most significant examples where genetic improvement contributed to increased production and indicate whether they were developed by public, private or public/private partnerships.

Add Row

Species	Type of genetic improvement *mark all that apply*	Developed By *mark all that apply*	
	☒ Traditional selective breeding	☒ Private Sector ☒ Public Sector ☐ Private/Public partnership	
	☐ Hybrids	☐ Private Sector ☐ Public Sector ☐ Private/Public partnership	
Oncorhynchus mykiss	☒ Triploids and other polyploids	☒ Private Sector ☐ Public Sector ☐ Private/Public partnership	X
	☒ Mono-sex production	☒ Private Sector ☐ Public Sector ☐ Private/Public partnership	
	☐ Other	☐ Private Sector ☐ Public Sector ☐ Private/Public partnership	
	☒ Traditional selective breeding	☒ Private Sector ☒ Public Sector ☐ Private/Public partnership	
	☒ Hybrids — Specify parental species in the box below: Salvelinus alpinus x Salvelinus fontinalis	☒ Private Sector ☒ Public Sector ☐ Private/Public partnership	
Salvelinus spp	☐ Triploids and other polyploids	☐ Private Sector ☐ Public Sector ☐ Private/Public partnership	X
	☐ Mono-sex production	☐ Private Sector ☐ Public Sector ☐ Private/Public partnership	
	☐ Other	☐ Private Sector ☐ Public Sector ☐ Private/Public partnership	

	☒ Traditional selective breeding	☒ Private Sector ☒ Public Sector ☐ Private/Public partnership	
	☐ Hybrids	☐ Private Sector ☐ Public Sector ☐ Private/Public partnership	
Coregonus spp	☐ Triploids and other polyploids	☐ Private Sector ☐ Public Sector ☐ Private/Public partnership	X
	☐ Mono-sex production	☐ Private Sector ☐ Public Sector ☐ Private/Public partnership	
	☐ Other	☐ Private Sector ☐ Public Sector ☐ Private/Public partnership	

9. Please fill in table 1.1

Table 1.1 Aquatic genetic resources (AqGR) of farmed aquatic species in your country

Add Row

Farmed species	Genetic type	Availability of genetic data	Trends in production	Future trends in production	Genetic improvement	Future genetic improvement	Comments	
List species (scientific names), strains and varieties as scientific names (put in brackets the most widely used national common name or names) and indicate whether native or introduced	*Indicate all genetic types that apply to the species*	Are genetic data available for farmed populations? If yes, give summary details in comments	Over the last 10 years, production has been ***(mark one)***	Expected trend over the next 10 years is that production will ***(mark one)***	Which genetic technologies are currently being used on the species ***(mark all that apply)***	***mark all that apply***	For example important traits improved, how data are used in management or name of breed, source of information, etc.	
○ Native ● Introduced Crassostrea gigas	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	○ Yes ● No ○ Not Known	○ Increasing ● Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ● Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☒ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☒ Other (specify in comment)	The species is only produced by one business which has relied on the purchase of British and Irish stocking oysters up to now. Due to legal concerns, the continuation of these imports and the future of oyster production in Germany are unclear. Currently their is littlle production on wild seed base, therefore no genetic improvement on this species.	X

◉ Native ○ Introduced Mytilus edulis	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	○ Yes ◉ No ○ Not Known	○ Increasing ○ Stable ◉ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ○ Stable ◉ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	Blue mussel production in German coastal waters depends very much on the occurrence of natural mussel seed as the purchase of wild seed from other marine regions has been prohibited in the meantime. Genetic data are only avaible for wild populations in connection with ecological issues. No breeding and genetic improvement regarding this species.	X
○ Native ◉ Introduced Acipenseridae	☒ Wild Type ☒ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☒ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☒ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	The production of sturgeon for caviar production in particular has increased continuously over the last decade. Barcoding data (A. baerii, A. güldenstaedtii, A. ruthenus, A. stellatus, A. oxyrynchus) originating from aquaculture were recorded by KNEBELSBERGER ET AL. (2014) within the scope of the GBOL Barcoding project (http: dx.doi.org/10.1111/1755-0998.12322).	X

◉ Native ○ Introduced Anguilla anguilla	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ◉ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	On the basis of glass eel catches in the wild, eel is reared in warm water systems either as a food fish or for the stocking of natural waters. With 706 tonnes, eel production in 2013reached the highest level ever statistically recorded for Germany. A genuine trend cannot be derived from this, however, as production depends on the availability of catches of glass eel in the wild. Artifical reproduction hardly possible therefore no breeding or genetic improvement Genetic data: TRAUTNER J. (2006), DOI: 10.3220/Infn53_49-51_2006	X
○ Native ◉ Introduced Clarias gariepinus	☐ Wild Type ☒ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ◉ Not known	☒ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☒ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	The production in recirculating aquaculture systems of African sharp-tooth catfish has risen continuously in recent years. It cannot currently be estimated whether this trend will continue or whether production may even collapse again altogether. Moleculargenetic data are not available but some mor-phometric data. This species does not occur in the wild (only in RAS).	X

◉ Native ○ Introduced Coregonus spp	☒ Wild Type ☒ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ◉ Not known	☒ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☒ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	Wild-caught whitefish are bred in aquaculture for stocking purposes. Intensive aquaculture for food fish production is currently at the trial stage. In connection with the domestication of the maraena whitefish for aquaculture purposes, work is currently being done at the Leibnitz Institute for Livestock Biology in Dummerstorf, Faculty of Fish Genetics to decipher the genome of the maraena whitefish and characterise biomarker genes.	X
◉ Native ○ Introduced Cyprinus carpio	☒ Wild Type ☒ Selective bred type ☐ Hybrids ☐ Cross breeds ☒ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	○ Increasing ○ Stable ○ Fluctuating ◉ Decreasing ○ Stopped ○ Not known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☒ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☒ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	Breeding activities are based primarily on positive mass selection. Selection is usually made for morphological characteristics and growth performance with moderate to high intensities. There is likely to have been a slight decline in the production trend for carp in the last 10 years. It is to be feared that this trend will continue if no countermea-sures are taken. Genetic data on carp in Germany are mainly available from KOHLMANN ET AL. (2003) and KOHLMANN ET AL. (2005), as well as MÜLLER-BELECKE ET AL. (2009). Within the scope of a survey of brood stock (MÜLLER-BELECKE ET AL. 2009) 35 brood stock of carp from fish farms all over Germany were genetically characterised. Several farmed individuals of this species were recorded	X

							by KNEBELSBERGER ET AL. (2014) within the scope of the GBOL barcoding project.	
◉ Native ○ Introduced Esox lucius	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	○ Yes ◉ No ○ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	Pike are produced mainly as accompanying fish in carp farming and bred for the stocking of natural waters. There are not usually any targeted breeding activities. Genetic data are only available for wild populations.	X
○ Native ◉ Introduced Oreochromis (=Tilapia) spp	☐ Wild Type ☒ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☒ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☒ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	-GMT (Genetically Male Tilapia) breeding lines are used for breeding.This species does not occur in the wild (only in RAS). Genetic data were generated by JENNECKENS ET AL. (1999) in connection with the development of homozygotic breeding lines of Nile tilapia (DOI: 10.1016/S0044-8486(98)00462-1)	X

◉ Native ○ Introduced Salmo salar	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ◉ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	Salmon is reproduced artificially almost exclusively for stocking purposes in connection with re-settlement measures for this species, therefore their is no targeted breeding to improve performance characteristics. Genetic data exist only to determine genetic diversity for reintroduction purposes.	X
◉ Native ○ Introduced Salmo trutta	☒ Wild Type ☒ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☒ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☒ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	Production of brown trout has increased in recent years and this trend could possibly continue in the coming years. This species plays an essential role, in particu-lar as a stocking fish for natural waters. To a lesser extent, the brown trout is also produced as a food fish. Within the scope of the brood stock survey con-ducted by (MÜLLER-BELECKE ET AL. 2009), 33 breeding stocks of brown trout from fish farms were genetically characterised.	X

◉ Native ○ Introduced Salvelinus spp	☒ Wild Type ☒ Selective bred type ☒ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☒ Selective breeding ☒ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☒ Selective breeding ☒ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	The Arctic char is bred in aquaculture as a stocking fish for natural waters and to a lesser extent as a food fish. Production of the "Elsässer Saibling", a cross between the Arctic char and brook trout (Salvelinus alpinus x Salvelinus fontinalis) has shown a considerable upward trend in recent years. Genetic data: GROSS ET AL. (2004) examined different brood stocks of arctic char and brook trout and their hybrid (Elsässer Saibling).REITER R.H. (2006) examined the performance and quality characteristics of brook trout and arctic char on the basis of genetic markers. Wedekind et al. (2010) genetically characterised wild populations of Arctic char and examined them for their suitability in aquaculture. Within the scope of the broodstock survey con-ducted by (MÜLLER-BELECKE ET AL. 2009), 3 breeding stocks of farmed arctic char were genetically characterised. Several farmed individuals of char were recorded by KNEBELSBERGER ET AL. (2014) within the scope of the GBOL barcoding project.	X

◉ Native ○ Introduced Sander lucioperca	☒ Wild Type ☒ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☒ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☒ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	Pikeperch is reproduced artificially for stocking purposes and for aquaculure as food fish. Production of pikeperch as a food fish has increased continuously in recent years. In terms of overall production, however, (approx. 55 tonnes in 2013) pikeperch production is still low. Breeding activities are based primarily on positive mass selection. Within the scope of the broodstock survey conducted by (MÜLLER-BELECKE ET AL. 2009), 8 breeding stocks of pikeperch from fish farms were genetically characterised.	X
◉ Native ○ Introduced Silurus glanis	☒ Wild Type ☒ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	○ Yes ○ No ◉ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ◉ Not known	☒ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☒ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	Food fish production has remained relatively stable in recent years at between 150-200 tonnes.	X

◉ Native ○ Introduced Tinca tinca	☒ Wild Type ☒ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ◉ Not known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ◉ Not known	☒ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☒ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	Breeding is for the production of stocking and food fish. Production volume of farmed tench in 2013: 156 tonnes. No statements on the production trend can be made. Genetic data: MÜLLER-BELECKE ET AL. (2009) determined the genetic parameters of 12 breeding stocks of tench in Germany. Kohlmann et al. 2010 examined the genetic variability of wild and farmed populations of tench on the basis of microsatellites (3 origins examined in Germany).	X
○ Native ◉ Introduced Oncorhynchus mykiss	☐ Wild Type ☒ Selective bred type ☐ Hybrids ☐ Cross breeds ☒ Strains ☐ Varieties ☒ Polyploids	◉ Yes ○ No ○ Not Known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☒ Selective breeding ☐ Hybridization ☒ Polyploidy (chromosome set manipulation) ☒ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☒ Selective breeding ☐ Hybridization ☒ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	Breeding activities with rainbow trout are based primarily on positive mass selection. Selection is usually made for morphological characteristics and growth performance with moderate to high intensities. There has been a slight increase in recent years in the production trend for rainbow trout as the most important aquaculture species in Germany. Genetic data from breeding populations of rainbow trout are available from TRAUTNER (2000) and MÜLLER-BELECKE ET AL. (2009). Within the scope of the broodstock survey conducted by (MÜLLER-BELECKE ET AL. 2009), 39 breeding stocks of rainbow trout from fish farms were genetically character-ised. Several farmed individuals of this species were recorded by KNEBELSBERGER ET AL.	X

							(2014) within the scope of the GBOL barcoding project.	
○ Native ◉ Introduced Ctenopharyngodon idellus	☐ Wild Type ☒ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	○ Increasing ○ Stable ○ Fluctuating ◉ Decreasing ○ Stopped ○ Not known	○ Increasing ○ Stable ○ Fluctuating ◉ Decreasing ○ Stopped ○ Not known	☒ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☒ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	There is likely to have been a decline in the production trend for white amur in the last 10 years. Barcoding data of White amur were recorded by KNEBELSBERGER ET AL. (2014) within the scope of the GBOL Barcoding project (http: dx.doi.org/10.1111/1755-0998.12322).	X
◉ Native ○ Introduced Chlorella spp	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☒ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☒ Other (specify in comment)	Unicellular green microalgae (Native and introduced) In Germany certification for use in food products. Genetic data: Several total genome sequences No genetic improvement.	X

◉ Native ○ Introduced Spirulina spp	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☒ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☒ Other (specify in comment)	Filamentous cyanobacterium (Native and introduced) In Germany certification for use in food products. Genetic data: Several total genome sequences No genetic improvement.	X
◉ Native ○ Introduced Nannochloropsis spp	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☒ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☒ Other (specify in comment)	Unicellular Eustigmatophyceae (Native and introduced) In Germany used as feed for Aquaculture Genetic data: Several total genome sequences No genetic improvement.	X

◉ Native ○ Introduced Haematococcus spp	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☒ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☒ Other (specify in comment)	Unicellular green microalgae (Native and introduced) In Germany extracted Carotinoid Astaxanthin used as feed supply for Aquaculture Genetic data: genome sequences No genetic improvement.	X
◉ Native ○ Introduced Astacus astacus	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	Apart production for restocking purposes their is a low level production for food purposes. Efforts are currently being made to increase the production for food purposes. Recent genetic studies have shown large differences in in haplotype diversity of wild populations in Germany. Some farmers consider local origin and genetic diversity of their stocks, especially if crayfish are sold for restocking purposes.	X

◉ Native ○ Introduced Laminaria saccharina	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	○ Yes ○ No ◉ Not Known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ◉ Not known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ◉ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	According to the National Strategy Plan on Aquaculture this brown alga is cultivated in Germany (as more information becomes available this will be submitted)	X
◉ Native ○ Introduced Ulva lactuca	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	○ Yes ○ No ◉ Not Known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ◉ Not known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ◉ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	According to the National Strategy Plan on Aquaculture these Green algae are cultivated in Germany (as more information becomes available this will be submitted)	X

◉ Native ○ Introduced Delesseria sanguinea	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	○ Yes ○ No ◉ Not Known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ◉ Not known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ◉ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	According to the National Strategy Plan on Aquaculture this red alga is cultivated in Germany (as more information becomes available this will be submitted)	X

10. Which aquatic species in your country are thought to have potential for domestication and future use in aquaculture?

Add Row

Species ***Type and select a species***	Is the species native to your country?	Comments ***For example main sources of information***	
Sander lucioperca	(●) Yes ( ) No ( ) Not Known	The pikeperch is regarded as a particularly promising candidate for intensive aquaculture. In recent years, the foundation has been laid for successful pike-perch production in recirculation systems, the first of which have gone into operation with the goal of commercial pike-perch production in Germany.	X
Coregonus spp	(●) Yes ( ) No ( ) Not Known	The high demand and constant price level for Whitefish appear to be a good prerequisite for establishing this species in aquaculture throughout Germany. A research project with the title "Examination of the introduction of lavaret (Coregonus lavaretus) as a new species for German aquaculture" is being conducted by the Fishery Research Centre of the state of Baden-Württemberg in Langenargen. On the basis of the research results on the establishment and development of a maraena whitefish (Coregonus maraena) aquaculture in Mecklenburg-Western Pomerania (ARNDT et al. 2013), it has to be assumed that the aquaculture of this species constitutes a serious opportunity to increase fish production and a valuable supplement to catches in the wild.	X
Perca fluviatilis	(●) Yes ( ) No ( ) Not Known	Opportunities for the intensive aquaculture of European perch are being investigated.	X

Astacus astacus	(●) Yes ( ) No ( ) Not Known	Opportunities for the intensive aquaculture of noble crayfish are being investigated.	X
Psetta maxima	(●) Yes ( ) No ( ) Not Known	Opportunities for the intensive aquaculture of turbot are being investigated.	X
Dicentrarchus labrax	(●) Yes ( ) No ( ) Not Known	Opportunities for the intensive aquaculture of European seabass are being investigated.	X

11. Please list the aquatic genetic resources of farmed aquatic species your country has transferred or exchanged with other countries over the past 10 years.

Add Row

Species	Genetic alteration of exchanged material **Mark all that apply**	Details of transfer or exchange	Type of genetic material exchanged **Mark all that apply**	Country or countries involved with exchange **Hold CTRL button to select more than one country**	Comments ***Please add main purpose or objective of the exchange and main sources of information***	
Oncorhynchus mykiss	☐ No deliberate genetic alteration ☒ Traditional selective breeding ☐ Hybrids ☒ Triploids and other polyploids ☒ Mono-sex production ☐ Other	☒ Import ☒ Export	☐ DNA ☐ Genes ☒ Gametes ☐ Tissues ☒ Embryos ☒ Living specimens ☐ Other	Thailand Timor-Leste Togo Tokelau (Associate Me Tonga Trinidad and Tobago Tunisia Turkey Turkmenistan Tuvalu Uganda Ukraine United Arab Emirates United Kingdom United Republic of Ta United States of Amer Uruguay	Food fish production, only triploids (no polyploids) Source: AqGR expert committee	X
Acipenser ruthenus	☐ No deliberate genetic alteration ☒ Traditional selective breeding ☐ Hybrids ☐ Triploids and other polyploids ☐ Mono-sex production ☐ Other	☒ Import ☐ Export	☐ DNA ☐ Genes ☐ Gametes ☐ Tissues ☐ Embryos ☒ Living specimens ☐ Other	Fiji Finland France Gabon Gambia Georgia Germany Ghana Greece Grenada Guatemala Guinea Guinea-Bissau Guyana Haiti Hungary Iceland	Food fish and caviar production. Ornamental fish farming. Source: Expert Committee on AqGR	X

Acipenser gueldenstaedtii	☐ No deliberate genetic alteration ☒ Traditional selective breeding ☐ Hybrids ☐ Triploids and other polyploids ☐ Mono-sex production ☐ Other	☒ Import ☐ Export	☐ DNA ☐ Genes ☐ Gametes ☐ Tissues ☐ Embryos ☒ Living specimens ☐ Other	Fiji Finland France Gabon Gambia Georgia Germany Ghana Greece Grenada Guatemala Guinea Guinea-Bissau Guyana Haiti Hungary Iceland	Food fish and caviar production. Ornamental fish farming. Source: Expert Committee on AqGR	X
Acipenser baerii	☐ No deliberate genetic alteration ☒ Traditional selective breeding ☐ Hybrids ☐ Triploids and other polyploids ☐ Mono-sex production ☐ Other	☒ Import ☐ Export	☐ DNA ☐ Genes ☐ Gametes ☐ Tissues ☐ Embryos ☒ Living specimens ☐ Other	Denmark Djibouti Dominica Dominican Republic Ecuador Egypt El Salvador Equatorial Guinea Eritrea Estonia Ethiopia European Union (Mer Faroe Islands (Associa Fiji Finland France Gabon		X
Cyprinus carpio	☐ No deliberate genetic alteration ☒ Traditional selective breeding ☐ Hybrids ☐ Triploids and other polyploids ☐ Mono-sex production ☐ Other	☒ Import ☐ Export	☐ DNA ☐ Genes ☒ Gametes ☐ Tissues ☒ Embryos ☒ Living specimens ☐ Other	Cambodia Cameroon Canada Central African Repub Chad Chile China Colombia Comoros Cook Islands Costa Rica Côte d'Ivoire Croatia Cuba Cyprus Czech Republic Republic of Korea	Food fish production and research. Source: Expert Committee on AqGR	X

Oreochromis (=Tilapia) spp	☐ No deliberate genetic alteration ☒ Traditional selective breeding ☐ Hybrids ☐ Triploids and other polyploids ☒ Mono-sex production ☐ Other	☒ Import ☐ Export	☐ DNA ☐ Genes ☐ Gametes ☐ Tissues ☐ Embryos ☒ Living specimens ☐ Other	Cambodia Cameroon Canada Central African Repub Chad Chile China Colombia Comoros Cook Islands Costa Rica Côte d'Ivoire Croatia Cuba Cyprus Czech Republic Republic of Korea	Food fish production and research. Source: Expert Committee on AqGR	X
Sander lucioperca	☐ No deliberate genetic alteration ☒ Traditional selective breeding ☐ Hybrids ☐ Triploids and other polyploids ☐ Mono-sex production ☐ Other	☒ Import ☒ Export	☐ DNA ☐ Genes ☒ Gametes ☐ Tissues ☒ Embryos ☒ Living specimens ☐ Other	Central African Repub Chad Chile China Colombia Comoros Cook Islands Costa Rica Côte d'Ivoire Croatia Cuba Cyprus Czech Republic Republic of Korea Democratic Republic Denmark Djibouti	Food fish production Source: Expert Committee on AqGR	X
Clarias gariepinus	☐ No deliberate genetic alteration ☒ Traditional selective breeding ☐ Hybrids ☐ Triploids and other polyploids ☐ Mono-sex production ☐ Other	☒ Import ☐ Export	☐ DNA ☐ Genes ☐ Gametes ☐ Tissues ☐ Embryos ☒ Living specimens ☐ Other	Ghana Greece Grenada Guatemala Guinea Guinea-Bissau Guyana Haiti Hungary Iceland India Indonesia Iran (Islamic Republic Iraq Ireland Israel Italy	Food fish production and research. Source: Expert Committee on AqGR	X

Salvelinus spp	☐ No deliberate genetic alteration ☒ Traditional selective breeding ☒ Hybrids ☒ Triploids and other polyploids ☐ Mono-sex production ☐ Other	☒ Import ☐ Export	☐ DNA ☐ Genes ☒ Gametes ☐ Tissues ☒ Embryos ☒ Living specimens ☐ Other	Central African Repub Chad Chile China Colombia Comoros Cook Islands Costa Rica Côte d'Ivoire Croatia Cuba Cyprus Czech Republic Republic of Korea Democratic Republic Denmark Djibouti	Food fish produc-tion, only triploids (no polyploids) Source: Expert Committee on AqGR	X
Pangasius hypophthalmus	☐ No deliberate genetic alteration ☒ Traditional selective breeding ☐ Hybrids ☐ Triploids and other polyploids ☐ Mono-sex production ☐ Other	☒ Import ☐ Export	☐ DNA ☐ Genes ☐ Gametes ☐ Tissues ☐ Embryos ☒ Living specimens ☐ Other	Slovakia Slovenia Solomon Islands Somalia South Africa South Sudan Spain Sri Lanka Sudan Suriname Swaziland Sweden Switzerland Syrian Arab Republic Tajikistan Thailand Timor-Leste	Food fish production Source: Expert Committee on AqGR	X
Penaeus vannamei	☐ No deliberate genetic alteration ☒ Traditional selective breeding ☐ Hybrids ☐ Triploids and other polyploids ☐ Mono-sex production ☐ Other	☒ Import ☐ Export	☐ DNA ☐ Genes ☐ Gametes ☐ Tissues ☐ Embryos ☒ Living specimens ☐ Other	Thailand Timor-Leste Togo Tokelau (Associate Me Tonga Trinidad and Tobago Tunisia Turkey Turkmenistan Tuvalu Uganda Ukraine United Arab Emirates United Kingdom United Republic of Ta United States of Amer Uruguay	Food fish production Source: Expert Committee on AqGR	X

Wild relatives of farmed aquatic species

12. Please list any wild relatives of aquatic species present in your country that are farmed in another country (but not in your country) and indicate their uses.

