Federal Ministry
Republic of Austria
Agriculture, Regions
and Tourism

Federal Ministry of Agriculture, Regions and Tourism

Regulation (EU) 2017/1004 of the European Parliament and of the Council

on the establishment of a Union framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the common fisheries policy and repealing Council Regulation (EC) No 199/2008 (recast)

Commission Implementing Decision (EU) 2016/1251

adopting a multiannual Union programme for the collection, management and use of data in the fisheries and aquaculture sectors for the period 2017-2019

Commission Implementing Decision (EU) 2016/1701

laying down rules on the format for the submission of work plans for data collection in the fisheries and aquaculture sectors

Commission Implementing Decision (EU) 2018/1283

laying down rules on the format and timetables for the submission of annual data collection reports in the fisheries and aquaculture sectors

Austrian Annual Report for data collection in the fisheries and aquaculture sectors

2019

Vienna, 28 May 2020

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Text Box 1C: Sampling intensity for biological variables

General comment: This box fulfils paragraph 2 point (a)(i)(ii)(iii) of Chapter III, Chapter IV of the multiannual Union programme and Article 2, Article 4 paragraph 1 and Article 8 of the Decision (EU) 2016/1701. This box is applicable to the Annual Report.

Not applicable, Austria is a land-locked country.

Text Box 1D - Recreational fisheries

General comment: This box fulfills paragraph 2 point (a) (iv) of Chapter III of the multiannual Union programme and Article 2, Article 3 and Article 4 paragraph 1 of the Decision (EU) 2016/1701. This box is applicable to the Annual Report. This box is intended to provide information on the design, implementation and analysis of all components of sampling schemes/ surveys that are listed in Table 1D.

Not applicable, Austria is a land-locked country.

Pilot Study 1: Relative share of catches of recreational fisheries compared to commercial fisheries

General comment: This box fulfils paragraph 4 of Chapter V of the multiannual Union programme and Article 2 and Article 4 paragraph (3) point (a) of the Decision (EU) 2016/1701.

General comment: This box is applicable to the Annual Report. This box is intended to provide information on the results obtained from the implementation of the pilot study.

Not applicable as such for Austria. However, the pilot study "Data collection of whitefish and arctic charr stocks in Alpine lakes of Austria" fits best in here and is described below.

Pilot Study 1a: Data collection of whitefish and arctic charr stocks in Alpine lakes of Austria

General comment: This box fulfils paragraph 4 of Chapter V of the multiannual Union programme and Article 2 and Article 4 paragraph (3) point (a) of the Decision (EU) 2016/1701.

1. Aim of pilot study

For a long-term and effective management of commercially used fish stocks (whitefish) it is of the utmost importance to not only keep catch statistics, but also to regularly collect data on population structure and stock size. With such regularly collected data, it is possible to suitably analyse changes in fish stocks and to timely respond to changes. Age and length structures, growth, condition factor and age at maturity constitute important and essential fish biological basic data in this context. To estimate the amount of fish that can be taken sustainably, a hydroacoustic assessment of fish biomass is essential. It is the aim of the proposed pilot study to create a suitable starting point for ensuring optimum response in the event of landlocked countries being subject to a mandatory collection of socio-economic data in the future.

2. Duration of pilot study

The main fish species exploited commercially in the Austrian lakes is whitefish, and, accordingly, whitefish stocks are subject to high fishing pressure. Thus, for the period 2017-2019, the examination of whitefish stocks in lakes in northern and southern parts of the Alps, at least in ten Austrian lakes is planned. The collection takes´place annually in late September/early October respectively.

3. Methodology and expected outcomes of pilot study

The fish (appr. 150 animals per examination year) are caught using a fleet of gill nets with 9 different mesh sizes (15, 20, 25, 30, 35, 45, 55 and 70 mm) or with standardised Nordic multi-mesh nets. The aim in this context is to catch, to the extent possible, all age groups equally well. In order to be able to compare the samples of the different lakes, the catches are performed as CPUE (catch per unit effort). The caught fish are measured, weighed and tested for abnormalities (damage caused by hooks, injuries, parasites, etc.). Moreover, scale samples (whitefish) are taken for determination of age, sex and maturity stage age.

From a scientific point of view it is necessary that the method development and data collection in the Austrian lakes with a study on 10 to 11 lakes is the minimum requirement to make a relevant statistical statement. Due to the different naturerelated conditions, there are influences on the results of the survey, which can not be determined in advance. Only with a statistically sufficiently secured data situation can these factors be determined and correspondingly taken into account in the interpretation of the data. Data sets from less than 10 lakes produce higher statistical uncertainties and may lead to a misinterpretation of the data and results obtained.

Age determination will be made by counting annually from projected slide images of dried and cleaned scales. Two independent readers, to whom information such as length or weight will not be available, have to age each fish three times. The most frequent age-value will be used for further calculations.

The results are represented in histograms or plots in the form of growth curves. age and length structures as well as plots representing maturity stage.

The overall fish biomass of the lakes is estimated with a scientific echo sounder (SIMRAD EK 60 with a 7°x7° composite split beam transducer). Surveys are conducted exclusively during night hours along zigzag transects three times (autumn to winter) per lake.The acoustic data is analysed with Sonar 5 Pro post-processing software. Based on these data overall fish biomass as well as mean size distribution in 2 cm classes will be calculated.

Owners of fishing rights will be involved in the monitoring programme and provided with yearly data on stocking and harvest.

At the end of this monitoring programme profound ecological data sets on the development of age and length structure, maturity and growth of withefish will be available. Age and length structure can be used to draw conclusions about fishing pressure and reproduction success. Data on age and length at maturity allow verification of the used mesh size and/or of the existing minimum size limit. Based on the data of growth and condition factor chances in food supply and problems with dense populations can be derived.