Add Row

This question refers to aquatic genetic resources that are present in the wild in your country and that are being farmed elsewhere (but not farmed in your country), indicating any uses these resources may have in your country.

Species	Use *(mark all that apply)*	Comments	
	☐ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)		X

13. Please list the aquatic genetic resources of wild relatives of farmed aquatic species your country has transferred or exchanged with other countries over the past 10 years.

Add Row

This question refers to wild aquatic genetic resources collected from the wild, not from farming facilities as in question 11.

Species	Details of transfer or exchange *mark all that apply*	Type of genetic material exchanged	Country **Hold CTRL button to select more than one country**	Comments ***main sources of information, if the transfer was legal or not***	
Mytilus edulis	☒ Import ☐ Export	☐ Tissues ☐ Gametes ☐ DNA ☐ Genes ☐ Embryos ☒ Living specimens ☐ Other	Ghana Greece Grenada Guatemala Guinea Guinea-Bissau Guyana Haiti Hungary Iceland India Indonesia Iran (Islamic Republic of) Iraq Ireland Israel	Source: Expert Committee on AqGR / legal trans-fer	X
Anguilla anguilla	☒ Import ☐ Export	☐ Tissues ☐ Gametes ☐ DNA ☐ Genes ☐ Embryos ☒ Living specimens ☐ Other	Djibouti Dominica Dominican Republic Ecuador Egypt El Salvador Equatorial Guinea Eritrea Estonia Ethiopia European Union (Member Faroe Islands (Associate M Fiji Finland France Gabon	Source: Expert Committee on AqGR / legal transfer	X
Acipenseridae	☒ Import ☐ Export	☐ Tissues ☐ Gametes ☐ DNA ☐ Genes ☐ Embryos ☒ Living specimens ☐ Other	Belgium Belize Benin Bhutan Bolivia (Plurinational State Bosnia and Herzegovina Brazil Brunei Darussalam Bulgaria Burkina Faso Burundi Cabo Verde Cambodia Cameroon Canada Central African Republic	Acipenser oxyrinchus for reintroduction purposes. Source: Expert Committee on AqGR / legal transfer	X

Acipenseridae	☒ Import ☐ Export	☐ Tissues ☐ Gametes ☐ DNA ☐ Genes ☐ Embryos ☒ Living specimens ☐ Other	Djibouti Dominica Dominican Republic Ecuador Egypt El Salvador Equatorial Guinea Eritrea Estonia Ethiopia European Union (Membei Faroe Islands (Associate M Fiji Finland France Gabon	Acipenser sturio for reintroduction purposes. Source: Expert Committee on AqGR / legal transfer	X
Salmo salar	☒ Import ☐ Export	☐ Tissues ☐ Gametes ☐ DNA ☐ Genes ☒ Embryos ☒ Living specimens ☐ Other	Chad Chile China Colombia Comoros Cook Islands Costa Rica Côte d'Ivoire Croatia Cuba Cyprus Czech Republic Republic of Korea Democratic Republic of th Denmark Diibouti	Source: Expert Committee on AqGR / legal transfer	X
Salmo trutta	☒ Import ☐ Export	☐ Tissues ☐ Gametes ☐ DNA ☐ Genes ☒ Embryos ☒ Living specimens ☐ Other	Djibouti Dominica Dominican Republic Ecuador Egypt El Salvador Equatorial Guinea Eritrea Estonia Ethiopia European Union (Membei Faroe Islands (Associate M Fiji Finland France Gabon	Source: Expert Committee on AqGR / legal transfer	X

14. Please fill in table 1.2

Table 1.2 Aquatic genetic resources of wild relatives of farmed aquatic species in your country.

Add Row

Target species, stocks or other management units	Characteristics of species	Capture fisheries	Management measures	Availability of genetic data	Use of genetic data in management	Trends in catches	Future trends in catches	Ecosystem(s) where the fishery is located	Changes in ranges and habitats	Reasons for change in abundance of species	
For each row, list the species as scientific names (put in brackets the most widely used national common For each species, include the named stocks and name of other management units if known)	Is the species ***(mark as appropriate):***	Is this species targeted by capture fisheries?	Are there any management measures in place?	Are genetic data available for the fishery?	Are genetic data used in management?	Over the last 10 years, catches have been:	Expected trend over the next 10 years.	Indicate the ecosystem where the fishery is located (***mark all that apply)***	The habitat or range is	What are likely reasons for changes? (***mark all that apply)***	
Crassostrea gigas	☐ Straddling ☒ Transboundary ☒ Introduced ☐ Native	○ Yes ◉ No ○ Not Known	◉ Yes ○ No ○ Not Known	○ Yes ○ No ◉ Not Known	○ Yes ○ No ◉ Not Known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Depleted ◉ Not known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Depleted ◉ Not known	☒ Intertital ☐ Coastal in EEZ ☐ High seas ☐ Lake ☐ Reservoir ☐ River ☐ Swamp ☐ Other **(specify)**	○ Increasing ○ Stable ○ Decreasing ◉ Not known	☐ Habitat ☐ Climate ☐ Invasive species ☐ Pollution ☐ Rehabilitation of habitat ☐ Others ☒ Not known	X

Target species, stocks or other management units	Characteristics of species	Capture fisheries	Management measures	Availability of genetic data	Use of genetic data in management	Trends in catches	Future trends in catches	Ecosystem(s) where the fishery is located	Changes in ranges and habitats	Reasons for change in abundance of species	
Mytilus edulis	☐ Straddling ☒ Transboundary ☐ Introduced ☒ Native	◉ Yes ○ No ○ Not Known	◉ Yes ○ No ○ Not Known	◉ Yes ○ No ○ Not Known	○ Yes ◉ No ○ Not Known	○ Increasing ○ Stable ◉ Fluctuating ○ Decreasing ○ Depleted ○ Not known	○ Increasing ○ Stable ◉ Fluctuating ○ Decreasing ○ Depleted ○ Not known	☒ Intertital ☐ Coastal in EEZ ☐ High seas ☐ Lake ☐ Reservoir ☐ River ☐ Swamp ☐ Other **(specify)**	○ Increasing ◉ Stable ○ Decreasing ○ Not known	☐ Habitat ☐ Climate ☐ Invasive species ☐ Pollution ☐ Rehabilitation of habitat ☐ Others ☐ Not known	X
Acipenseridae	☒ Straddling ☒ Transboundary ☐ Introduced ☒ Native	○ Yes ◉ No ○ Not Known	◉ Yes ○ No ○ Not Known	◉ Yes ○ No ○ Not Known	◉ Yes ○ No ○ Not Known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ◉ Depleted ○ Not known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ◉ Depleted ○ Not known	☒ Intertital ☒ Coastal in EEZ ☒ High seas ☐ Lake ☐ Reservoir ☒ River ☐ Swamp ☐ Other **(specify)**	◉ Increasing ○ Stable ○ Decreasing ○ Not known	☐ Habitat ☐ Climate ☐ Invasive species ☐ Pollution ☒ Rehabilitation of habitat ☐ Others ☐ Not known	X

Target species, stocks or other management units	Characteristics of species	Capture fisheries	Management measures	Availability of genetic data	Use of genetic data in management	Trends in catches	Future trends in catches	Ecosystem(s) where the fishery is located	Changes in ranges and habitats	Reasons for change in abundance of species	
Anguilla anguilla	☒ Straddling ☒ Transboundary ☐ Introduced ☒ Native	○ Yes ◉ No ○ Not Known	◉ Yes ○ No ○ Not Known	◉ Yes ○ No ○ Not Known	◉ Yes ○ No ○ Not Known	○ Increasing ○ Stable ○ Fluctuating ◉ Decreasing ○ Depleted ○ Not known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Depleted ◉ Not known	☒ Intertital ☒ Coastal in EEZ ☒ High seas ☒ Lake ☐ Reservoir ☐ River ☐ Swamp ☐ Other **(specify)**	○ Increasing ○ Stable ◉ Decreasing ○ Not known	☒ Habitat ☒ Climate ☒ Invasive species ☐ Pollution ☐ Rehabilitation of habitat ☐ Others ☐ Not known	X
Coregonus spp	☐ Straddling ☒ Transboundary ☐ Introduced ☒ Native	◉ Yes ○ No ○ Not Known	◉ Yes ○ No ○ Not Known	◉ Yes ○ No ○ Not Known	○ Yes ○ No ◉ Not Known	○ Increasing ○ Stable ○ Fluctuating ◉ Decreasing ○ Depleted ○ Not known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Depleted ◉ Not known	☐ Intertital ☒ Coastal in EEZ ☐ High seas ☒ Lake ☒ Reservoir ☐ River ☐ Swamp ☐ Other **(specify)**	○ Increasing ◉ Stable ○ Decreasing ○ Not known	☐ Habitat ☐ Climate ☐ Invasive species ☐ Pollution ☐ Rehabilitation of habitat ☐ Others ☐ Not known	X

Target species, stocks or other management units	Characteristics of species	Capture fisheries	Management measures	Availability of genetic data	Use of genetic data in management	Trends in catches	Future trends in catches	Ecosystem(s) where the fishery is located	Changes in ranges and habitats	Reasons for change in abundance of species	
Cyprinus carpio	☐ Straddling ☐ Transboundary ☐ Introduced ☒ Native	◉ Yes ○ No ○ Not Known	◉ Yes ○ No ○ Not Known	◉ Yes ○ No ○ Not Known	○ Yes ◉ No ○ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Depleted ○ Not known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Depleted ○ Not known	☐ Intertital ☒ Coastal in EEZ ☐ High seas ☒ Lake ☒ Reservoir ☒ River ☐ Swamp ☐ Other **(specify)**	○ Increasing ◉ Stable ○ Decreasing ○ Not known	☐ Habitat ☐ Climate ☐ Invasive species ☐ Pollution ☐ Rehabilitation of habitat ☐ Others ☐ Not known	X
Salmo salar	☒ Straddling ☒ Transboundary ☐ Introduced ☒ Native	○ Yes ◉ No ○ Not Known	◉ Yes ○ No ○ Not Known	◉ Yes ○ No ○ Not Known	◉ Yes ○ No ○ Not Known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ◉ Depleted ○ Not known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ◉ Depleted ○ Not known	☒ Intertital ☒ Coastal in EEZ ☒ High seas ☐ Lake ☐ Reservoir ☒ River ☐ Swamp ☐ Other **(specify)**	◉ Increasing ○ Stable ○ Decreasing ○ Not known	☐ Habitat ☐ Climate ☐ Invasive species ☐ Pollution ☒ Rehabilitation of habitat ☐ Others ☐ Not known	X

Target species, stocks or other management units	Characteristics of species	Capture fisheries	Management measures	Availability of genetic data	Use of genetic data in management	Trends in catches	Future trends in catches	Ecosystem(s) where the fishery is located	Changes in ranges and habitats	Reasons for change in abundance of species	
Salmo trutta	☐ Straddling ☐ Transboundary ☐ Introduced ☒ Native	◉ Yes ○ No ○ Not Known	◉ Yes ○ No ○ Not Known	◉ Yes ○ No ○ Not Known	○ Yes ◉ No ○ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Depleted ○ Not known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Depleted ○ Not known	☒ Intertital ☒ Coastal in EEZ ☐ High seas ☒ Lake ☐ Reservoir ☒ River ☐ Swamp ☐ Other **(specify)**	◉ Increasing ○ Stable ○ Decreasing ○ Not known	☐ Habitat ☐ Climate ☐ Invasive species ☐ Pollution ☒ Rehabilitation of habitat ☐ Others ☐ Not known	X
Salvelinus spp	☐ Straddling ☐ Transboundary ☐ Introduced ☒ Native	◉ Yes ○ No ○ Not Known	◉ Yes ○ No ○ Not Known	◉ Yes ○ No ○ Not Known	○ Yes ○ No ◉ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Depleted ○ Not known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Depleted ○ Not known	☐ Intertital ☐ Coastal in EEZ ☐ High seas ☒ Lake ☒ Reservoir ☒ River ☐ Swamp ☐ Other **(specify)**	○ Increasing ◉ Stable ○ Decreasing ○ Not known	☐ Habitat ☐ Climate ☐ Invasive species ☐ Pollution ☐ Rehabilitation of habitat ☐ Others ☐ Not known	X

Target species, stocks or other management units	Characteristics of species	Capture fisheries	Management measures	Availability of genetic data	Use of genetic data in management	Trends in catches	Future trends in catches	Ecosystem(s) where the fishery is located	Changes in ranges and habitats	Reasons for change in abundance of species	
Sander lucioperca	☐ Straddling ☒ Transboundary ☐ Introduced ☒ Native	◉ Yes ○ No ○ Not Known	◉ Yes ○ No ○ Not Known	◉ Yes ○ No ○ Not Known	○ Yes ◉ No ○ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Depleted ○ Not known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Depleted ○ Not known	☐ Intertital ☒ Coastal in EEZ ☐ High seas ☒ Lake ☒ Reservoir ☐ River ☐ Swamp ☐ Other **(specify)**	○ Increasing ◉ Stable ○ Decreasing ○ Not known	☐ Habitat ☐ Climate ☐ Invasive species ☐ Pollution ☐ Rehabilitation of habitat ☐ Others ☐ Not known	X
Silurus glanis	☐ Straddling ☐ Transboundary ☐ Introduced ☒ Native	◉ Yes ○ No ○ Not Known	◉ Yes ○ No ○ Not Known	◉ Yes ○ No ○ Not Known	○ Yes ◉ No ○ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Depleted ○ Not known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Depleted ○ Not known	☐ Intertital ☐ Coastal in EEZ ☐ High seas ☒ Lake ☒ Reservoir ☒ River ☐ Swamp ☐ Other **(specify)**	◉ Increasing ○ Stable ○ Decreasing ○ Not known	☐ Habitat ☒ Climate ☐ Invasive species ☐ Pollution ☐ Rehabilitation of habitat ☒ Others ☐ Not known	X

Target species, stocks or other management units	Characteristics of species	Capture fisheries	Management measures	Availability of genetic data	Use of genetic data in management	Trends in catches	Future trends in catches	Ecosystem(s) where the fishery is located	Changes in ranges and habitats	Reasons for change in abundance of species	
Tinca tinca	☐ Straddling ☐ Transboundary ☐ Introduced ☒ Native	◉ Yes ○ No ○ Not Known	◉ Yes ○ No ○ Not Known	◉ Yes ○ No ○ Not Known	○ Yes ◉ No ○ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Depleted ○ Not known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Depleted ○ Not known	☐ Intertital ☒ Coastal in EEZ ☐ High seas ☒ Lake ☒ Reservoir ☒ River ☐ Swamp ☐ Other **(specify)**	○ Increasing ◉ Stable ○ Decreasing ○ Not known	☐ Habitat ☐ Climate ☐ Invasive species ☐ Pollution ☐ Rehabilitation of habitat ☐ Others ☐ Not known	X
Esox lucius	☐ Straddling ☐ Transboundary ☐ Introduced ☒ Native	◉ Yes ○ No ○ Not Known	◉ Yes ○ No ○ Not Known	◉ Yes ○ No ○ Not Known	○ Yes ◉ No ○ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Depleted ○ Not known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Depleted ○ Not known	☐ Intertital ☒ Coastal in EEZ ☐ High seas ☒ Lake ☒ Reservoir ☒ River ☐ Swamp ☐ Other **(specify)**	○ Increasing ◉ Stable ○ Decreasing ○ Not known	☐ Habitat ☐ Climate ☐ Invasive species ☐ Pollution ☐ Rehabilitation of habitat ☐ Others ☐ Not known	X

Target species, stocks or other management units	Characteristics of species	Capture fisheries	Management measures	Availability of genetic data	Use of genetic data in management	Trends in catches	Future trends in catches	Ecosystem(s) where the fishery is located	Changes in ranges and habitats	Reasons for change in abundance of species	
Oncorhynchus mykiss	☐ Straddling ☐ Transboundary ☒ Introduced ☐ Native	○ Yes ◉ No ○ Not Known	◉ Yes ○ No ○ Not Known	○ Yes ○ No ◉ Not Known	○ Yes ◉ No ○ Not Known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Depleted ○ Not known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Depleted ○ Not known	☐ Intertital ☒ Coastal in EEZ ☐ High seas ☒ Lake ☒ Reservoir ☒ River ☐ Swamp ☐ Other **(specify)**	○ Increasing ◉ Stable ○ Decreasing ○ Not known	☐ Habitat ☐ Climate ☐ Invasive species ☐ Pollution ☐ Rehabilitation of habitat ☐ Others ☐ Not known	X
Astacus astacus	☐ Straddling ☒ Transboundary ☐ Introduced ☒ Native	○ Yes ◉ No ○ Not Known	◉ Yes ○ No ○ Not Known	◉ Yes ○ No ○ Not Known	◉ Yes ○ No ○ Not Known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ◉ Depleted ○ Not known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ◉ Depleted ○ Not known	☐ Intertital ☐ Coastal in EEZ ☐ High seas ☒ Lake ☒ Reservoir ☒ River ☐ Swamp ☐ Other **(specify)**	○ Increasing ○ Stable ◉ Decreasing ○ Not known	☐ Habitat ☐ Climate ☒ Invasive species ☐ Pollution ☐ Rehabilitation of habitat ☒ Others ☐ Not known	X

Chapter 2: Drivers and Trends in Aquaculture: Consequences for Aquatic Genetic Resources within National Jurisdiction

The main objective of Chapter 2 is to review the main drivers and trends that are shaping aquaculture and their consequences for aquatic genetic resources.

15. Please indicate the ways the aquatic genetic resources (AqGR) of **farmed aquatic species** have been impacted by the following drivers. Please give examples of positive and negative impacts for specific drivers.

This question refers to drivers impacting farmed aquatic genetic resources, not about impacts on the entire aquaculture sector. Drivers should be seen from a national perspective.

Driver impacting aquaculture	Effect on AqGR ***Mark appropriate box***	Comments ***List examples or other relevant information***
Human population increase	○ Strongly positive ○ Positive ○ Negative ○ Strongly negative ● No effect ○ Unknown	Like many other industrialised countries, Germany is also affected by the problem of an aging population and is therefore dependent on immigration in order to maintain population numbers. Since the seventies, the birth rate in Germany has been one third below the population maintenance level. To date, this development has not had any direct effects on the AqGR produced in aquaculture. Against the backdrop of global population growth and the increasing worldwide food problem, the high German dependence on imports fish and seafood at just under 90% seems ever more questionable, however. At < 0.1 %, Germany's share in worldwide aquaculture is far below the potential that Germany could have in this area. From the point of view of sustainability, it will be a matter of increasing urgency that Germany grows the production of AqGR in aquaculture and therefore makes a contribution to the globally increasing demand for fish and seafood.
Increased wealth and demand for fish	○ Strongly positive ○ Positive ● Negative ○ Strongly negative ○ No effect ○ Unknown	One effect of the comparatively high level of prosperity in Germany is that people can afford to satisfy the demand for fish and seafood primarily through imports. In-country production can be neglected without the fear of supply shortages in this area. One of the consequences of increased prosperity is that the demand for cyprinids from tradi-tional pond management has declined con-tinuously during the last decade. Instead, we have seen an increased demand for carnivore fish from aquaculture, such as salmonids and catfish.
Governance (ability of government, industry and the public to work together in managing resources)	○ Strongly positive ○ Positive ○ Negative ● Strongly negative ○ No effect ○ Unknown	In Germany, adequate state governance to conserve and ensure the sustainable development of AqGR produced through aquaculture is not a separate policy and legal area (also see no. 16). Aquaculture is mainly subject to the regulations on fisheries, environmental and nature protection as well as consumer protection policy. In the limnic segment, the AqGR are particularly affected by the regulations governing water management. The legal principles that govern, for example, the creation of aquaculture facilities in Germany depend in large measure on which type of facility is planned and in which regional state. In addition, concrete administrative practice may also differ between different districts in a specific regional state. In other words, there are no approval authorities in Germany that are exclusively responsible for aquaculture and that cover all legal areas. In the field of aquaculture, investors have to consult multiple authorities in order to obtain different permits. Alongside these institutional problems that make the sustainable development of aquaculture difficult, there are NGOs like fisheries and nature conservation associa-tions that often take up diametrically opposed positions with regard to the utilisation of AqGR and the expansion of aquaculture. Improved governance structures in the field of aquaculture are one of the preconditions for the more effective development of the production of AqGR in Germany.

Driver impacting aquaculture	Effect on AqGR ***Mark appropriate box***	Comments ***List examples or other relevant information***
Climate change	○ Strongly positive ○ Positive ○ Negative ○ Strongly negative ○ No effect ◉ Unknown	So far, AqGR aquaculture and fisheries in Germany are only slightly affected by climate change. The rise in water temperature e. g. in the carp pond aquaculture may lead to better growth of thermophilic fish species - on the other hand the water management is negative affected by water deficiency in some German regions. Higher water temperatures in trout farms using surface water may lead to problems. Other than climatic changes e.g. human impacts on marine and freshwater ecosystems currently show more pronounced effects on fisheries and aquaculture. However, correlation of climatic parameters and distribution pattern of fish species are discussed both for marine and freshwater ecosystems. According to current knowledge, there is no reliable scientific evidence for climate change induced effects in German aquaculture.
Competition for resources, especially freshwater	○ Strongly positive ○ Positive ◉ Negative ○ Strongly negative ○ No effect ○ Unknown	Due to competition with other sectors such as nature conservation, environmental pro-tection, water management and the leisure industry, the development of new natural resources for aquaculture is currently as good as impossible – despite the fact that Germany could be an outstanding location for the development of sustainable aquacul-ture production due to its high-quality freshwater resources, sufficient know-how and its proximity to sales markets.
Changes in values and ethics of consumers	○ Strongly positive ○ Positive ◉ Negative ○ Strongly negative ○ No effect ○ Unknown	The changing values among consumers are also reflected in the frequently poor image of the term "aquaculture" in Germany (BMEL 2014). With the exception of the perhaps positive local roots of traditional forms of production (e.g. carp pond culture), aquaculture in Germany generally suffers from a bad image. This is also due to the fact that consumers possess little knowledge about the origin and production methods of aquaculture products. This topic only reaches many consumers on an emotional and moral level. Naturalness, animal welfare and the avoidance of the use of pharmaceuticals all play a role in this respect. Plus: the undisputed risks and problems of some production methods are widely reported in the media; these risks and problems are often generalised and seen as applying to the entire sector.
Other ***Add other drivers as necessary*** Add Row / Remove Row	○ Strongly positive ○ Positive ○ Negative ○ Strongly negative ○ No effect ○ Unknown	

16. Please indicate the ways the aquatic genetic resources of **wild relatives of farmed aquatic species** in nature have been impacted by the following drivers. Please give examples of positive and negative impacts for specific drivers.

This question refers to drivers impacting wild aquatic genetic resources of farmed species, not about impacts on the entire aquaculture sector. Drivers should be seen from a national perspective.

Driver impacting aquaculture	Effect on AqGR ***Mark appropriate box***	Comments ***List examples or other relevant information***
Human population increase	○ Strongly positive ○ Positive ○ Negative ○ Strongly negative ◉ No effect ○ Unknown	To date, the declining population (see no. 15) has had no significant effects on the wild AqGR occur-ring in nature.
Increased wealth and demand for fish	○ Strongly positive ○ Positive ○ Negative ○ Strongly negative ◉ No effect ○ Unknown	The share of domestic wild populations of AqGR in the total food supply of the population has been marginal for quite some time, particularly in the field of inland fisheries. In this area as well, the major part of demand is met via imports. The consequence is that the awareness and understanding of fishing as a particularly sustainable form of utilisation of natural resources is meanwhile absent among large sections of the population, and that AqGR are often only seen from the aspect of conservation but no longer in terms of utilisation (also see Question 15 "Increased wealth and demand for fish").
Governance (ability of government, industry and the public to work together in managing resources)	○ Strongly positive ○ Positive ◉ Negative ○ Strongly negative ○ No effect ○ Unknown	As the legislative responsibility for the legal regulation of the use of AqGR in the fields of inland fisheries and aquaculture lies with Germany's regional states, the development of the sector and its administrative structures differ considerably from state to state. This makes nationwide coordination in the solution of sectorspecific problems very difficult. In addition to the statespecific fisheries laws, however, there are also regulations that have a direct influence on the development of fishing and fish breeding in inland waters and aquaculture facilities – such as nationwide laws like those governing water management, animal protection, animal welfare, veterinary matters, building con-servation, nature conservation and endangered species protection as well as European directives and regulations such as the Water Framework Directive, the Habitats Directive, the regulation concerning use of alien and locally absent species in aquaculture, and the Regulation to replenish the stock of the European eel. In the most recent past, it is the major increase in the number of EU regu-lations in particular that has resulted in considerable adaptation and implementation problems in enterprises and at fisheries authorities. Even though some of the EU regulations, such as the WFD, have a positive impact on AqGR, other directives such as the bird protection directive exercise a negative influence on AqGR due to the high level of cormorant predation. On the whole, the system of governance is seen as having more of a negative effect.

Driver impacting aquaculture	Effect on AqGR ***Mark appropriate box***	Comments ***List examples or other relevant information***
Climate change	◯ Strongly positive ◯ Positive ◯ Negative ◯ Strongly negative ◯ No effect ◉ Unknown	As a result of global climatic changes, distribution areas and population dynamics of North Atlantic fish stocks are changing. This has impacts on the utilisation of these stocks by the fishing industry. Long-term time series of oceanographic parameters around Greenland reveal significant correlations with changes in fish stocks. In the North Sea, the climatic signal is weaker and so far only detectable in southern regions of the North Sea. Correlation of climatic parameters and distribution pattern of fish species are being discussed. For wild populations of freshwater fish a rise in water temperature extends the habitat for warm water fish species such as barbel, bream and chub. They are able to spread upstream and might thus even profit from climate change. Salmonids, however, are adapted to cooler waters and would migrate to higher ranges in order to avoid critical temperatures. In future, an increased water tem-perature of the Rhine and its tributaries combined with anthropogenic effects (thermal discharges) could be a limiting factor for the salmon popula-tions in the Rhine. But according to current knowledge, there is so far no reliable scien-tific evidence for climate change induced effects on AqGR in German freshwater habitats.
Competition for resources, especially freshwater	◯ Strongly positive ◯ Positive ◉ Negative ◯ Strongly negative ◯ No effect ◯ Unknown	In the recent past, the framework conditions for the use of AqGR in commercial fishing in German lakes and rivers have become more complicated and problematic due to competition with other water utilisation interests. This has led to a difficult economic situation in most of the enterprises as well as the closure of some companies in the sector, and the situation is not expected to improve in the foreseeable future. Alongside the ongoing cormorant problem, there are also natural conservation regulations and restrictions such as management or stocking bans that have a massive impact on fishing. Conflicts are particularly common in connection with management plans in FFH areas, where restrictions on the use of water bodies for fishing are stipulated by such things as the exclusion of partial areas or restrictions on the use of fishing gear. In addition, the intensive use of inland water areas is often in conflict with other interests, such as shipping, leisure/ tourism, energy generation from hydropower and the extraction of cooling water (BRÄMICK et al. 2013).
Changes in values and ethics of consumers	◯ Strongly positive ◉ Positive ◯ Negative ◯ Strongly negative ◯ No effect ◯ Unknown	From the point of view of consumers, ethical questions play an ever-greater role in the purchase and consumption of fish and seafood in Germany. In particular, animal welfare, nature conservation and consumer protection concerns are increasingly important for the marketing of fish products. This is also reflected in the growing number of eco-certifications for fish products from sustainable fisheries activities. These eco-certifications are most common in the area of marine fisheries, but the first German inland fishing enterprise was also eco-certified in 2014.

Driver impacting aquaculture	Effect on AqGR ***Mark appropriate box***	Comments ***List examples or other relevant information***
Other ***Add other drivers as necessary*** Add Row / Remove Row	◯ Strongly positive ◯ Positive ◯ Negative ◯ Strongly negative ◯ No effect ◯ Unknown	

17. What countermeasures might be taken to reduce adverse impacts on the aquatic genetic resources that sustain current aquaculture and/or provide for its future development?

Describe countermeasures

Specific measures are outlined in Chapter 6 of the National Programme for the Conservation and Sustainable Use of AqGR. The primary objectives of the programme are as follows:

1. To preserve the diversity of the aquatic genetic resources in situ and ex situ in the long term in a scientifically validated and cost-effective manner, to develop these resources and render them usable by taking suitable measures such as evaluation, characterisation and documentation, and to make increasing commercial use of these resources – in particular in the field of aquaculture

2. To promote the resettlement of fish species that used to be present in certain bodies of water

3. To make a contribution to the conservation and restoration of the aquatic ecosystems

4. To support all activities geared towards the conservation and sustainable use of aquatic genetic resources

5. To create greater transparency in the distributed powers and responsibilities of the federal government, the regional states and the municipalities, as well as with regard to the people, organisations and institutions ac-tive in this field

6. To exploit and promote synergies resulting from increased cooperation on national, supranational-regional and international level

Biotechnologies

18. To what extent have the following biotechnologies been used in your country for the genetic improvement of farmed aquatic organisms.

Biotechnology	Extent of use	Comments ***main sources of information, important species for which the biotechnology is applied***
Selective breeding	○ Not at all ○ To a minor extent ◉ To some extent ○ To a great extent	Main sources of information: Expert Committee on AqGR Important species: Cyprinus carpio Oncorhynchus mykiss
Hybridization	○ Not at all ◉ To a minor extent ○ To some extent ○ To a great extent	Main sources of information: Expert Committee on AqGR Important species: Salvelinus alpinus × Salvelinus fontinalis
Polyploidy (chromosome set manipulation)	○ Not at all ◉ To a minor extent ○ To some extent ○ To a great extent	Main sources of information: Expert Committee on AqGR Important species: Oncorhynchus mykiss Oreochromis spp
Monosex production	○ Not at all ○ To a minor extent ◉ To some extent ○ To a great extent	Main sources of information: Expert Committee on AqGR Important species: Oreochromis spp Oncorhynchus mykiss
Marker assisted selection	◉ Not at all ○ To a minor extent ○ To some extent ○ To a great extent	
Gynogenesis/androgenesis	◉ Not at all ○ To a minor extent ○ To some extent ○ To a great extent	
Other **Continue adding row as necessary** Add Row / Remove Row	○ Not at all ○ To a minor extent ○ To some extent ○ To a great extent	

19. Please indicate the ways aquatic genetic resources of the wild relatives of farmed aquatic species have been impacted by drivers that are changing aquatic ecosystems. Please give countermeasures that might be taken to reduce adverse consequences for the aquatic genetic resources that sustain capture fisheries on wild relatives of farmed species.

Drivers that are changing aquatic ecosystems	Effect on AqGR ***mark appropriate box***	Countermeasures and effects
Habitat loss and degradation	◉ Strongly positive ○ Positive ○ Negative ○ Strongly negative ○ No effect ○ Unknown	Hydromorphological degradation of the watercourses as a result of dyke construction as protection against flooding, obstructing features to regulate flow-off, water damming and energy generation measures, and the growth of inland shipping are having an adverse impact on discharge dynamics and on the passability of the water bodies. Particularly in the densely populated and highly industrialised regions of Germany, the hydromorphological impairments are among the most serious negative factors affecting AqGR. It is therefore necessary to push ahead with and support measures that are geared towards ensuring near-natural conditions and improved passability of the water bodies. One key measure in this regard is implementation of the EC Water Framework Directive 2000/60/EC (WFD).
Pollution of waters	○ Strongly positive ○ Positive ◉ Negative ○ Strongly negative ○ No effect ○ Unknown	Despite constant improvements in cleaning methods, watercourses in particular are still contaminated with various toxic substances and compounds. Although this burden has been greatly reduced in recent decades, the EC Water Framework Directive 2000/60/EC (WFD) stipulates stricter obligations on the part of the member states when it comes to collecting data on water quality and defining the targets for water quality. According to the BMEL (2014 b), the ambitious goals of the WFD for 2015 have not yet been achieved in all cases: -Industrial chemicals: the volume of these chemicals is set to decrease in the long term. The German Environmental Index (DUX) includes an indicator for the burden of adsorbable organic halogen compounds (AOX). The aim is to achieve chemical water quality class II and better at 100% of the test points by 2015. In the period from 1998 to 2003, this target was achieved with fluctuation at 40% – 58% of the test points, with a slightly positive trend. -Heavy metals: there has been a major reduction – in the order of 70% plus in the case of mercury and nickel – mainly as a result of the reduction in direct industrial discharges. -Nutrients: nitrogen emissions in the surface waters were 37% lower in 1998-2000 than in 1983–1987, while phosphorus emissions fell by 64% during the same period. The environmental target for 2015 – water quality II – was only achieved at 12% - 17% of the test points for total nitrogen in the period from 1996 to 2003, with fluctuations with no clear trend. There are persisting concerns regarding agriculture and its diffuse nutrient inputs. A reduction of these inputs into the watercourses is often only noticeable after sev-eral years, as the soil and groundwater are still con-taminated with previous inputs and the nutrients are only gradually released. Overall, however, there has been a positive trend with regard to abating water pollution in recent decades.

Drivers that are changing aquatic ecosystems	Effect on AqGR ***mark appropriate box***	Countermeasures and effects
Increased frequency of extreme climatic events and long-term climate change	○ Strongly positive ○ Positive ○ Negative ○ Strongly negative ○ No effect ◉ Unknown	Concerning aquatic genetic resources it is necessary to strengthen the efforts to assess anthropogenic and environmental factors affecting aquatic ecosystems. The implications of climate change for fisheries and aquaculture should be evaluated based on the best available scientific information. Emphasis should be placed on the ecological and economic resilience of fisheries and aquaculture operations to develop an effective and flexible fisheries management system in an ecosystem context.
Establishment of invasive species	○ Strongly positive ○ Positive ◉ Negative ○ Strongly negative ○ No effect ○ Unknown	There are numerous species of neozoa, which can sometimes cause major damage (e.g. Chinese mitten crab, crayfish plague, invasive gobies). As it is extremely difficult if not impossible to remove neozoa from water bodies once they have established a presence, the best protection is to prevent the penetration of (further) neozoa. This is another area where more extensive monitoring is needed. If the occurrence of neozoa is identified at an early stage, measures can be initiated to stop their further spread. REG (EC) No. 708/2007 concerning use of alien and locally absent species in aquaculture contains relatively strict provisions for the avoidance of risks associated with the use of alien species in aquaculture (e.g. fauna falsification and the introduction of diseases and parasites).
Introductions of parasites and pathogens	○ Strongly positive ○ Positive ○ Negative ◉ Strongly negative ○ No effect ○ Unknown	Disease pathogens and parasites such as the swimbladder worm (Anguillicola crassus) in eels introduced in the 1980s constitute a serious threat to indigenous stocks of AqGR. This parasite lives in the swimbladder of eels in Asia, where it causes no problems for the eel species in the region. However, the swimbladder of the European eel is seriously compromised if the parasites occur in large numbers. It is fair to assume that almost all stocks of this eel in Germany are meanwhile infected. In freshwater environments, the infection of the swimbladder evidently has no or only few negative effects. Dutch analyses show that problems with spawning migration occur if the infestation is serious enough. Although there is no direct evidence that this is connected to the strong decline in the presence of glass eels at the mouths of European rivers in recent years, such a connection cannot be ruled out. The precondition for avoidance of the occurrence and spread of new disease pathogens and parasites is strict compliance with the health and hygiene regulations for animals in aquaculture and aquaculture products and for the prevention and control of certain aquatic animal diseases in line with Directive 2006/88/EC.
Impacts of purposeful stocking and escapes from aquaculture	○ Strongly positive ○ Positive ◉ Negative ○ Strongly negative ○ No effect ○ Unknown	Knowledge of specific genetic features and characteristics is neces-sary in order to protection genetically independent populations from the harmful effects of stocking and resettlement measures. The aim has to be to respect the genetic diversity in the entire distribution area of a species on population level, and to preserve such species as "evolutionary entities" with their regional genetic and phenotypical characteristics as well as to secure their stocks in the long term. This not only serves the purpose of species protection but also promotes fish stocks that are regionally well adapted to prevailing conditions. In this connection, the BMEL is currently engaged in a pilot-type project for the molecular genetic documentation of genetic management units of the crayfish, the brown-, lake- and sea trout, the barbel, the burbot, the grayling and the tench. The knowledge gained during this project is to be incorporated in practical recommendations for the stock management of these species and made available in the

Drivers that are changing aquatic ecosystems	Effect on AqGR ***mark appropriate box***	Countermeasures and effects
		AGRDEU database for those active in the fish-related management of bodies of water.
Capture fisheries	○ Strongly positive ◉ Positive ○ Negative ○ Strongly negative ○ No effect ○ Unknown	The fisheries sector, and in particular inland fishery, operates in accordance with the relevant water management, animal welfare, veterinary matters, nature conservation and species protection regulations on the level of the Laender, on federal level and/or on EU level. The fisheries laws of the regional states define species protection and nature conservation as part of the intended purposes of fishing, and this is outlined in more specific detail in numerous regulations. As a result, commercial inland fishery poses little or no threat to species diversity and fish stocks. Other damaging effects (e.g. accidental catching of otters, beavers and birds, damage to aquatic vegetation due to catching nets) can also be avoided or mitigated by taking suitable measures. Commercial inland fishing is not the cause of water pollution through emissions. Neither, based on current knowledge, has inland fishing played any role in the extinction of fish species or the decline in fish stocks; nor has it had any other negative impacts on biodiversity (Brämick et al. 2013). The fisheries laws and regulations of Germany's regional states represent the oldest and most differentiated form of legal fish species protection. The obligation of care is aimed at achieving a diversity of fish species adapted to the water bodies in question. Moreover, the fisheries sector is committed to the protection of aquatic habitats and the protection of further aquatic species. In this way, at least freshwater fishery also has a positive impact on AqGR.
Other ***Continue listing other driverst*** Add Row / Remove Row	○ Strongly positive ○ Positive ○ Negative ○ Strongly negative ○ No effect ○ Unknown	

Chapter 3: *In Situ* Conservation of Aquatic Genetic Resources of Farmed Aquatic Species and their wild Relatives within National Jurisdiction

The main objective of Chapter 3 is to review the current status and future prospects for the *in situ* conservation of aquatic genetic resources of farmed aquatic species and their wild relatives within national jurisdiction for food and agriculture.

The specific objectives are as follows:

- To review the current and likely future contributions to *in sit*u conservation of aquatic genetic resources of farmed aquatic species and their wild relatives by those who use them in responsible and well managed capture fisheries, aquaculture, and culture-based fisheries.
- To identify and describe any existing and planned aquatic protected areas that are contributing, or will contribute, to *in situ* conservation of aquatic genetic resources of wild relatives of farmed aquatic species.
- To identify and describe any major existing and planned efforts for the *in situ* conservation of threatened or endangered aquatic genetic resources (farmed and wild).
- To review needs and priorities for the future development of *in situ* conservation of aquatic genetic resources of farmed aquatic species and their wild relatives.

Overview of the current status and future prospects for the *in situ* conservation of aquatic genetic resources of farmed aquatic species and their wild relatives

20. To what extent are responsible and well managed aquaculture and culture-based fisher*ies* contributing to *in situ* conservation of the aquatic genetic resources of farmed aquatic species and their wild relatives.

Please mark appropriate box.

- (●) To a great extent
- ( ) To a limited extent
- ( ) Not at all
- ( ) Not applicable

Please include any additional information

In German aquaculture with its regional and tightly knit structure, various locally adapted breeding populations which are characteristic of AqGR in Germany have emerged through traditional breeding work. The danger of a loss of AqGR in aquaculture exists above all through the closure of breeding and propagation in fish farms or entire businesses due to economic pressure. For this reason, the conservation of resources in aquaculture is linked to a special degree with the continuation of traditional breeding businesses.
With a view towards culture-based fisheries, in particular stocks of coregonids (Coregonus spp), trout (Salmo trutta) and Arctic char (Salvelinus alpinus and/or.S.umbla) are being artificially reproduced in German inland and coastal fisheries for enhancement stocking purposes because the natural reproduction of these species has been considerably impaired in some areas due to the loss of natural spawning grounds, for example. To maintain the genetic integrity of these populations, more and more focus is being placed on the exclusive use of parent animals from home waters for species such as the whitefish and char, which were caught at the spawning grounds. Where sea trout are concerned, some parent animals are being used which are bred under controlled conditions as the descendants of wild animals. Breeding takes place in special hatcheries. Once they have reached different sizes, the juvenile fish are released into the lakes or, in the case of the sea trout, the tributaries.

21. To what extent are existing facilities contributing to *in situ* conservation of aquatic genetic resources of wild relatives of farmed aquatic species?

Please mark appropriate box.

- ○ To a great extent
- ◉ To a limited extent
- ○ Not at all
- ○ Not applicable

Please include any additional information

Due to changes and/or degradation of spawning grounds, the in situ conservation of many wild fish populations in German lakes and flowing waters has for a long time depended on the reproduction of fish caught in the wild and hatchery reared descendants of wild fish. The production of stocking fish in aquaculture as a separate branch of industry is standard practice in many inland regions. Only in this way was it possible to conserve several fish species – some of which are also severely endangered in some regions (e.g. trout, coregonids) – and/or re-establish lost/extinct species (e.g. salmon, sturgeon, houting). Correct and proper stocking with wild fish of regional origin is anchored by law in the fishery ordinance of most federal states and forms an important basis for the in situ conservation of wild species of AqGR.
Improved water conditions have also contributed to a reduction of stocking activities in several regions.

22. Please provide ex*amples* of current or planned activities for the *in situ* conservation of endangered or threatened farmed species and their wild relatives with demonstrated or potential importance for aquaculture, culture-based fisheries, and capture fisheries.

Please describe examples

Example 1: The Federal Ministry of Food, Agriculture and Consumer Protection (BMELV, now BMEL) developed a concept for the conservation and sustainable utilisation of genetic resources for food, agriculture and forestry in 1999 and published it in the BMEL series of papers (Leaflet 487). The national programme proposed therein is made up of specialised sectoral programmes on each sub-area of genetic resources. For the sub-area of aquatic genetic resources, Germany meets its obligations with the National Programme for the Conservation and Utilisation of AqGR. It is the result of the work of a group of experts made up of representatives of fisheries administration, research institutions and associations. Under the overarching aspect of sustainability, this special programme serves above all the purpose of ensuring that the diversity of aquatic genetic resources can be maintained and utilised in the long term on the basis of scientific evidence.

Example 2: Documentation of existing breeding strains in aquaculture
As a precautionary measure for preserving AqGR, a documentation of the broodstocks on hand in German aquaculture was commissioned by the Federal Office for Agriculture and Food (BLE) for the nationwide recording of fishery businesses with their own broodstocks as their main source of income. The specific characteristics of farmed stocks were recorded and documented in microsatellite marker studies for spawning fish stocks of the food fish species grayling (Thymallus thymallus), brown trout (Salmo trutta fario), brook trout (Salvelinus fontinalis), carp (Cyprinus carpio carpio), rainbow trout (Oncorhynchus mykiss), tench (Tinca tinca), Arctic char (Salvelinus alpinus) and pike-perch (Sander lucioperca) along with the characterisation of their genetic identity, variability and family relationships. The conservation status and conservation requirements of the examined spawning fish stocks were assessed (Müller-Belecke et al. 2009). The results can be accessed via the following link to the BLE's AGRDEU database: http://agrdeu.genres.de/agrdeu.

Example 3: Due to the special need for protection of the European eel, the EU eel regulation (Reg. (EC) No. 1100/2007 of the Council of 18 September 2007 establishing measures for the recovery of stocks of European eel) came into force on 18 Sep. 2007. With this ordinance, the member states were obliged to present eel management plans (EMP) to the European Commission (COM) by the end of 2008 with proposals for the recovery of the stock of European eel. If these plans had not been presented or approved, eel fishing would have had to be restricted in the EU member states in question. Nine EMPs were submitted punctually for Germany, all of which were approved by the COM in April 2010 (all of the German plans can be downloaded at www.portal-fischerei.de). In accordance with Art. 9 of the eel regulation, the member states must in future regularly report the status of the measures taken in the eel management plans to the COM. The first implementation report on the eel management plans of the federal states of Germany was presented to the COM within the deadline at the end of June 2012.

Example 4: European Maritime and Fisheries Fund (EMFF)
Regulation (EU) No. 508/2014 of the European Parliament and of the Council of 15 May 2014 on the European Maritime and Fisheries Fund is intended to achieve the objectives of the reformed Common Fisheries Policy. The conservation and improvement of aquatic ecosystems, biodiversity and habitats through such means as ensuring the passability of water bodies, the creation of spawning grounds and measures to support fish species in special need of protection is another goal of the operational programme (EU Priority 1, Objective 2, Art. 44.6) which is promoted within the scope of the EMFF.

23. Please rank (from 1 to 10) the importance of the following objectives for *in situ* conservation of aquatic genetic resources of farmed aquatic species and their wild relatives in your country.

Objectives of *in situ* conservation	Rank 1=Very Important 10=No importance
Preservation of aquatic genetic diversity	4
Maintain good strains for aquaculture production	4
Meet consumer and market demands	4
To help adapt to impacts of climate change	6
Future breed improvement in aquaculture	5
Please continue listing any other objectives as needed	
Add Row / Remove Row	

Review of the *in situ* conservation of aquatic genetic resources of farmed aquatic species and their wild relatives through their use in responsible and well managed aquaculture and culture-based fisheries

24. Is the *in situ* conservation of aquatic genetic resources included in the policy as an objective in the management of aquaculture and/or culture-based fisheries in your country?

Please mark appropriate box

- (●) Yes
- ( ) Not yet, but planned to be included
- ( ) No
- ( ) Unknown

If yes, please give examples

The in situ conservation of AqGR is the goal of the National Programme for the Conservation and Sustainable Utilisation of AqGR. The following central objective is mentioned in the programme in this regard:
• To preserve the diversity of aquatic genetic resources in situ and ex situ in the long term based on scientific evidence and in a cost-efficient manner, to develop and make them usable through suitable measures such as evaluation, characterisation and –especially where aquaculture is concerned – make them economically viable;
The implementation of this goal is underpinned by various measures proposed in the programme.

25. To what extent are collectors of wild seed and brood stock for aquaculture and culture-based fisheries contributing to the conservation of aquatic genetic resources by maintaining habitats and/or limiting the quantities collected?

Please mark appropriate box

- ( ) To a great extent
- ( ) To a limited extent
- ( ) Not at all
- ( ) Not applicable

Please include any additional details

Seed material for aquaculture from wild populations is only used to any great extent in German aquaculture for the European eel and blue mussel.
A total of 5,574 kg of wild-caught European glass eels were introduced to German aquaculture in 2013 (Federal Statistical Office 2014). The glass eels are reared in warm water systems for use either as food fish or they are released into rivers and lakes once they have reached stocking size. No commercial glass eel fishery has existed in Germany for many years now, however. Today, all glass eels used for stocking or aquaculture purposes are imported from France, England and occasionally from Spain.
A total of 4,484 tonnes of blue mussel spat was acquired for the mussel farming industry in 2013. The mussel spat is acquired by placing artificial hard substrates in their natural habitat where the young blue mussels accumulate before being skimmed off onto on-bottom culture areas where they then grow to food mussel size. As mussel farming and the acquisition of mussel spat take place mainly within the German Wadden Sea National Park, the industry must adhere to the provisions of national park law and the relevant European directives that have been implemented into national law. By taking into account the results of research projects, fishery biology and continuous mussel monitoring, the utilisation of mussels must be organised to comply with the UN agreement on biological diversity (Rio agreement 1992) in a sustainable manner which does not harm the ecosystem, thus resulting in the particularly restrictive management of mussel stocks in terms of time and space.
For culture based fischeries wild seed and brood stock has regionally importance for species impacted due to lack of suitable spawning habitat (see Question 20 + 21). In particular the fisheries on Baltic whitefish (Coregonus maraena) in Mecklenburg-Western Pomerania is a good example for culture-based fisheries in Germany. The fisheries on this anadromic whitefish species and his conservation is highly depending on brood stock sourced from wild populations.

Review of the *in situ* conservation of aquatic genetic resources of farmed aquatic species and their wild relatives through their use in responsible and well managed capture fisheries

26. Is the conservation of aquatic genetic resources of wild relatives of farmed aquatic species included as an objective in the management of any capture fisheries in your country?

Please mark appropriate box

If yes, please give examples

- (●) Yes
- ( ) Not yet, but under development
- ( ) No
- ( ) Unknown

The principle of the sustainable utilisation of fishery resources has top priority in the fishery laws of the Laender. To achieve the related objective of securing vital fish stocks in a biodiversity as close to natural as possible, suitable management measures and utilisation forms are being defined and condensed by the terms "proper fishing" or "best practice". This includes among other things the establishment of closed seasons and minimum landing sizes for each individual fish species, as well as the coordination of the fishing methods used to regulate stocking and removal which form the legal framework for fishery management. Fishery laws also establish the basic professional qualifications required to work in the fishing industry. In the fundamental interests of the fishing industry as a whole, fishery laws are not restricted to the mere catching of fish, they include to an equal extent the obligation to preserve the entire aquatic ecosystem. In this regard, there is a high level of conformity between the goals of fishery management and those of nature conservation. There can be contradictory conservation objectives in certain instances, such as the protection of the cormorant (Phalacrocorax carbo) and the protection of fish species, as well as a potential for conflict between the fishing industry and nature conservation, because many fish populations have had to suffer a particularly sharp decline in numbers in the last two decades due to a sharp increase in cormorant numbers. As it is often impossible to compensate the losses caused by high occurrences of cormorants in certain places at certain times through fishery management measures, a responsible management of cormorant numbers would also be required to protect AqGR.

Review of the *in situ* conservation of aquatic genetic resources of farmed aquatic species and their wild relatives through the establishment and management of aquatic protected areas

27. Please list any aquatic protected areas in your country that are contributing to the *in situ* conservation of aquatic genetic resources of wild relatives of farmed aquatic species and an assessment of effectiveness

Add Row

Aquatic protected area	Effectiveness of conserving Aquatic Genetic Resources	Comments ***provide any additional information***	

Aquatic protected area	Effectiveness of conserving Aquatic Genetic Resources	Comments ***provide any additional information***	
See Table 3 (there are too many aquatic protected areas in Germany in order to list every single one)	○ Very effective ◉ Somewhat effective ○ Not effective ○ Unknown	Large areas of Germany have various protection statuses with regard to nature and the environment, and the programme also needs to take account of these statuses. The list in Table 3 provides an overview. The protection areas comprise a broad spectrum of the occurring landscape formations in Germany with the corresponding typical animal and plant species. Of particular relevance in connection with the in-situ protection of AqGR are protection areas that contain large water areas and watercourses, such as the Lower Saxony, Hamburg and Schleswig-Holstein Wadden Sea national parks, the Vorpommersche Boddenlandschaft park, the Müritz und Unteres Odertal valley or the Oberlausitzer Heide- und Teichlandschaft biosphere reserve. As in the last-named case, the existence of ponds or pond landscapes is in various cases the very reason for the protection order, as carp ponds and their environment in particular can be of paramount importance for the preservation of numerous and sometimes rare animal and plant species. Fishing is generally permitted in most of the protection area categories. However, fishing and aquaculture are restricted or totally prohibited in certain protection areas if this is required by the purpose of the protection order. Alongside the protection areas in the categories listed above, it is above all the network of areas reported under "Natura 2000" that are of relevance in connection with the in-situ protection AqGR. These areas are made up of areas that have been reported to the EU based on the "Habitats Directive" (92/43/EEC) and the "Birds Directive" (79/409/EEC). Some of these areas overlap, and some also overlap with the aforementioned protection areas. According to the Federal Agency for Nature Conservation (BfN), all the Natura 2000 areas together cover around 13.5% of the terrestrial area of Germany and 41% of the marine area. To date, Germany has submitted 4,619 FFH areas spread across three biogeographic regions (Alpine, Atlantic, Continental). This is equivalent to a reporting share of 9.3% based on the land area. Then there are 2,122,161 ha of Lake Constance as well as marine, lagoon and mudflat areas (as of 30 September 2011). Germany's Exclusive Economic Zone (EEZ) accounts for 943,984 ha of these marine protection areas. The protection areas in the Natura 2000 ecological network mainly serve to ensure the protection of the habitat types and species of Community importance listed in Annexes I and II of the FFH Habitats Directive as well as the bird species listed in Annex I of the Birds Directive and other regularly occurring migratory bird species in the member states. Some of the wild relatives of the aquaculture species listed in Tab. 1.2 and specific aquatic habitat types are listed in the Annexes of the Habitats Directive and are therefore protected. The many protection area and protection area categories in Germany make it difficult to assess their individual effect on the in-situ conservation of the AqGR. In principle, all protection areas designed to promote conservation, restoration and the interconnection of aquatic habitats	X

Aquatic protected area	Effectiveness of conserving Aquatic Genetic Resources	Comments ***provide any additional information***	
		should have a positive impact on the in-situ conservation of the wild relatives of the AqGR. In some cases, there are competing protection goals, above all between the protection of fish species and birds (see Question 26).	
NATURA 2000 site "Ahrtal"	○ Very effective ◉ Somewhat effective ○ Not effective ○ Unknown	The formerly extincted salmon is successfully reintroduced in the river Ahr and is now one of the species which is protected by the EU "Habitats Directive" in the NATURA 2000 site "Ahrtal"	X
Lower Oder Valley National Park	○ Very effective ◉ Somewhat effective ○ Not effective ○ Unknown	The Lower Oder Valley National Park is of some importance for the reintroduction of the Baltic sturgeon.	X
Oberlausitzer Heide- und Teichlandschaft UNESCO Biosphere Reserve	◉ Very effective ○ Somewhat effective ○ Not effective ○ Unknown	The Oberlausitzer Heide- und Teichlandschaft UNESCO Biosphere Reserve is the only biosphere reserve in Saxony and one of the largest pond areas in Germany. This pond area is of particular importance for the in situ conservation of many aquatic and semiaquatic species.	X

Chapter 4: *Ex Situ* Conservation of Aquatic Genetic Resources of Farmed Aquatic Species and their Wild Relatives within National Jurisdiction

The main objective of Chapter 4 is to review the current status and future prospects for the *ex situ* conservation of aquatic genetic resources of farmed aquatic species and their wild relatives.

The specific objectives are:

- To review existing *ex situ* conservation of aquatic genetic resources of farmed aquatic species and their wild relatives in aquaculture facilities, culture collections and gene banks, research facilities, zoos and aquaria;
- To review the contributions that various stakeholders are making to the *ex situ* conservation of aquatic genetic resources of farmed aquatic species and their wild relatives;
- To review needs and priorities for the future development of *ex situ* conservation of aquatic genetic resources of farmed aquatic species and their wild relatives, including any that are threatened or endangered.

Review of existing and planned collections of live breeding individuals of aquatic genetic resources of farmed aquatic species and their wild relatives

28. Please list your country's existing collections of live breeding aquatic organisms that can be considered as contributing to the *ex situ* conservation of aquatic genetic resources. This includes not only collections of species farmed directly for human use, but also collections of live feed organisms (e.g., bacterial flocs, yeasts, microalgae, rotifers and brine shrimp (*Artemia*)).

Add Row

Species (*include information on subspecies or strain in comments if available*)	Type of use ***Please mark all that apply***	Is the species (or subspecies) threatened or endangered for example in the IUCN Red List, CITES Appendices or national lists? ***Please mark appropriate box***	Comments ***Please list any additional information***	
Acipenser sturio	☐ Direct human consumption ☐ Live feed organism ☒ Other	◉ Yes ○ No ○ Unknown	There is parent fish collections that are kept as ex-situ collections for resettlement purposes as a genetic reserve for the purpose of reproduction.	X
Salmo salar	☐ Direct human consumption ☐ Live feed organism ☒ Other	◉ Yes ○ No ○ Unknown	For salmon, there are parent fish collections that are kept as ex situ collections for resettle-ment purposes as a genetic reserve for the purpose of re-production.	X
Alosa alosa	☐ Direct human consumption ☐ Live feed organism ☒ Other	◉ Yes ○ No ○ Unknown	For allis shad, an ex situ collection is being created for resettle-ment purposes as a genetic reserve for the purpose of re-production.	X

Species (*include information on subspecies or strain in comments if available*)	Type of use ***Please mark all that apply***	Is the species (or subspecies) threatened or endangered for example in the IUCN Red List, CITES Appendices or national lists? ***Please mark appropriate box***	Comments ***Please list any additional information***	
Oncorhynchus mykiss	☒ Direct human consumption ☐ Live feed organism ☐ Other	○ Yes ◉ No ○ Unknown	A special resistant rainbow trout strain ("Bornforelle") adapted to brackish water that has been reared in the State Research Institute for Agri-culture and Fisheries of Mecklenburg-Western Pom-erania for decades.	X
Astacus astacus	☐ Direct human consumption ☐ Live feed organism ☒ Other	◉ Yes ○ No ○ Unknown	Special parent animal collec-tions exist at, among other places, the LANUV NRW and other institutes	X
Chelon labrosus	☒ Direct human consumption ☐ Live feed organism ☐ Other	○ Yes ◉ No ○ Unknown	Special parent animal collec-tion at the Fraunhofer EMB for establishment in aquaculture for closed recirculation facilities in northern Europe	X
Microalga	☒ Direct human consumption ☒ Live feed organism ☒ Other	○ Yes ◉ No ○ Unknown	The Culture Collection of Al-gae at Goettingen University (international acronym SAG) is a living resource of culture material of microalgae and is among the five largest algal service collections in the world. It serves the scientific community and also the educational field through its service and curatorial roles. A huge diversity of about 1,600 species of microscopic algae (about 2400 strains) are currently available. Customers are scientists worldwide from various types of institutions, industries, and environmental research agencies.	X
Acipenser oxyrinchus	☐ Direct human consumption ☐ Live feed organism ☒ Other	◉ Yes ○ No ○ Unknown	There is parent fish collections that are kept as ex-situ collections for resettlement purposes as a genetic reserve for the purpose of reproduction.	X

Review of existing *ex situ* conservation activities of aquatic genetic resources of farmed aquatic species and their wild relatives *in vitro*.

29. Please list your country's *in vitro* collections and gene banks of the gametes, embryos, tissues, spores and other quiescent forms of farmed aquatic species and their wild relatives , using cryopreservation or other methods of long-term storage. Describe the major examples, identifying the facilities in which the collections are held. Include examples of any such genetic material from your country that is being kept in *in vitro* collections outside your country on behalf of beneficiaries in your country.

Add Row

Species (include information on subspecies or strain if available in comments)	Users and managers ***List all that apply***	Type of *ex-situ* conservation collection *in vitro* ***mark all that apply***	Facilities where collection is located ***mark all that apply***	Comments ***list all breeds, subspecies of the species and any additional information***	
Acipenser sturio	Leibniz Institute of Freshwater Ecology and Inland Fisheries (IGB)	☒ In vitro collection of gametes ☐ In vitro collextion of embryos ☐ In vitro collection of tissues ☐ Spores ☐ Other	☐ Aquaculture facilities ☒ Research facilities ☐ Universities ☐ Zoos and aquaria ☐ Other	Cryoconservaton of sperm for conservation purposes	X
Salmo salar	"Alfred Brehm" German Cell Bank for Wildlife	☒ In vitro collection of gametes ☐ In vitro collextion of embryos ☐ In vitro collection of tissues ☐ Spores ☐ Other	☐ Aquaculture facilities ☒ Research facilities ☐ Universities ☐ Zoos and aquaria ☐ Other	Tissue from which the cells originate: entire specimen – juvenile animal	X
Acipenser oxyrinchus	"Alfred Brehm" German Cell Bank for Wildlife; Leibniz Institute of Freshwater Ecology and Inland Fisheries (IGB)	☒ In vitro collection of gametes ☐ In vitro collextion of embryos ☐ In vitro collection of tissues ☐ Spores ☐ Other	☐ Aquaculture facilities ☒ Research facilities ☐ Universities ☐ Zoos and aquaria ☐ Other	Tissue from which the cells originate: larva. Cryoconservaton of sperm for conservation purposes	X
Salmo Trutta	"Alfred Brehm" German Cell Bank for Wildlife	☒ In vitro collection of gametes ☐ In vitro collextion of embryos ☐ In vitro collection of tissues ☐ Spores ☐ Other	☐ Aquaculture facilities ☒ Research facilities ☐ Universities ☐ Zoos and aquaria ☐ Other	Tissue from which the cells originate: heart + larva	X

Species (include information on subspecies or strain if available in comments)	Users and managers ***List all that apply***	Type of *ex-situ* conservation collection *in vitro* ***mark all that apply***	Facilities where collection is located ***mark all that apply***	Comments ***list all breeds, subspecies of the species and any additional information***	
Anguilla anguilla	"Alfred Brehm" German Cell Bank for Wildlife	☒ In vitro collection of gametes ☐ In vitro collextion of embryos ☐ In vitro collection of tissues ☐ Spores ☐ Other	☐ Aquaculture facilities ☒ Research facilities ☐ Universities ☐ Zoos and aquaria ☐ Other	Tissue from which the cells originate: entire specimen	X
Coregonus maraena	"Alfred Brehm" German Cell Bank for Wildlife	☒ In vitro collection of gametes ☐ In vitro collextion of embryos ☐ In vitro collection of tissues ☐ Spores ☐ Other	☐ Aquaculture facilities ☒ Research facilities ☐ Universities ☐ Zoos and aquaria ☐ Other	Tissue from which the cells originate: larva	X
Oncorhynchus mykiss	"Alfred Brehm" German Cell Bank for Wildlife	☒ In vitro collection of gametes ☐ In vitro collextion of embryos ☐ In vitro collection of tissues ☐ Spores ☐ Other	☐ Aquaculture facilities ☐ Research facilities ☐ Universities ☐ Zoos and aquaria ☐ Other	Tissue from which the cells originate: skin, brain, kidney, liver, larva	X
Acipenser baerii	"Alfred Brehm" German Cell Bank for Wildlife	☒ In vitro collection of gametes ☐ In vitro collextion of embryos ☐ In vitro collection of tissues ☐ Spores ☐ Other	☐ Aquaculture facilities ☒ Research facilities ☐ Universities ☐ Zoos and aquaria ☐ Other	Tissue from which the cells originate: kidney, larva	X
Psetta maxima	"Alfred Brehm" German Cell Bank for Wildlife	☒ In vitro collection of gametes ☐ In vitro collextion of embryos ☐ In vitro collection of tissues ☐ Spores ☐ Other	☐ Aquaculture facilities ☒ Research facilities ☐ Universities ☐ Zoos and aquaria ☐ Other	Tissue from which the cells originate: brain, spleen	X

Species (include information on subspecies or strain if available in comments)	Users and managers ***List all that apply***	Type of *ex-situ* conservation collection *in vitro* ***mark all that apply***	Facilities where collection is located ***mark all that apply***	Comments ***list all breeds, subspecies of the species and any additional information***	
Silurus glanis	"Alfred Brehm" German Cell Bank for Wildlife	☒ In vitro collection of gametes ☐ In vitro collextion of embryos ☐ In vitro collection of tissues ☐ Spores ☐ Other	☐ Aquaculture facilities ☒ Research facilities ☐ Universities ☐ Zoos and aquaria ☐ Other	Tissue from which the cells originate: entire specimen – juvenile animal	X
Cyprinus carpio	"Alfred Brehm" German Cell Bank for Wildlife	☒ In vitro collection of gametes ☐ In vitro collextion of embryos ☐ In vitro collection of tissues ☐ Spores ☐ Other	☐ Aquaculture facilities ☐ Research facilities ☐ Universities ☐ Zoos and aquaria ☐ Other	DNA from fertilised, enucleated oocytes of rare carp breeding lines, sperm	X
Gadus morhua	"Alfred Brehm" German Cell Bank for Wildlife	☒ In vitro collection of gametes ☐ In vitro collextion of embryos ☐ In vitro collection of tissues ☐ Spores ☐ Other	☐ Aquaculture facilities ☒ Research facilities ☐ Universities ☐ Zoos and aquaria ☐ Other	Tissue from which the cells originate: liver, brain, skin, muscle	X
Pleuronectes platessa	"Alfred Brehm" German Cell Bank for Wildlife	☒ In vitro collection of gametes ☐ In vitro collextion of embryos ☐ In vitro collection of tissues ☐ Spores ☐ Other	☐ Aquaculture facilities ☒ Research facilities ☐ Universities ☐ Zoos and aquaria ☐ Other	Tissue from which the cells originate: spleen, liver	X
Dicentrarchus labrax	"Alfred Brehm" German Cell Bank for Wildlife	☒ In vitro collection of gametes ☐ In vitro collextion of embryos ☐ In vitro collection of tissues ☐ Spores ☐ Other	☐ Aquaculture facilities ☒ Research facilities ☐ Universities ☐ Zoos and aquaria ☐ Other	Tissue from which the cells originate: skin, muscle, liver	X

30. Please rank (from 1 – 10) the importance of the following objectives for ex situ conservation of aquatic genetic resources of farmed aquatic species and their wild relatives in your country

Objectives of *ex situ* conservation	Rank 1=Very Important 10=No importance
Preservation of aquatic genetic diversity	9
Maintain good strains for aquaculture production	10
Meet consumer and market demands	10
To help adapt to impacts of climate change	10
Future breed improvement in aquaculture	8
Other ***Continue adding row as necessary***	
Add Row / Remove Row	

Chapter 5: Stakeholders with Interests in Aquatic Genetic Resources of Farmed Aquatic Species and their Wild Relatives within National Jurisdiction

The main objective of Chapter 5 is to provide an overview of the perspectives and needs of the principal stakeholders who have interests in aquatic genetic resources of farmed aquatic species and their wild relatives for food and agriculture. Stakeholder groups can be identified from existing institutional knowledge, from sectoral and sub-sectoral consultations conducted during the country reporting process and where necessary from expert opinions. Gender issues pertaining to the conservation, sustainable use and development of aquatic genetic resources of farmed aquatic species and their wild relatives should be considered, as well as the perspectives and needs of indigenous peoples and local communities.

The specific objectives are:

- To describe the different principal stakeholder groups with interests in aquatic genetic resources of farmed aquatic species and their wild relatives To identify the type(s) of aquatic genetic resources of farmed aquatic species and their wild relatives in which each stakeholder group has interests and why.

- To describe the roles of stakeholder groups and the actions they are taking for the conservation, sustainable use and development of the aquatic genetic resources in which they have interests.

- To describe the further actions that stakeholder groups would like to see taken for the conservation, sustainable use and development of aquatic genetic resources in which they have interests, and the constraints that are hindering those actions, including lack of capacity and perceived threats.

Overview of the principal stakeholder groups who have interests in aquatic genetic resources of farmed aquatic species and their wild relatives

31. Please indicate the principal stakeholder groups who have interests in aquatic genetic resources of farmed aquatic species and their wild relatives including, *inter alia*: fish farmers; fishers in capture fisheries; persons involved in stocking and harvesting in culture-based fisheries; persons employed in postharvest chains; government officials; staff and members of aquaculture associations; managers of aquatic protected areas and others working for the conservation of aquatic ecosystems; researchers; and civil society.

Stakeholders	Role of stakeholder in regards og AqGR ***mark all that apply***	Genetic resource of main interest ***mark all that apply***	Comments ***Please provide any information or explanation of stakeholders' role***
Fish Farmers	☒ Conservation ☒ Production ☐ Feed manufactoring ☒ Breeding ☐ Research ☒ Marketing ☒ Processing ☐ Advocacy ☒ Outreach/Extension ☐ Other (**specify**)	☐ DNA ☒ Stock, breed or variety ☒ Species ☐ Other	All aquaculture businesses in Germany are SMEs (small and medium enter-prises). They are often run by families who work in all production stages of the value-added chain, from breeding to marketing. The maintenance of aquaculture stocks in Germany is therefore primarily in the hands of small aquaculture businesses. The production of fish for stocking purposes to maintain wild stocks is also carried to a great extent by businesses of this kind.
Fishers	☐ Conservation ☒ Production ☐ Feed manufactoring ☒ Breeding ☐ Research ☒ Marketing ☒ Processing ☐ Advocacy ☒ Outreach/Extension ☐ Other (**specify**)	☐ DNA ☐ Stock, breed or variety ☒ Species ☐ Other	The freshwater and coastal fishing sector in Germany is also dominated by small to medium-sized family enterprises with regional roots who are active in various production phases from capture through to processing and marketing.

Stakeholders	Role of stakeholder in regards og AqGR ***mark all that apply***	Genetic resource of main interest ***mark all that apply***	Comments ***Please provide any information or explanation of stakeholders' role***
Fish hatchery people	☒ Conservation ☒ Production ☐ Feed manufactoring ☒ Breeding ☐ Research ☐ Marketing ☐ Processing ☐ Advocacy ☐ Outreach/Extension ☐ Other (**specify**)	☐ DNA ☐ Stock, breed or variety ☒ Species ☐ Other	Fish breeding businesses involved exclusively in breeding and production tend to be the exception rather than the rule in the relatively lowly specialised German aquaculture sector. There are, however, a few state-run fish breeding institutes that produce seed fish for natural waters in order to support the stocks of demanding fish species such as coregones, whose natural reproduction ability is impaired.
People involved in marketing	☐ Conservation ☐ Production ☐ Feed manufactoring ☐ Breeding ☐ Research ☒ Marketing ☒ Processing ☒ Advocacy ☒ Outreach/Extension ☐ Other (**specify**)	☐ DNA ☐ Stock, breed or variety ☒ Species ☐ Other	The influence of this stakeholder group on the AqGR is considered to be very low.
Government resource managers	☒ Conservation ☒ Production ☐ Feed manufactoring ☒ Breeding ☒ Research ☒ Marketing ☐ Processing ☒ Advocacy ☒ Outreach/Extension ☐ Other (**specify**)	☒ DNA ☒ Stock, breed or variety ☒ Species ☐ Other	In Germany, fishery authorities and fishery institutions play a key role in the conservation of AqGR.

Stakeholders	Role of stakeholder in regards og AqGR ***mark all that apply***	Genetic resource of main interest ***mark all that apply***	Comments ***Please provide any information or explanation of stakeholders' role***
Fishing or aquaculture associations	☒ Conservation ☒ Production ☐ Feed manufactoring ☒ Breeding ☐ Research ☐ Marketing ☒ Processing ☒ Advocacy ☒ Outreach/Extension ☐ Other (**specify**)	☐ DNA ☒ Stock, breed or variety ☒ Species ☐ Other	German commercial and hobby fishermen are organised in a wide range of associations and federations. As the umbrella association, the Deutscher Fischerei-Verband e. V. fishing association comprises the commercial and leisure fishermen in the fields of high-sea fishing, coastal fishing, fresh-water fishing and aquaculture. The fishermen and anglers are the people who actually look after and manage the bodies of water. In doing so, they share their traditional know-how and display a high level of honorary commitment. The associations of the commercial and hobby fishermen are important actors in the implementation of the AqGR programme.
Aquatic protected area managers	☒ Conservation ☐ Production ☐ Feed manufactoring ☐ Breeding ☐ Research ☐ Marketing ☐ Processing ☒ Advocacy ☒ Outreach/Extension ☐ Other (**specify**)	☐ DNA ☐ Stock, breed or variety ☒ Species ☐ Other	

Stakeholders	Role of stakeholder in regards og AqGR ***mark all that apply***	Genetic resource of main interest ***mark all that apply***	Comments ***Please provide any information or explanation of stakeholders' role***
Policy Makers	☒ Conservation ☒ Production ☒ Feed manufactoring ☒ Breeding ☒ Research ☒ Marketing ☒ Processing ☒ Advocacy ☒ Outreach/Extension ☐ Other (**specify**)	☒ DNA ☒ Stock, breed or variety ☒ Species ☐ Other	Are involved within the framework of legislative processes in all listed areas and provide funds for the implementation of programmes and research projects geared towards the protection and sustainable use of AqGR.
Non-Governmental Organizations	☒ Conservation ☒ Production ☒ Feed manufactoring ☒ Breeding ☒ Research ☒ Marketing ☒ Processing ☒ Advocacy ☒ Outreach/Extension ☐ Other (**specify**)	☐ DNA ☒ Stock, breed or variety ☒ Species ☐ Other	Numerous NGOs are committed to the conservation of the AqGR and their habitats on regional or national level.
Intergovernmental Organizations	☒ Conservation ☒ Production ☐ Feed manufactoring ☐ Breeding ☒ Research ☐ Marketing ☐ Processing ☐ Advocacy ☒ Outreach/Extension ☐ Other (**specify**)	☐ DNA ☒ Stock, breed or variety ☒ Species ☐ Other	Committed on national level to the protection and conservation of the AqGR.

Stakeholders	Role of stakeholder in regards og AqGR ***mark all that apply***	Genetic resource of main interest ***mark all that apply***	Comments ***Please provide any information or explanation of stakeholders' role***
Donors	☐ Conservation ☐ Production ☐ Feed manufactoring ☐ Breeding ☐ Research ☐ Marketing ☐ Processing ☐ Advocacy ☐ Outreach/Extension ☐ Other (**specify**)	☐ DNA ☐ Stock, breed or variety ☐ Species ☐ Other	The influence of this stakeholder group on the AqGR is assessed as being very low.
Consumers	☐ Conservation ☐ Production ☐ Feed manufactoring ☐ Breeding ☐ Research ☒ Marketing ☒ Processing ☐ Advocacy ☐ Outreach/Extension ☐ Other (**specify**)	☐ DNA ☐ Stock, breed or variety ☒ Species ☐ Other	Consumers influence the AqGR above all through their purchase decisions.

a) Please indicate the most important role of women in regards to AqGR

In Germany, women enjoy the same rights as men. Women are greatly underrepresented in the production sector, however.

b) Please indicate the most important role of indigenous and local communities in regards to AqGR

Chapter 6: National Policies and Legislation for Aquatic Genetic Resources of Farmed Aquatic Species and their Wild Relatives within National Jurisdiction

The main objective of Chapter 6 is to review the status and adequacy of national policies and legislation concerning aquatic genetic resources of farmed aquatic species and their wild relatives including access and benefit sharing.

The specific objectives are as follows:

- To describe the existing national policy and legal framework for the conservation, sustainable use and development of aquatic genetic resources of farmed aquatic species and their wild relatives.
- To review current national policies and instruments for access to aquatic genetic resources of farmed aquatic species and their wild relatives and the fair and equitable sharing of benefits arising from their utilization.
- To identify any significant gaps in policies and legislation concerning aquatic genetic resources of farmed aquatic species and their wild relatives..

Review of national policies and legislation for Aquatic Genetic Resources of farmed aquatic species and their wild relatives within national jurisdiction

32. Please list national legislation, policies and/or mechanisms that address aquatic genetic resources of farmed species and their wild relatives (see question 47 regarding international agreements).

Add Row

National legislation, policy and/or mechanism	Date established	Scope ***Select all that apply***	Comments ***Please provide any additional information for example whether it has been effective or not; and main sources of information***	
Regulation (EU) 511/2014 on compliance measures for users from the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilisation in the Union - national legislation in preparation	April 16, 2014	☐ Genes or molecules only ☒ Aquaculture ☒ Capture fisheries ☒ Conservation ☒ Intellectual property protection ☒ Importation ☒ Trade and commerce ☒ Access and benefit sharing ☐ Other	Legislation in Germany on ABS is based on the compliance provisions outlined in the Nagoya Protocol. Germany will ratify the Nagoya Protocol and implement the relevant compliance obligations through transposition of the EU Directive.	X
REG EC 1100/2007 with Establishing measures for the recovery of the stock of European eel - this EU regulation is translocated in national law by the fisheries laws ofthe German Laender (see below)	Sept 18, 2007	☐ Genes or molecules only ☒ Aquaculture ☒ Capture fisheries ☒ Conservation ☐ Intellectual property protection ☐ Importation ☒ Trade and commerce ☐ Access and benefit sharing ☐ Other	Contains measures for the recovery of the stock of European eel.	X

National legislation, policy and/or mechanism	Date established	Scope ***Select all that apply***	Comments ***Please provide any additional information for example whether it has been effective or not; and main sources of information***	
REGULATION (EC) No. 708/2007 concerning use of alien and locally absent species in aquaculture this EU regulation is translocated in national law by the fisheries laws ofthe German Laender (see below)	June 11, 2007	☐ Genes or molecules only ☒ Aquaculture ☐ Capture fisheries ☐ Conservation ☐ Intellectual property protection ☒ Importation ☒ Trade and commerce ☐ Access and benefit sharing ☐ Other	Serves to protect against aquatic inva-sive species.	X
Act on the Regulation of Marine Fisheries and Implementation of the Fisheries Law of the European Union (SeeFischG) (last amended 7 August 2013)	July 9, 1984	☐ Genes or molecules only ☐ Aquaculture ☒ Capture fisheries ☒ Conservation ☐ Intellectual property protection ☐ Importation ☐ Trade and commerce ☐ Access and benefit sharing ☐ Other	In German law, the German Marine Fisheries Act (SeeFischG) forms the basis for commercial fishing at sea, in particular in the Exclusive Economic Zone of the North and Baltic Sea. It also defines the tasks and responsibilities for the official monitoring of marine fishing. In addition to transposing international agreements on fishery, the Act above all complies with the EU provisions on marine fishery arising from the Com-mon Fisheries Policy (CFP).	X

National legislation, policy and/or mechanism	Date established	Scope ***Select all that apply***	Comments ***Please provide any additional information for example whether it has been effective or not; and main sources of information***	
Fisheries laws of the German Laender, 16 in all): Baden-Württemberg 11/1979 (last amendment 07/2015) Bavaria October 2008 Berlin September 2000 Brandenburg 05/1993 (last amend-ment 09/1997) Bremen September 1991 Hamburg May 1986 Hesse December 1990 Mecklenburg-Western Pomerania April 2005 Lower Saxony 02/1978 (last amend-ment 12/1989) North Rhine-Westphalia June 1994 Rhineland-Palatinate 12/1974 (last amend-ment 12/1990) Saarland July1999 Saxony August 2008 Saxony-Anhalt 08/1993 (last amend-ment 04/2005) Schleswig-Holstein 02/1996 (last amend-ment 10/2011) Thuringia October 1992		☐ Genes or molecules only ☒ Aquaculture ☒ Capture fisheries ☒ Conservation ☐ Intellectual property protection ☐ Importation ☐ Trade and commerce ☐ Access and benefit sharing ☐ Other	The German Laender have the sole responsibility for freshwater fisheries and aquaculture, and they also implement the regulations for coastal fishing within the 12-sm zone. The focal points of their activities include the protection of fish species (maintenance obligation, stocking stipulations, closed seasons, protected sizes, protected regions, water protection, extraction rules).	X

National legislation, policy and/or mechanism	Date established	Scope ***Select all that apply***	Comments ***Please provide any additional information for example whether it has been effective or not; and main sources of information***	
Federal Nature Conservation Act (BNatschG) (last amendment 10/2011)	December 1976	☐ Genes or molecules only ☐ Aquaculture ☐ Capture fisheries ☒ Conservation ☐ Intellectual property protection ☒ Importation ☒ Trade and commerce ☐ Access and benefit sharing ☐ Other	German nature conservation law contains a number of framework provisions concerning the specific protection of species also covered by fisheries law. It is also via the nature conservation laws that the EU Habitats Directive is trans-posed into national law, and these laws are of relevance to the wild populations of AqGR, as they stipulate the protection of specific species and habitats. In addition, the German nature conserva-tion laws are the laws via which the Cites provisions are transposed into German law.	X
Federal Water Resources Act (WHG) and water laws of the Laender	June 2006	☐ Genes or molecules only ☒ Aquaculture ☐ Capture fisheries ☒ Conservation ☐ Intellectual property protection ☐ Importation ☐ Trade and commerce ☐ Access and benefit sharing ☐ Other	The water laws contain provisions on the protection of surface waters and groundwater.	X

National legislation, policy and/or mechanism	Date established	Scope ***Select all that apply***	Comments ***Please provide any additional information for example whether it has been effective or not; and main sources of information***	
National Strategy Plan for the development of aquaculture	July 2014	☐ Genes or molecules only ☒ Aquaculture ☐ Capture fisheries ☐ Conservation ☐ Intellectual property protection ☐ Importation ☒ Trade and commerce ☐ Access and benefit sharing ☒ Other	The new EU Fisheries Regulation (REG (EU) 1380/2013) concerning the Joint Fisheries Policy of the EU (CFP) also includes aquaculture for the first time, which means greater importance is at-tached to aquaculture than was previ-ously the case. The EU member states undertake to draw up their own "na-tional strategy plans" for the develop-ment of the sector and to submit these plans to the EU Commission. The na-tional aquaculture strategy plan for German was submitted to the EU Com-mission in July 2014. This strategy plan basically pursues three goals and is structured accordingly: 1. A detailed review and description of the current situation in German aquaculture including specific list-ing of the main obstacles to devel-opment 2. The formulation of fundamental and generally valid long-term strategic goals as well as the derivation of concrete sectoral growth targets for German aquaculture for the medium term (strategic planning section) 3. The formulation of the necessary measures to achieve the strategic goals	X
German Genetic Engineering Act (GenTG) (last amendment December 2010)	June 1990	☒ Genes or molecules only ☐ Aquaculture ☐ Capture fisheries ☐ Conservation ☐ Intellectual property protection ☐ Importation ☐ Trade and commerce ☐ Access and benefit sharing ☐ Other	The German Genetic Engineering Act (GenTG) was adopted in order to create a legal framework for the use of genetic engineering and to prevent risks. As a subordinate set of rules to the GenTG, the Genetic Engineering Safety Ordinance governs safety requirements for genetic engineering facilities and the release of genetically modified organisms into the environment.	X

Review of the current status and gaps in national policies and legislation for the conservation, sustainable use and development of aquatic genetic resources of farmed aquatic species and their wild relatives

33. Please list any gaps in the coverage or constraints in implementing national legislation, policies and/or mechanisms in regard to aquatic genetic resources.

As the legislative power over freshwater fishery and aquaculture lies with Germany's federal Laender, the development of the sector and its administrative structures vary considerably from region to region. Alongside the fisheries laws in the various Laender, however, there are other laws that directly influence the development of fishing and fish breeding in freshwater areas and aquaculture facilities, such as nationwide laws on water management, animal protection, veterinary matters, building conservation, nature conservation and species protection, as well as European directives and regulations like the Water Framework Directive, the Habitats Directive, the Regulation concerning use of alien and locally absent species in aquaculture, and the Regulation on the recovery of the stock of the European eel. In particular, the considerable increase in EU-wide regulations in the recent past is resulting in serious adaptation and implementation problems in companies and fisheries authorities (Brämick et al. 2013). In some cases, the outlined structural problems with regard to legislative responsibilities are also leading to restrictions with regard to the protection and sustainable use of AqGR. Moreover, in its Communication to the Council of 2009, the EU Commission already described the main obstacles that are complicating the continuation and development of aquaculture as a vehicle for aquatic genetic diversity: "limited access to space and licensing; industry fragmentation; limited access to seed capital or loans for innovation in a risky context (particularly with constant changes in the economic situation and in trade patterns); pressure from imports; insufficiency of medicines and vaccines. In addition, stringent EU rules, particularly on environmental protection, generate competitive constraints vis-à-vis competitors in Asia or Latin America." This general description is an appropriate characterisation of the situation in Germany, and the access to the resources of space and water as well as the bureaucratic effort required from enterprises are to be seen as the main starting point for improvements. Above all, simplified provisions in the field of the water laws and nature conservation (Natura-2000) regulations are considered to be necessary for the development of the aquaculture sector.

34. Please indicate any national aquatic genetic resources of farmed aquatic species and their wild relatives for which your country restricts access.

Type of genetic resource (can be species name, DNA, gametes or other descriptor)	Comments ***Please, provide verifiable main sources of information, effectiveness of the restriction, description of type of restriction and for whom does the restriction apply***
DNA	In Germany, there is no legislation restricting access to genetic resources in line with CBD Article 15 or the Nagoya Protocol.
Stock, breed or variety	In Germany, there is no legislation restricting access to genetic resources in line with CBD Article 15 or the Nagoya Protocol.
Species	In Germany, there is no legislation restricting access to genetic resources in line with CBD Article 15 or the Nagoya Protocol.
Other **Continue adding row as necessary** Add Row / Remove Row	

35. Over the past 10 years, indicate the actions your country has taken to maintain or enhance access to aquatic genetic resources of farmed aquatic species and their wild relatives located outside your country; for example, by establishing germplasm acquisition agreements or material transfer agreements.

Add Row

Action taken to enhance access to aquatic genetic resources outside your country	Type of genetic resource ***Mark all that apply***	Comment ***for example other types of genetic resources***	
	☐ DNA ☐ Genes ☐ Gametes ☐ Tissues ☐ Embryos ☐ Living specimens		X

36. Please indicate any obstacles your country has encountered when trying to access aquatic genetic resources of farmed aquatic species and their wild relatives outside of your country (including access for research purposes).

Obstacles to accessing aquatic genetic resources	Please describe type of genetic resource ***mark all that apply***	Comments ***please include additional information as needed***
Intellectual property protection	☐ DNA ☐ Stock, breed or variety ☐ Species ☐ Other	
National laws of your country	☒ DNA ☒ Stock, breed or variety ☒ Species ☐ Other	Implementation of the Nagoya Protocol in Germany is via transposition of EU Regulation No. 511/2014 (in force since 12 October 2014) and the German Transposition Act (not yet in force). The Nagoya Protocol and its national implementation will make it more difficult to access AqGR from other countries, as the user in the EU/Germany will be subject to a duty of care and reporting obligations that involve a great deal of bureaucratic effort, and as there will be sanctions for noncompliance.
National laws of donor country	☒ DNA ☒ Stock, breed or variety ☒ Species ☐ Other	Independently of the various national access regulations (ABS laws) under the Nagoya Protocol, access to genetic resources from the country in question can be limited to differing degrees but will in any case involve a high level of bureaucracy.
Internationl laws or protocols	☒ DNA ☒ Stock, breed or variety ☒ Species ☐ Other	The implementation of the CBD and the Nagoya Protocol can lead to considerable restrictions on access/bureaucratic hurdles in the various countries.
Too expensive	☐ DNA ☐ Stock, breed or variety ☐ Species ☐ Other	There are no experiences to date in Germany with the implementation of the Nagoya Protocol for AqGR.
Material transfer agreements required	☒ DNA ☒ Stock, breed or variety ☒ Species ☐ Other	Non-profit MTAs are signed by universities and other research institutions for the transfer of biologi-cal/ chemical material for research purposes. Up to now, this has been consid-ered relatively unproblem-atic.
Knowledge gaps	☒ DNA ☒ Stock, breed or variety ☒ Species ☐ Other	In connection with the new regulations due to the Nagoya Protocol, it is currently still very difficult to obtain concrete information regarding the national provisions of po-tential donor countries.

Obstacles to accessing aquatic genetic resources	Please describe type of genetic resource ***mark all that apply***	Comments ***please include additional information as needed***
Public perception	☐ DNA ☐ Stock, breed or variety ☐ Species ☐ Other	Low level of public perception to date and no data based on experience.
Other **Continue adding row as necessary** Veterinary certificate, Cites certificate Add Row / Remove Row	☒ DNA ☒ Stock, breed or variety ☒ Species ☐ Other	Obtaining veterinary and Cites certificates can involve a high degree of bureaucracy, in particular when importing living AqGR.

Chapter 7: Research, Education, Training and Extension on Aquatic Genetic Resources within National Jurisdiction: Coordination, Networking and Information

The main objective of Chapter 7 is to review the status and adequacy of national research, education, training and extension, coordination and networking arrangements and information systems that support the conservation, sustainable use and development of aquatic genetic resources of farmed aquatic species and their wild relatives for food and agriculture.

The specific objectives are:

- To describe the current status, future plans, gaps, needs and priorities for research, training, extension and education on the conservation, sustainable use and development of aquatic genetic resources of farmed aquatic species and their wild relatives
- To describe existing or planned national networks for the conservation, sustainable use and development of aquatic genetic resources of farmed aquatic species and their wild relatives.
- To describe existing or planned information systems for the conservation, sustainable use and development of aquatic genetic resources of farmed aquatic species and their wild relatives.

Research

37. Does your national research programme support the conservation, sustainable use and development of aquatic genetic resources of farmed aquatic species and their wild relatives? If yes, give details of current and/or planned research; if no, explain the main reasons why not in box below.

Please mark appropriate box

- (●) Yes
- ( ) No
- ( ) Unknown

Please provide details

In the national "Aquatic genetic resources" programme, the Federal Ministry of Food and Agriculture has in place a working programme for the conservation and sustainable use of fish, shellfish and crustaceans in Germany. The programme describes the current situation in the area of coastal fishing and fishing on the high seas as well as the area of freshwater fishing in lakes and rivers, recreational fishery and aquaculture. In addition to the objectives, the legal framework conditions, the current and future measures, and the involved actors are also listed. With this special programme, the Ministry meets the obligation laid out in the Convention on Biodiversity (CBD) to promote the conservation and sustainable utilisation of agrobiodiversity in Germany. The Ministry has tasked the Expert Committee on Aquatic Genetic Resources with the organisation, implementation and continuation of the programme; the committee is supported by a secretariat located at the Information and Coordination Centre for Biodiversity (IBV) at the Federal Office for Agriculture and Food (BLE).

One central goal of the programme is to preserve the diversity of the aquatic genetic resources in situ and ex situ in the long term in a scientifically validated and cost-effective manner, to develop these resources and render them usable by taking suitable measures such as evaluation, characterisation and documentation, and to make increasing commercial use of these resources – in particular in the field of aquaculture.

For this purpose, the Ministry supports and funds research projects and surveys in the field of biological diversity as well as so-called model and demonstration projects for the preservation and innovative sustainable use of the existing biological diversity.

In this connection, a comprehensive survey and characterisation of the aquaculture broodstock has already been performed in Germany and has provided valuable information for the on-farm conservation and sustainable use of farmed fish stocks in Germany. This information is documented in a publicly accessible database. Germany-wide genetic characterisation of wild fish populations is currently in progress, and this will supply data for the in-situ conservation and sustainable use of wild fish stocks. Within this framework, projects for the valuation of wild fish species in the field of aquaculture and for the cryoconservation of gametes of rare and endangered broodstock have also been promoted. There are currently plans to expand the genetic characterisation of wild fish populations – as well as to implement projects for the genetic improvement of aquaculture stocks.

Moreover, there are many, often smaller, scientific institutions in Germany that are involved in widely varying aspects of the conservation, sustainable use and promotion of AqGR.

38. Please list main institutions, organizations, corporations and other entities in your country that are engaged in field and/or laboratory research related to the conservation, sustainable use and development of aquatic genetic resources of farmed aquatic species and their wild relatives.

Add Row

Main institutions, organizations, corporations and other entities	Area of research ***Mark all that apply***	Comments ***Please provide any additional information***	
Federal Office for Agriculture and Food (BLE) - Information and Coordination Centre for Biological Diversity (IBV), Aquatic Genetic Resources unit http://www.genres.de/en/aquatic-genetic-resources/	☒ Genetic resource management ☒ Basic knowledge on aquatic genetic resources ☒ Characterization and monitoring of aquatic genetic resources ☒ Genetic improvement ☒ Economic valuation of aquatic genetic resources ☒ Conservation of aquatic genetic resources ☒ Communication on aquatic genetic resources ☒ Access and distribution of aquatic genetic resources ☒ Other	The Aquatic Genetic Resources unit at the Information and Coordination Centre for Biological Diversity performs various tasks in connection with AqGR.	X
Expert Committee on Aquatic Genetic Resources https://fachausschuss-agr.genres.de/ (only German)	☒ Genetic resource management ☒ Basic knowledge on aquatic genetic resources ☒ Characterization and monitoring of aquatic genetic resources ☒ Genetic improvement ☒ Economic valuation of aquatic genetic resources ☒ Conservation of aquatic genetic resources ☒ Communication on aquatic genetic resources ☒ Access and distribution of aquatic genetic resources ☒ Other	The Expert Committee on Aquatic Ge-netic Resources supports the imple-mentation of the National Programme for the Conservation and Sustainable Use of Aquatic Genetic Resources.	X

Main institutions, organizations, corporations and other entities	Area of research ***Mark all that apply***	Comments ***Please provide any additional information***	
Research Institutions of the BMEL https://www.ti.bund.de/en/thuenen-institute/ http://www.fli.de/en/home/	☒ Genetic resource management ☒ Basic knowledge on aquatic genetic resources ☒ Characterization and monitoring of aquatic genetic resources ☒ Genetic improvement ☒ Economic valuation of aquatic genetic resources ☒ Conservation of aquatic genetic resources ☒ Communication on aquatic genetic resources ☒ Access and distribution of aquatic genetic resources ☐ Other	Among other things, the Thünen Insti-tute (TI) is part of the network of European fishery research institutes and conducts its own research on the biological monitoring and sustainable management of living marine resources (fish, crustaceans and molluscs); it is also concerned with issues connected with the conservation and protection of marine mammals and birds. Further working areas include the investigation of the spread and impact of pollutants in the sea and the effects of aquaculture on the waters and their biocoenoses. The Friederich Löffler Institute (FLI) conducts research in the field of infec-tious animal diseases and related scientific areas.	X
Fishery institutes and institutions of the individual Laender http://www.portal-fischerei.de/bund/weitere-infos/weitere-ansprechpartner/landeseigene-institute/	☒ Genetic resource management ☒ Basic knowledge on aquatic genetic resources ☒ Characterization and monitoring of aquatic genetic resources ☒ Genetic improvement ☒ Economic valuation of aquatic genetic resources ☒ Conservation of aquatic genetic resources ☒ Communication on aquatic genetic resources ☒ Access and distribution of aquatic genetic resources ☐ Other	The fishery institutes and institutions of the Laender are directly involved in the development and implementation of measures to protect and ensure the sus-tainable use of AqGR. They generally conduct hands-on and need-based fisheries research. A further main task is to provide advice to the ministries and authorities as well as to represent them on national and international expert bodies. In addition, they are responsible for the provision of advice to and the further training and education of profes-sional fishermen, river and lake keepers, and fish breeders.	X

Main institutions, organizations, corporations and other entities	Area of research ***Mark all that apply***	Comments ***Please provide any additional information***	
University institutes http://www.portal-fischerei.de/bund/weitere-infos/weitere-ansprechpartner/hochschulinstitute/	☐ Genetic resource management ☒ Basic knowledge on aquatic genetic resources ☒ Characterization and monitoring of aquatic genetic resources ☒ Genetic improvement ☒ Economic valuation of aquatic genetic resources ☒ Conservation of aquatic genetic resources ☒ Communication on aquatic genetic resources ☐ Access and distribution of aquatic genetic resources ☐ Other	Many of the university institutes listed under the specified link are involved in national and international activities geared towards researching and protect-ing aquatic genetic resources.	X
Institutes and institutions whose work is related to fishery http://www.portal-fischerei.de/bund/weitere-infos/weitere-ansprechpartner/fischereibezug/	☐ Genetic resource management ☒ Basic knowledge on aquatic genetic resources ☒ Characterization and monitoring of aquatic genetic resources ☐ Genetic improvement ☐ Economic valuation of aquatic genetic resources ☒ Conservation of aquatic genetic resources ☐ Communication on aquatic genetic resources ☒ Access and distribution of aquatic genetic resources ☐ Other	Some of the institutes and institutions listed under the specified link are in-volved in national and international activities geared towards researching and protecting aquatic genetic resources.	X

39. What capacity strengthening is needed to improve national research in support of the conservation, sustainable use and development of aquatic genetic resources of farmed aquatic species and their wild relatives?

Please rank the following in regard to capacity strengthening.

Capacities	Rank 1=Very Important 10=No importance
Improve basic knowledge on aquatic genetic resources	2
Improve capacities for characterization and monitoring of aquatic genetic resources	2
Improve capacities for genetic improvement	1
Improve capacities for genetic resource management	3
Improve capacities for economic valuation of aquatic genetic resources	3
Improve capacities for conservation of aquatic genetic resources	3
Improve communication on aquatic genetic resources	4
Improve access to and distribution of aquatic genetic resources	8
Add other rows as appropriate and rank Add Row / Remove Row	

Please describe any other capacity building needs in regards to aquatic genetic resources

Particular need for action to conserve and promote the sustainable use of AqGR in German aquaculture (Expert Committee on AGR):
• Measures that serve to conserve existing broodstocks in fish farms and research institutions must be supported.
• For practical applications, recommendations should be drawn up to conserve genetic variability, and – in dependence on the enterprise structure and fish species – tips given to achieve breeding progress.
• The existing nationwide documentation of the existing master cultures should be updated at regular intervals and new species added as needed.
• In the case of new types of aquaculture, the focus should be on promoting breeding selection. It would be desirable to document the course of domestication and to perform genetic analyses parallel to this process in order to avoid an undesirable loss of genetic variability due to founder effects and genetic drift.
• With regard to the most important aquaculture fish species kept in Germany, the performance characteristics of

breeding stocks can differ considerably in different regions. This is an area in which there is potential for targeted improvement through the use of classic breeding methods (origin comparisons, combined individual and family selection, cross or combination breeding). Cooperation between breeding activities on national and international level should be promoted.

• It should be determined whether a gene bank might help to preserve the existing genetic material.

Education, training and extension

40. Please indicate the extent that education, training and extension in your country covers the conservation, sustainable use and development of aquatic genetic resources of farmed aquatic species and their wild relatives? List the main institutions involved and the types of courses offered.

Add Row

Institution	Thematic Area	Type of courses **mark all that apply**	Comments	
• Humboldt-Unversität zu Berlin, Faculty of Life Sciences, Department Integrative Fisheries Management • Leibniz Institute of Freshwater Ecology and Inland Fisheries, Berlin (IGB)	Genetic resource management	☒ Undergraduate ☒ Post-graduate ☒ Training ☐ Extension	There are many universities in Germany that are involved in topics relating to the protection and sustainable use of aquatic genetic resources in the broader sense. The list of universities in in this table could be extended, but the table only lists selected universities that are particularly active in the various thematic areas.	
	Characterization and monitoring of aquatic genetic resources	☐ Undergraduate ☐ Post-graduate ☐ Training ☐ Extension		X
	Genetic improvement	☐ Undergraduate ☐ Post-graduate ☐ Training ☐ Extension		
	Economic valuation of aquatic genetic resources	☐ Undergraduate ☐ Post-graduate ☐ Training ☐ Extension		
	Conservation of aquatic genetic resources	☐ Undergraduate ☐ Post-graduate ☐ Training ☐ Extension		

• Humboldt-Unversität zu Berlin, Faculty of Life Sciences, Department Integrative Fisheries Management • Leibniz Institute of Freshwater Ecology and Inland Fisheries, Berlin (IGB) • TU Dresden University of Technology, Institute for Hydrobiology • TU Munich University of Technology, Chair of Aquatic System Biology • University of Hamburg, Institute for Hydrobiol-ogy and Fisheries Science • Christian Albrecht University of Kiel, Institute for Animal Breeding and Animal Management • Leibniz Institute for Baltic Sea Research, Warnemünde (IOW) • University of Rostock, Biosciences Institute • University of Rostock, Department of Agricultural and Environmental Technology • University of Constance, Limnological Institute & Institute for Environment Sciences • Thünen Institute for Fisheries Ecology, Marine Fisheries and Baltic Fisheries	Genetic resource management	☐ Undergraduate ☐ Post-graduate ☐ Training ☐ Extension		
	Characterization and monitoring of aquatic genetic resources	☒ Undergraduate ☒ Post-graduate ☒ Training ☐ Extension	There are many universities in Germany that are involved in topics relating to the protection and sustainable use of aquatic genetic resources in the broader sense. The list of universities in in this table could be extended, but the table only lists selected uni-versities that are particularly active in the thematic areas.	X
	Genetic improvement	☐ Undergraduate ☐ Post-graduate ☐ Training ☐ Extension		
	Economic valuation of aquatic genetic resources	☐ Undergraduate ☐ Post-graduate ☐ Training ☐ Extension		
	Conservation of aquatic genetic resources	☐ Undergraduate ☐ Post-graduate ☐ Training		
• University of Göttingen, Department of Animal Breeding and Genetics • Humboldt-Unversität zu Berlin, Faculty of Life Sciences, Department Integrative Fisheries Management • Leibniz Institute of Freshwater Ecology and Inland Fisheries Berlin (IGB) • Christian Albrecht University of Kiel, Institute for Animal Breeding and Animal Management • Thünen Institute for Fisheries Ecology, Marine Fisheries and Baltic Fisheries • Leibnitz Institute for Farm Animal Biology, Dummerstorf, Institute of Fish Genetics	Genetic resource management	☐ Undergraduate ☐ Post-graduate ☐ Training ☐ Extension		
	Characterization and monitoring of aquatic genetic resources	☐ Undergraduate ☐ Post-graduate ☐ Training ☐ Extension		
	Genetic improvement	☒ Undergraduate ☒ Post-graduate ☒ Training ☐ Extension	There are many universities in Germany that are involved in topics relating to the protection and sustainable use of aquatic genetic resources in the broader sense. The list of universities in in this table could be extended, but the table only lists selected uni-versities that are particularly active in the various thematic areas.	X
	Economic valuation of aquatic genetic resources	☐ Undergraduate ☐ Post-graduate ☐ Training ☐ Extension		
	Conservation of aquatic genetic resources	☐ Undergraduate ☐ Post-graduate ☐ Training ☐ Extension		

• Humboldt-Unversität zu Berlin, Faculty of Life Sciences, Department Integrative Fisheries Management • Christian Albrecht University of Kiel, Institute for Animal Breeding and Animal Management • Thünen Institute for Fisheries Ecology, Marine Fisheries and Baltic Fisheries	Genetic resource management	☐ Undergraduate ☐ Post-graduate ☐ Training ☐ Extension		
	Characterization and monitoring of aquatic genetic resources	☐ Undergraduate ☐ Post-graduate ☐ Training ☐ Extension		
	Genetic improvement	☐ Undergraduate ☐ Post-graduate ☐ Training ☐ Extension		X
	Economic valuation of aquatic genetic resources	☒ Undergraduate ☒ Post-graduate ☒ Training ☐ Extension	There are many universities in Germany that are involved in topics relating to the protection and sustainable use of aquatic genetic resources in the broader sense. The list of universities in in this table could be extended, but the table only lists selected universities that are particularly active in the various thematic areas.	
• Leibniz Institute for Marine Sciences, University of Kiel, IFM-GEOMAR • Humboldt-Unversität zu Berlin, Faculty of Life Sciences, Department Integrative Fisheries Management • Leibniz Institute of Freshwater Ecology and Inland Fisheries Berlin (IGB) • TU Dresden University of Technology, Institute for Hydrobiology • TU Munich University of Technology, Chair of Aquatic System Biology • University of Hamburg, Institute for Hydrobiology and Fisheries Science • Leibniz Institute for Baltic Sea Research, Warnemünde (IOW) • University of Cologne, Zoological Institute, General Ecology and Limnology • University of Constance, Limnological Institute & Institute for Environment Sciences • Thünen Institute for Fisheries Ecology, Marine Fisheries and Baltic Fisheries	Genetic resource management	☐ Undergraduate ☐ Post-graduate ☐ Training ☐ Extension		
	Characterization and monitoring of aquatic genetic resources	☐ Undergraduate ☐ Post-graduate ☐ Training ☐ Extension		
	Genetic improvement	☐ Undergraduate ☐ Post-graduate ☐ Training ☐ Extension		X
	Economic valuation of aquatic genetic resources	☐ Undergraduate ☐ Post-graduate ☐ Training ☐ Extension		
	Conservation of aquatic genetic resources	☒ Undergraduate ☒ Post-graduate ☒ Training ☐ Extension	There are many universities in Germany that are involved in topics relating to the protection and sustainable use of aquatic genetic resources in the broader sense. The list of universities in in this table could be extended, but the table only lists selected universities that are particularly active in the various thematic areas.	

• Bavarian Agricultural Agency, Institute for Fish-eries • LAZBW, Baden-Württemberg Fisheries Research Office • Institute for Freshwater Fisheries, Potsdam Sacrow • North Rhine-Westphalia Office for Nature, Envi-ronment and Consumer Protection (LANUV) Unit 26: Fisheries Ecology • Mecklenburg-Western Pomerania Agency for Agriculture and Fisheries, Institute for Fisheries • Saxon Agency for Environment, Agriculture and Geology, Fisheries Unit • Lower Saxony Agency for Consumer Protection and Food Safety (LAVES)	Genetic resource management	☐ Undergraduate ☐ Post-graduate ☐ Training ☐ Extension		
	Characterization and monitoring of aquatic genetic resources	☒ Undergraduate ☒ Post-graduate ☒ Training ☒ Extension	The Land fisheries institutions and institutes listed here offer a wide range of hands-on voca-tional training programmes and courses, some of which cover the topic areas of monitoring, breed-ing and protection of AqGR.	X
	Genetic improvement	☒ Undergraduate ☒ Post-graduate ☒ Training ☒ Extension	The Land fisheries institutions and institutes listed here offer a wide range of hands-on voca-tional training programmes and courses, some of which cover the topic areas of monitoring, breed-ing and protection of AqGR.	
	Economic valuation of aquatic genetic resources	☐ Undergraduate ☐ Post-graduate ☐ Training ☐ Extension		
	Conservation of aquatic genetic resources	☒ Undergraduate ☒ Post-graduate ☒ Training ☒ Extension	The Land fisheries institutions and institutes listed here offer a wide range of hands-on voca-tional training programmes and courses, some of which cover the topic areas of monitoring, breed-ing and protection of AqGR.	

Coordination and networking

41. Please list any mechanisms within your country responsible for coordinating the aquaculture, culture-based fisheries and capture fisheries subsectors with the other sectors that use watersheds and coastal ecosystems and have impacts on aquatic genetic resources of wild relatives of farmed aquatic species (e.g., agriculture, forestry, mining, tourism, waste management and water resources).

If no mechanism exists check here: ☐

Add Row

Name of mechanism	Description of how mechanism operates	
Common Fisheries Policy (CFP) of the EU	The CFP aims at ensuring that fishing and aquaculture activities are environmentally sustainable in the long term and are managed in a way that is consistent with the objectives of achieving economic, social and employment benefits, and of contributing to the availability of food supplies. The goal of the reformed CFP is to apply the precautionary approach to fisheries management, and it aims to ensure that exploitation of living marine biological resources restores and maintains populations of harvested species above levels which can produce the maximum sustainable yield (MSY). In order to reach the objective of progressively restoring and maintaining populations of fish stocks above biomass levels capable of producing maximum sustainable yield, the maximum sustainable yield exploitation rate is to be achieved by 2015 where possible and, on a progressive, incremental basis at the latest by 2020 for all stocks. The use of an ecosystem approach in the area of fisheries management should be implemented within the context of the CFP and the European Marine Strategy Framework Directive. Among other things, the European Marine and Fisheries Fund (EMFF) should be used to put this policy into practice – for example by promoting more selective fish capture, providing support for the implementation of the ban on discards, ensuring data collection that is adapted to the requirements, and taking measures to control or compensate for the social consequences of restrictions.	X
Habitats Directive /Natura 2000	In the field of freshwater fisheries, one factor that is of relevance for the aquatic habitats is implementation of the Habitats Directive, FFH, 92/43/EEC of 21 May 1992, and the subsequent definition of protection areas based on NATURA 2000. Among other things, the systematic pro-tection of habitats and the fauna therein will also cover the habitats of the aquatic genetic resources. Management plans should ensure the conserva-tion of the habitats named in Annex I, including the aquatic habitats, and the species listed in Annex II, including fish species. The fact that there is a certain conflict potential between the interests of natural conservation and fishing in connection with the implementation of this directive has already been pointed out elsewhere.	X

Name of mechanism	Description of how mechanism operates	
EU Water Framework Directive (WFD)	The European Water Framework Directive (WFD, 2000/60/EC) came into effect on 22 December 2000. It pools all the water directives of the European Union that existed at the time. The core objective of this wide-ranging directive already becomes clear in the preamble. The objective is to return Europe's water – streams, rivers, lakes, the groundwater and the coastal water – to a good condition or maintain them in such a condition for future generations, and to ensure sustainable management of water resources. The waters in the contiguous river basic districts are to be considered and managed holistically without regard to the state, Laender and administrative borders. The aim of the EC WFD is to achieve a uniform standard for water management throughout Europe. A Common Implementation Strategy (CIS) was developed on European level for the purpose of standardisation, and national experts from all member states draw up CIS Guidances to support implementation with regard to numerous detailed questions. The federal government represents the German position in consultation with the National/Laender Working Group on Water (LAWA). In LAWA, Germany has a central body where processes are coordinated and defined. LAWA has developed numerous methods, action guidelines and text modules for the updating of management plans and programmes of measures which have been taken into account by both the German river basin communities and the Laender. The goal is to harmonise the strategy of the Laender and, consequently, to also harmonise the enforcement of measures under the water laws and water management action. In order to achieve the goals of the EC WFD and the Federal Water Resources Act, the member states prepared nationally and internationally coordinated management plans and measures for river basin districts on 22 December 2009 for the first time, and these plans and measures are updated every six years.	X
Land development plans	Within the context of "Land development plans", different mechanisms exist in different regions for the coordination of different interest groups.	X
EU Marine Strategy Framework Directive (MSFD)	For the first time, the MSFD defines a harmonised regulatory framework for the environmental condition of the marine waters of the member states of the European Union In line with the integration principle, the aim is to, among other things, incorporate environmental concerns in all key policy areas. At the same time, the MSFD is the environmental cornerstone of the European Integrated Marine Policy. The ecosystem approach is in turn one of the cornerstones of the MSFD. It is applied to control human action and is designed to ensure that the total burden resulting from human activities is limited to a magnitude that can be reconciled with a good environmental standard. Every member state must develop a strategy to achieve a good condition of its marine waters. In the case of Germany, this refers to the North Sea and the Baltic. The procedure for the development of a marine strategy is divided into six steps: • Initial assessment on the documentation of the current environmental status • Description of a good environmental status • Definition of environmental goals and associated indicators • Creation and implementation of a monitoring programme for the continuous assessment and regular updating of the goals of the Directive • Creation of a programme of measures to achieve or maintain a good environmental status (end of 2015) • Practical implementation of the programme of measures (end of 2016) The Federal Water Resources Act provides for the involvement of the public in the individual implementation steps of the MSFD.	X

42. Please indicate how capacity strengthening can be improved in intersectoral coordination in support of the conservation, sustainable use and development of aquatic genetic resources.

Please rank the following in regards to capacity strengthening.

Capacities	Rank 1=Very Important 10=No importance
Increase awareness in institutions	1
Increase technical capacities of institutions	4
Increase information sharing between institutions	2
Add other rows as appropriate and rank Increase personnel capacities of institutions Add Row / Remove Row	1

Please specify in box below

1. The assessment of the level of awareness and understanding of fishery and aquaculture as a particularly sustainable form of utilisation of aquatic resources differs widely in different sectors, and/or the level of awareness and understanding is very low in many institutions. AqGR are often only seen from the perspective of protection but not in terms of utilisation.
2. The intersectoral exchange of information concerning AqGR is complicated in Germany by a highly fragmented research landscape.
3. There are many institutions in Germany that are involved in the protection and utilisation of AqGR in the broader sense, but these research institutions generally have only extremely limited research capacities. It is therefore imperative that the existing capacities are pooled – for example through collaboration between different institutions.
4. Personnel resources would need to be expanded in the research and Land institutions to process and assess technical questions.

43. Please list any national networks in your country or any international networks your country belongs to that support the conservation, sustainable use and development of aquatic genetic resources.

Add Row

Network	Objectives of the network ***Please mark all that apply*** to your country	Comments	

Network	Objectives of the network ***Please mark all that apply*** to your country	Comments	
Expert Committee on Aquatic Genetic Resources	☒ Improve basic knowledge on aquatic genetic resources ☒ Improve capacities for characterization and monitoring of aquatic genetic resources ☒ Improve capacities for genetic improvement ☒ Improve capacities for economic valuation of aquatic genetic resources ☒ Improve capacities for conservation of aquatic genetic resources ☒ Improve communication on aquatic genetic resources ☒ Improve access to and distribution of aquatic genetic resources	An expert committee has been set up to achieve the objectives outlined in the programme for the con-servation and utilisation of aquatic genetic re-sources and to promote the necessary organisation and implementation of the measures that need to be taken. The expert committee has the following functions: • Provision of advice on specialist issues that arise in connection with the implementation of the programme • Analysis and assessment of measures to con-serve aquatic genetic resources • Drafting of new proposals for measures to be taken or improvement of existing measures and continuation of the programme • Coordination of measures with relevant actors, in particular with the federal government, the Laender, the world of science and people on the ground • Receipt of and consultation on reports on the implementation and outcomes of this pro-gramme • Exchange of information and experience Moreover, the committee can also express its views on all specialist questions relating to the conserva-tion and sustainable use of aquatic genetic re-sources and issue recommendations for scientific opinions and statements. 16 members have been appointed to the expert committee, most of whom were already involved in the preparation of the programme as members of the expert body. The members are responsible for representing the areas of coastal and high seas fisheries, lake and river fishing, and aquaculture, including economic, cultural and ecological aspects. On an organisational level, they represent the com-petent or affected national authorities and authori-ties of the Laender, the specialist associations and organisations, and the worlds of science and indus-try. The expert committee is supported by a secre-tariat attached to the Information and Coordination Centre for Biological Diversity IBV) at the Federal Office for Agriculture and Food (BLE). The expert committee is also tasked with advis-ing and supporting the Advisory Council for Biodiversity and Genetic Resources at the BMEL. The Advisory Council has the job of advising the BMEL in general and fundamental questions relating to the conservation and sus-tainable use of genetic resources for food, agri-culture, forestry and fishery as an	X

Network	Objectives of the network ***Please mark all that apply*** to your country	Comments	
National/Laender Working Group on Water (LAWA)	☐ Improve basic knowledge on aquatic genetic resources ☒ Improve capacities for characterization and monitoring of aquatic genetic resources ☒ Improve capacities for genetic improvement ☐ Improve capacities for economic valuation of aquatic genetic resources ☐ Improve capacities for conservation of aquatic genetic resources ☒ Improve communication on aquatic genetic resources ☐ Improve access to and distribution of aquatic genetic resources	The National/Laender Working Group on Water (LAWA) was set up in 1956 as an umbrella group for the ministries of the Laender and the Federal Republic of Germany responsible for water man-agement and water legislation. The aim of the Na-tional/Laender Working Group on Water is to dis-cuss cross-regional and common water manage-ment and related legal issues, to draw up joint solu-tions, and to initiate recommendations for the im-plementation of these solutions. This task also encompasses topical questions on national, supranational and international level; these questions are the subject of broadly based discussion, and the findings are shared with the relevant organisations. To meet these objectives, the National/ Laender Working Group on Water (LAWA) has set up standing committees and topic-specific ad-hoc committees to handle the issues of water law, hy-drology, water and marine protection, ecology, flood protection, coastal protection, groundwater, water supply, municipal and industrial wastewater and dealing with substances that are hazardous to water.	X
International water commis-sions, e.g.: • International Commission for the Fisheries of Lake Constance (IBKF) • International Commission for the Protection of the Rhine (IKSR) • International Commission for the Protection of the Danube (IKSD) • International Commission for the Protection of the Elbe (IKSE)	☐ Improve basic knowledge on aquatic genetic resources ☒ Improve capacities for characterization and monitoring of aquatic genetic resources ☐ Improve capacities for genetic improvement ☐ Improve capacities for economic valuation of aquatic genetic resources ☒ Improve capacities for conservation of aquatic genetic resources ☐ Improve communication on aquatic genetic resources ☐ Improve access to and distribution of aquatic genetic resources	In freshwater areas, international water conserva-tion agreements are in place between neighbouring states, in particular for cross-border rivers and lakes. Among other things, these agreements are geared towards the reduction of pollutant burdens from industrial discharges or the development of joint management plans – also, for example, to encourage the return of extinct fish species.	X

Network	Objectives of the network ***Please mark all that apply*** to your country	Comments	
Regional fishery organisations (RFO s), e.g. North East Atlantic Fisheries Commission (NEAFC) Northwest Atlantic Fisheries Organization (NAFO) The Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) International Whaling Commission (IWC) North Atlantic Salmon Conservation Organization (NASCO)	☐ Improve basic knowledge on aquatic genetic resources ☒ Improve capacities for characterization and monitoring of aquatic genetic resources ☐ Improve capacities for genetic improvement ☒ Improve capacities for economic valuation of aquatic genetic resources ☒ Improve capacities for conservation of aquatic genetic resources ☒ Improve communication on aquatic genetic resources ☐ Improve access to and distribution of aquatic genetic resources	Germany is involved in numerous RFOs via its membership of the EU. Germany and the EU cannot stipulate any management rules for fisheries or marine areas outside the exclusive economic zone (200 nautical miles from the coast). Instead, marine areas and fisheries on the high sea are generally managed by regional fishery organisations (RFOs). The RFOs can stipulate catch and fishing effort limits in the various marine areas, define technical measures and monitor compliance with obligations. The EU is a member of numerous RFOs, where it is represented by the EU Commission. The agreements and recommendations of the RFOs are generally incorporated in EU fisheries laws, such as the regulation on admissible catch limits and quotas. Some of these organisations manage the entire fish stocks in a specific marine area, while others manage only certain highly migratory species, above all tuna.	X

Information systems

44. Please list any information systems existing in your country for receiving, managing and communicating information about the conservation, sustainable use and development of aquatic genetic resources of farmed aquatic species and their wild relatives.

Add Row

Name of information system	Type of information stored ***mark all that apply***	Main stakeholders ***mark all that apply***	
AGRDEU (national inventory of aquatic genetic resources) http://agrdeu.genres.de/agrdeu	☐ DNA sequence ☐ Genes and genotype ☒ Breeds, strains or stocks ☒ Species names ☐ Production figures ☒ Distribution ☒ Level of endangerment ☒ Other	☒ Fish farmers ☐ Fishers in capture fisheries ☒ Fish hatchery people ☐ People involved in marketing ☒ Government resource managers ☒ Fishing or aquaculture associations ☐ Aquatic protected area managers ☒ University and academic people ☐ Non-Governmental Organizations ☐ Intergovernmental Organizations ☐ Policy makers ☐ Donors ☐ Consumers ☐ Politicians **Please list other stakeholders as necessary**	X

Name of information system	Type of information stored ***mark all that apply***	Main stakeholders ***mark all that apply***	
FischDB (An Internet database to improve control of fishery products by protein and DNA analysis) http://www.fischdb.de/	☒ DNA sequence ☒ Genes and genotype ☐ Breeds, strains or stocks ☒ Species names ☐ Production figures ☐ Distribution ☐ Level of endangerment ☐ Other	☐ Fish farmers ☐ Fishers in capture fisheries ☐ Fish hatchery people ☒ People involved in marketing ☒ Government resource managers ☐ Fishing or aquaculture associations ☐ Aquatic protected area managers ☒ University and academic people ☐ Non-Governmental Organizations ☐ Intergovernmental Organizations ☐ Policy makers ☐ Donors ☐ Consumers ☐ Politicians **Please list other stakeholders as necessary**	X

Name of information system	Type of information stored ***mark all that apply***	Main stakeholders ***mark all that apply***	
Aquakulturinfo (Includes general information about aquaculture) http://www.aquakulturinfo.de/	☐ DNA sequence ☐ Genes and genotype ☐ Breeds, strains or stocks ☒ Species names ☐ Production figures ☐ Distribution ☐ Level of endangerment ☒ Other	☒ Fish farmers ☐ Fishers in capture fisheries ☒ Fish hatchery people ☒ People involved in marketing ☐ Government resource managers ☐ Fishing or aquaculture associations ☐ Aquatic protected area managers ☐ University and academic people ☐ Non-Governmental Organizations ☐ Intergovernmental Organizations ☐ Policy makers ☐ Donors ☒ Consumers ☐ Politicians **Please list other stakeholders as necessary**	X

Name of information system	Type of information stored ***mark all that apply***	Main stakeholders ***mark all that apply***	
Fischfauna-Online (Digital Atlas of freshwater fish species in Germany and Austria) http://www.fischfauna-online.de/cms2.0/index.php?option=com_biodiversity&view=species&Itemid=75	☐ DNA sequence ☐ Genes and genotype ☐ Breeds, strains or stocks ☒ Species names ☐ Production figures ☒ Distribution ☒ Level of endangerment ☐ Other	☐ Fish farmers ☐ Fishers in capture fisheries ☐ Fish hatchery people ☐ People involved in marketing ☐ Government resource managers ☐ Fishing or aquaculture associations ☒ Aquatic protected area managers ☒ University and academic people ☒ Non-Governmental Organizations ☐ Intergovernmental Organizations ☐ Policy makers ☐ Donors ☐ Consumers ☐ Politicians **Please list other stakeholders as necessary**	X

Name of information system	Type of information stored ***mark all that apply***	Main stakeholders ***mark all that apply***	
Fish species registers of the various German Laender	☐ DNA sequence ☐ Genes and genotype ☐ Breeds, strains or stocks ☒ Species names ☐ Production figures ☒ Distribution ☒ Level of endangerment ☒ Other	☐ Fish farmers ☐ Fishers in capture fisheries ☒ Fish hatchery people ☐ People involved in marketing ☒ Government resource managers ☒ Fishing or aquaculture associations ☒ Aquatic protected area managers ☒ University and academic people ☒ Non-Governmental Organizations ☒ Intergovernmental Organizations ☐ Policy makers ☐ Donors ☐ Consumers ☒ Politicians **Please list other stakeholders as necessary**	X

45. What capacity strengthening is needed to improve national information systems to support the conservation, sustainable use and development of aquatic genetic resources?

Please describe what capacities need to be strengthened

1. Despite the important role of aquatic genetic resources (AqGR) for human nutrition and for the con-servation of the biodiversity of aquatic habitats, information on the intraspecific genetic variability of wild and bred stocks of AqGR is very fragmented and incomplete. The collection and provision of genetic data is a key precondition for meeting the need for targeted and solid management of AqGR. The efforts that have already been initiated to record the genetic diversity of aquaculture and wild stocks of AqGR in Germany should therefore be continued and expanded.
2. Systematic and coordinated pooling of the relevant information in a national database for AqGR (AGRDEU) is necessary for the communication and dissemination of the recorded data. This database should not only supply data and information on the genetic diversity of regional breeding stock and genetic material from breeding programmes (on- farm) but also provide information on the genetic status or the genetic differentiation of wild AqGR that live free in nature (in situ/in vivo). Commercially used fish species and fish species managed for recreational purposes should be a particular focal point of interest, especially as fisheries management stands to profit considerably from exact genetic documentation of the utilised stocks.

Please describe any other capacity building needs in regards to information systems for aquatic genetic resources

There is a great need for the national and international coordination of all resettlement measures of AqGR (e.g. for salmon, sturgeon and other fish species). The necessary databases should be created for this purpose.

Chapter 8: International Collaboration on Aquatic Genetic Resources of Farmed Aquatic Species and Their Wild Relatives

The main objective of Chapter 8 is to review the mechanisms and instruments through which your country participates in international collaborations on aquatic genetic resources of farmed aquatic species and their wild relatives.

The specific objectives are:

- To identify your country's current participation in bilateral, sub-regional, regional, other international and global forms of collaboration on aquatic genetic resources. List national memberships, status as a Party and other forms of affiliation in agreements, conventions, treaties, international organizations, international networks and international programmes.
- To identify any other forms of international collaboration on aquatic genetic resources.
- To review the benefits from existing forms of international collaboration on aquatic genetic resources.
- To identify needs and priorities for future international collaboration on aquatic genetic resources

International collaboration includes bilateral arrangements and the sharing of particular waters and stocks of wild relatives of farmed aquatic species.

International, regional or sub-regional agreements, conventions and treaties concerning aquatic genetic resources of farmed aquatic species and their wild relatives

46. Please list the international, regional or sub-regional agreements your country subscribes to that cover aquatic genetic resources of farmed species and their wild relatives, such as the Nagoya Protocol[2] the Convention on Biological Diversity and the Cartagena Protocol and how they have impacted aquatic genetic resources and stakeholders in your country. Examples could include:

[2] http://www.cbd.int/abs/nagoya-protocol/signatories/

- Establishment and management of shared or networked aquatic protected areas as far as wild relatives of farmed aquatic species are concerned
- Aquaculture and culture-based fisheries in transboundary or shared water bodies
- Sharing aquatic genetic material and related information
- Fishing rights, seasons and quotas as far as wild relatives of farmed aquatic species are concerned
- Conservation and sustainable use of shared water bodies and watercourses as far as wild relatives of farmed aquatic species are concerned
- Quarantine procedures for aquatic organisms and for control and notification of aquatic diseases

Add Row

International, Regional, bilateral or Sub-Regional agreement	Year your country ratified or subscribed to the agreement	Impact on aquatic genetic resources	Impact on stakeholders	Comments	

International, Regional, bilateral or Sub-Regional agreement	Year your country ratified or subscribed to the agreement	Impact on aquatic genetic resources	Impact on stakeholders	Comments	
United Nations Convention on the Law of the Sea, UNCLOS)	1984	○ Strongly positive ◉ Positive ○ Negative ○ Strongly negative ○ No effect	○ Strongly positive ◉ Positive ○ Negative ○ Strongly negative ○ No effect	Since the National Convention on the Law of the Sea was adopted, a number of international treaties on the practical implementation of sustainable fishing on the high seas have been signed, one of which is the Agreement on strad-dling stocks and highly migratory fish stocks (1995).	X
CBD	1993	○ Strongly positive ◉ Positive ○ Negative ○ Strongly negative ○ No effect	○ Strongly positive ◉ Positive ○ Negative ○ Strongly negative ○ No effect	Within the CBD, the "Inland Waters Biodiversity" and "Marine and Coastal Biodiversity" programmes are of particular importance. In the Strategic Plan of the CBD, Target 6 of the Aichi Biodiversity Targets is especially important: by 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.	X
Cartagena Protocol	2003	○ Strongly positive ○ Positive ○ Negative ○ Strongly negative ◉ No effect	○ Strongly positive ○ Positive ○ Negative ○ Strongly negative ◉ No effect	Currently, there is no genetically modified aquatic species either for cultivation or for food or feed uses approved in Europe.	X

International, Regional, bilateral or Sub-Regional agreement	Year your country ratified or subscribed to the agreement	Impact on aquatic genetic resources	Impact on stakeholders	Comments	
Nagoya-Protocol	Subcribed in 2011, ratification intended in 2016	○ Strongly positive ○ Positive ○ Negative ○ Strongly negative ● No effect	○ Strongly positive ○ Positive ● Negative ○ Strongly negative ○ No effect	Too early to estimate the impact, but it is expected that the exchange of AGR will be much more complicated and that their is a negative impact for stakeholders.	X
FAO Code of Conduct for Responsible Fisheries	1995	○ Strongly positive ○ Positive ○ Negative ○ Strongly negative ○ No effect	○ Strongly positive ○ Positive ○ Negative ○ Strongly negative ○ No effect	This code defines the basic principles and international standards of conduct that ensure effective conservation, management and development of living aquatic resources under due consideration of the ecosystem and species diversity. It takes account of the biological characteristics of the resources and their environment as well as of the interests of consumers and other users. The code also integrates the requirements of the aforementioned and other important instruments, and promotes their implementation.	X

International, Regional, bilateral or Sub-Regional agreement	Year your country ratified or subscribed to the agreement	Impact on aquatic genetic resources	Impact on stakeholders	Comments	
NAFO	1978	○ Strongly positive ◉ Positive ○ Negative ○ Strongly negative ○ No effect	○ Strongly positive ◉ Positive ○ Negative ○ Strongly negative ○ No effect	Marine areas and fisheries on the high seas outside the exclusive economic zone of a country (200 nautical miles from the coast) are generally managed by regional fisheries organisations (RFOs). The RFOs can stipulate catch and fishing effort limits in the various marine areas, define technical measures and monitor compliance with obligations. The EU is a member of numerous RFOs, where it is represented by the EU Commission. The agreements and recommendations of the RFOs are generally incorporated in EU fisheries laws, such as the regulation on admissible catch limits and quotas. Some of these organisations manage the entire fish stocks in a specific marine area, while others manage only certain highly migratory species, above all tuna.	X

International, Regional, bilateral or Sub-Regional agreement	Year your country ratified or subscribed to the agreement	Impact on aquatic genetic resources	Impact on stakeholders	Comments	
Bilateral agreements with countries outside the EU		○ Strongly positive ◉ Positive ○ Negative ○ Strongly negative ○ No effect	○ Strongly positive ◉ Positive ○ Negative ○ Strongly negative ○ No effect	The EU has two types of fishing agreements with non-EU countries: • Fisheries Partnership Agreements – the EU gives financial and technical support in exchange for fishing rights, generally with southern partner countries. The EU fleet can then catch fish from stocks that are considered to be non-endangered and that are not fully utilised by the fleet of the country in question. These types of agreements are generally with southern partners. The exception is the agreement with Greenland, which – alongside Mauritania and Morocco – is of particular importance for the German fishing fleet. • "Northern agreements" – joint management of shared stocks with Norway, Iceland and the Faeroe Islands.	X
Washington Agreement on International Trade in Endangered Species of Wild Fauna and Flora (CITES, EU species protection regulation (EC) No. 338/97)	1976	○ Strongly positive ◉ Positive ○ Negative ○ Strongly negative ○ No effect	○ Strongly positive ○ Positive ◉ Negative ○ Strongly negative ○ No effect	CITES provisions may restrict trading and possession of some kinds of AqGR.	X

International, Regional, bilateral or Sub-Regional agreement	Year your country ratified or subscribed to the agreement	Impact on aquatic genetic resources	Impact on stakeholders	Comments	
IBKF	1893	○ Strongly positive ◉ Positive ○ Negative ○ Strongly negative ○ No effect	○ Strongly positive ◉ Positive ○ Negative ○ Strongly negative ○ No effect	In freshwater areas, international water conservation agreements are in place between neighbouring states, in particular for cross-border rivers and lakes. Among other things, these agreements are geared towards the reduction of pollutant burdens from industrial discharges or the development of joint management plans – also, for example, to encourage the return of extinct fish species.	X
OSPAR	OSPAR 1992	○ Strongly positive ◉ Positive ○ Negative ○ Strongly negative ○ No effect	○ Strongly positive ◉ Positive ○ Negative ○ Strongly negative ○ No effect		X

International, Regional, bilateral or Sub-Regional agreement	Year your country ratified or subscribed to the agreement	Impact on aquatic genetic resources	Impact on stakeholders	Comments	
NEAFC	1980	○ Strongly positive ◉ Positive ○ Negative ○ Strongly negative ○ No effect	○ Strongly positive ◉ Positive ○ Negative ○ Strongly negative ○ No effect	Marine areas and fisheries on the high seas outside the exclusive economic zone of a country (200 nautical miles from the coast) are generally managed by regional fisheries organisations (RFOs). The RFOs can stipulate catch and fishing effort limits in the various marine areas, define technical measures and monitor compliance with obligations. The EU is a member of numerous RFOs, where it is represented by the EU Commission. The agreements and recommendations of the RFOs are generally incorporated in EU fisheries laws, such as the regulation on admissible catch limits and quotas. Some of these organisations manage the entire fish stocks in a specific marine area, while others manage only certain highly migratory species, above all tuna.	X

International, Regional, bilateral or Sub-Regional agreement	Year your country ratified or subscribed to the agreement	Impact on aquatic genetic resources	Impact on stakeholders	Comments	
NASCO	1983	○ Strongly positive ◉ Positive ○ Negative ○ Strongly negative ○ No effect	○ Strongly positive ◉ Positive ○ Negative ○ Strongly negative ○ No effect	Marine areas and fisheries on the high seas outside the exclusive economic zone of a country (200 nautical miles from the coast) are generally managed by regional fisheries organisations (RFOs). The RFOs can stipulate catch and fishing effort limits in the various marine areas, define technical measures and monitor compliance with obligations. The EU is a member of numerous RFOs, where it is represented by the EU Commission. The agreements and recommendations of the RFOs are generally incorporated in EU fisheries laws, such as the regulation on admissible catch limits and quotas. Some of these organisations manage the entire fish stocks in a specific marine area, while others manage only certain highly migratory species, above all tuna.	X

International, Regional, bilateral or Sub-Regional agreement	Year your country ratified or subscribed to the agreement	Impact on aquatic genetic resources	Impact on stakeholders	Comments	
CCAMLR	1982	○ Strongly positive ◉ Positive ○ Negative ○ Strongly negative ○ No effect	○ Strongly positive ◉ Positive ○ Negative ○ Strongly negative ○ No effect	Marine areas and fisheries on the high seas outside the exclusive economic zone of a country (200 nautical miles from the coast) are generally managed by regional fisheries organisations (RFOs). The RFOs can stipulate catch and fishing effort limits in the various marine areas, define technical measures and monitor compliance with obligations. The EU is a member of numerous RFOs, where it is represented by the EU Commission. The agreements and recommendations of the RFOs are generally incorporated in EU fisheries laws, such as the regulation on admissible catch limits and quotas. Some of these organisations manage the entire fish stocks in a specific marine area, while others manage only certain highly migratory species, above all tuna.	X
IKSR	1951	○ Strongly positive ◉ Positive ○ Negative ○ Strongly negative ○ No effect	○ Strongly positive ◉ Positive ○ Negative ○ Strongly negative ○ No effect	In freshwater areas, international water conservation agreements are in place between neighbouring states, in particular for cross-border rivers and lakes. Among other things, these agreements are geared towards the reduction of pollutant burdens from industrial discharges or the development of joint management plans – also, for example, to encourage the return of extinct fish species.	X

International, Regional, bilateral or Sub-Regional agreement	Year your country ratified or subscribed to the agreement	Impact on aquatic genetic resources	Impact on stakeholders	Comments	
IKSMS	1962	○ Strongly positive ◉ Positive ○ Negative ○ Strongly negative ○ No effect	○ Strongly positive ◉ Positive ○ Negative ○ Strongly negative ○ No effect	In freshwater areas, international water conservation agreements are in place between neighbouring states, in particular for cross-border rivers and lakes. Among other things, these agreements are geared towards the reduction of pollutant burdens from industrial discharges or the development of joint management plans – also, for example, to encourage the return of extinct fish species.	X
IKSE	1990	○ Strongly positive ◉ Positive ○ Negative ○ Strongly negative ○ No effect	○ Strongly positive ◉ Positive ○ Negative ○ Strongly negative ○ No effect	In freshwater areas, international water conservation agreements are in place between neighbouring states, in particular for cross-border rivers and lakes. Among other things, these agreements are geared towards the reduction of pollutant burdens from industrial discharges or the development of joint management plans – also, for example, to encourage the return of extinct fish species.	X
IKSD	1994	○ Strongly positive ◉ Positive ○ Negative ○ Strongly negative ○ No effect	○ Strongly positive ◉ Positive ○ Negative ○ Strongly negative ○ No effect	In freshwater areas, international water conservation agreements are in place between neighbouring states, in particular for cross-border rivers and lakes. Among other things, these agreements are geared towards the reduction of pollutant burdens from industrial discharges or the development of joint management plans – also, for example, to encourage the return of extinct fish species.	X

International, Regional, bilateral or Sub-Regional agreement	Year your country ratified or subscribed to the agreement	Impact on aquatic genetic resources	Impact on stakeholders	Comments	
IKSO	1996	○ Strongly positive ◉ Positive ○ Negative ○ Strongly negative ○ No effect	○ Strongly positive ◉ Positive ○ Negative ○ Strongly negative ○ No effect	In freshwater areas, international water conservation agreements are in place between neighbouring states, in particular for cross-border rivers and lakes. Among other things, these agreements are geared towards the reduction of pollutant burdens from industrial discharges or the development of joint management plans – also, for example, to encourage the return of extinct fish species.	X
IGKB	1960	○ Strongly positive ◉ Positive ○ Negative ○ Strongly negative ○ No effect	○ Strongly positive ◉ Positive ○ Negative ○ Strongly negative ○ No effect	In freshwater areas, international water conservation agreements are in place between neighbouring states, in particular for cross-border rivers and lakes. Among other things, these agreements are geared towards the reduction of pollutant burdens from industrial discharges or the development of joint management plans – also, for example, to encourage the return of extinct fish species.	X
HELCOM	1992	○ Strongly positive ◉ Positive ○ Negative ○ Strongly negative ○ No effect	○ Strongly positive ◉ Positive ○ Negative ○ Strongly negative ○ No effect		X

47. Please list the priority needs regarding collaboration on conservation and sustainable use of aquatic genetic resources of farmed aquatic species and their wild relatives. Are they being addressed, i.e. are there any critical gaps?

Collaboration is needed in order to ...	Rank 1=Very Important 10=No importance	To what extent are the needs being met	Comments ***For example any critical gaps***
Improve information technology and database management	2	(●) To a great extent ( ) To some extent ( ) None ( ) Unknown	International cooperation in this area is ensured, for example, through cooperation with the ICES and the implementation of EU directives (e.g. WFD, Habitats Directive).
Improve basic knowledge on aquatic genetic resources	2	( ) To a great extent (●) To some extent ( ) None ( ) Unknown	
Improve capacities for characterization and monitoring of aquatic genetic resources	3	( ) To a great extent (●) To some extent ( ) None ( ) Unknown	
Improve capacities for genetic improvement	1	( ) To a great extent (●) To some extent ( ) None ( ) Unknown	Capacities that use modern genetic techniques to increase the performance of farmed fish and render these techniques usable in practice are almost non-existent in German aquaculture. There is a certain amount of cooperation in this area in the scientific field, but this cooperation needs to be considerably expanded in order to bring German aquaculture up to the same level as other countries in this area.
Improve capacities for economic valuation of aquatic genetic resources	1	( ) To a great extent ( ) To some extent (●) None ( ) Unknown	Little or no data is available on this topic to date.
Improve capacities for conservation of aquatic genetic resources	2	( ) To a great extent (●) To some extent ( ) None ( ) Unknown	

Collaboration is needed in order to ...	Rank 1=Very Important 10=No importance	To what extent are the needs being met	Comments ***For example any critical gaps***
Improve communication on aquatic genetic resources	3	○ To a great extent ● To some extent ○ None ○ Unknown	
To improve access to and distribution of aquatic genetic resources	9	● To a great extent ○ To some extent ○ None ○ Unknown	Germany meets all international obligations in this area and does not in any way restrict access to its own genetic resources.
Other **Continue adding row as necessary** Add Row / Remove Row		○ To a great extent ○ To some extent ○ None ○ Unknown	

48. Please describe the types of collaboration that have been most beneficial for your country, and why?

In freshwater areas, there are international water conservation agreements between neighbouring states, in particular for cross-border rivers and lakes. Among other things, these agreements are geared towards the reduction of pollutant burdens from industrial discharges or the development of joint management plans – also, for example, to encourage the return of extinct fish species. One example is the International Commission for the Fisheries of Lake Constance (IBKF).

49. Is there a need for your country to expand its collaboration concerning the conservation, sustainable use and development of aquatic genetic resources? If yes, give details, including any requirements for capacity strengthening in box below

(●) Yes

( ) No

If yes, please give details

International collaboration could be of great importance for the conservation of genetic resources. In international aquaculture, considerably greater importance is attached to the sustainable use and development of AqGR than is the case in Germany. In recent years, the major international aquaculture research institutions have laid the groundwork for performance trials and cross-breeding of many important AqGR under strict scientific supervision.

With regard to the conservation of genetic resources in Germany, therefore, it would certainly be a good idea to expand the contacts with international institutions in order to ensure access to the latters' genetic resources for the purpose of hybrid breeding if needed.

If the wide-ranging performance trials or hybrid breeding experiments at institutes outside Germany also show evidence of outstanding properties for aquaculture species held in Germany, these stocks could then be tested under controlled conditions in German fishery research institutes in order to determine their performance under the conditions of German aquaculture.

50. Describe important roles that your country performs within its region (and/or sub-region) and globally in terms of being a keeper, user and sharer of aquatic genetic resources.

Germany has multiple regional and national institutions and institutes that are active in the protection and sustainable use of AqGR.

Since the 1970s, intensive efforts have been made in Germany to protect and remediate degraded aquatic ecosystems. This is a field in which valuable experience and knowledge has been gained, knowledge that serves as a benchmark for the restoration of habitats of AqGR both regionally and internationally
Germany has a very long tradition in the field of aquaculture and in particular in the area of carp pond culture, a tradition that dates back to the early Middle Ages. The carp pond areas are still important cultivated landscapes today and provide many endangered animal and plant species with substitute habitats for floodplain habitats that have been lost. Germany plays a particularly important role for the conservation and continued survival of this near-natural form of fish production that is unique in Central Europe. Were it not for their continued use as carp ponds, it would not be feasible to preserve these unique cultivated landscapes with their valuable AqGR.

Germany possesses outstanding capacities for the exploration of living marine resources and marine ecosystems, and these capacities are also of importance on international level. The findings of this research are used in the definition of fishing quotas and other management measures of the EU, e.g. in the creation of protection areas or the definition of biological recovery periods or fishing equipment specifications; they are also used to determine how many fish of a specific population may be caught and how fishing impacts the marine ecosystem overall. The management rules are based on the data collections and model calculations of fisheries research. For this purpose, measuring and observation systems are continuously optimised, all the way through to the development of fully automatic recording and analysis systems. The high utilisation pressure on the German coastal waters that increasingly restricts utilisation of the existing AqGR makes the development of integrated ma-rine utilisation concepts all the more urgent. This is also an area in which Germany can use its experience and excellent scientific background to play a key role in the international exchange of experience.

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