Moreover, after the study has been completed, data on the overall fish biomass will be available for each lake as a basis to size up sustainable yield.

A short annual report will be prepared after finishing the yearly surveys and a final report at the end of the study. The final report will contain recommendations how to optimise the fisheries management of the investigated lakes.

4. Achievments of Pilot Study 1a - 2019:

Pilot Study 1a continued in 2019 as planned with analysis of collected sampling data and hydroacoustic data from 6 lakes in 2018 (Wolfgangsee, Obertrumer See, Traunsee, Hallstätter See, Millstätter See, Weissensee). Age of 628 whitefish and 325 arctic charr were determined from scale (whitefish) and otolith (arctic charr) samples by a group of experts. Age data was used subsequently for the calculation of growth trajectories of the two species. Analysis of maturity status was done through logistic regression. Catchability of gillnets and different mesh sizes as well as catch per unit effort of gillnet sampling were calculated for each lake. Hydroacousitic data collected through three surveys per lake in winter 2018/2019 were used to evaluate total fish biomasses. Both echosounder systems, SIMRAD EK60 and EK80, were used for data collection. Accordingly, provisional results comprise assessments of 6 stocks of whitefish and/or arctic charr by means of multi-mesh gillnetting in 2018, accomplished implementation of the new hydroacoustic system and completed analyses of data on fish growth, reproduction, catchability and total fish biomass. All results were compiled in a stock assessment report for every lake.

The stock assessments of the remaining 5 lakes (Achensee, Attersee, Grundlsee, Millstätter See 2 and Mondsee) were carried out between August and October 2019. Collected data on species, length, weight, sex and maturity stage were digitalized and uploaded in the national fish database (FDA) administered by the Federal Agency for Water Management of Austria. Analyses of all sampling data collected in 2019 will be done in spring 2020.

In addition to the stock assessment program, the method of purse seining for data collection of whitefish was tested within Pilot Study 1a. This technique enables a selective harvest of living fish. Consequently, the method is more considerate than gillnet sampling. A 200 meter long and 15 meter deep purse seine and an adapted fishing boat was purchased for the trial of the method. In October 2019, the setup was tested in collaboration with the manufacturer of the purse seine at Hallstätter See. The test was very promising and more than 600 whitefish were caught in the first trial in only 3 hours. However, no whitefish were caught in the rerun of another two trials of purse seining and further tests will be necessary in 2020. The first test results will be analysed in spring 2020 and presented in the final project report.

Overall, 11 stock assessments of 10 Austrian lakes (2x Millstätter See) with populations of whitefish and/or arctic charr were successfully conducted in Pilot Study 1a, as scheduled in the project proposal. A first comparison of provisional results reveals differences between stocks of whitefish and arctic charr in Austrian lakes. There are remarkable variations in maximum fish size and growth trajectories, total fish biomasses (40 to 250 kg/ha), population structure and local

fisheries management. Interestingly, there are several cases of stunted growth of whitefish, which seems to be related to high fish densities.

The data collected in Pilot study 1a indicate that the concept of maximum sustainable yield is yet not applied in Austrian lake fisheries. Results reveal cases of overfishing and noteworthy, cases of under-utilization causing fluctuations and unpredictability in yields and population dynamics. The results of Pilot study 1a are currently compiled to derive clear and sustainable action plans for fisheries management of the investigated stocks.

Provisional results already indicate that continuing and extending the stock assessment of at least the economical important species would be a useful tool for inland fisheries mangement.

The best practice for the monitoring of whitefish and arctic charr would be a three-year monitoring interval to review and forecast the development of fish populations in Alpine lakes. Such a monitoring program would contribute to predictable yields and healthy fish stocks. To achieve the goal of a sustainable and productive inland fishery, data on yields and the monitoring and documentation of fish stocking programs are urgently required from both sectors, commercial and recreational inland fisheries.

   5. Incorporation of results from pilot study into regular sampling by the Member State.

Not applicable – till now there is no regular sampling in landlocked countries.

SECTION 1: BIOLOGICAL DATA

Text Box 1E: Anadromous and catadromous species data collection in fresh water

General comment: This box fulfills paragraph 2 points (b) and (c) of Chapter III of the multiannual Union programme and Article 2 of the Decision (EU) 2016/1701.

General comment: This box is applicable to the Annual Report.

Not applicable. The stocks mentioned in table 1E of EU/2016/1251 are not relevant for Austria.

Further explanations have been provided in the 2018 Annual Report.

Text box 1F: Incidental by-catch of birds, mammals, reptiles and fish

General Comment: This box fulfils paragraph 3 point (a) of Chapter III of the multiannual Union programme and Article 2 of the Decision (EU) 2016/1701. This box is applicable to the Annual Report. This box is applicable only for those sections where Member States have reported that they have been carrying out regular sampling. Results and deviations for Pilot studies should be reported under Pilot Study 2.
Not applicable. Austria is a land-locked country.

Pilot Study 2: Level of fishing and impact of fisheries on biological resources and marine ecosystem

General comment: This Box fulfills paragraph 3 point (c) of Chapter III of the multiannual Union programme and Article 2 and Article 4 paragraph (3) point (b) of the Decision (EU) 2016/1701.
General comment: This box is applicable to the Annual Report. This box is intended to provide information on the results obtained from the implementation of the pilot study.
Not applicable, Austria is a land locked country.

Text Box 1G: List of research surveys at sea

General comment: This box fulfills Chapter IV of the multiannual Union programme and Article 2 and Article 7 paragraph (3) of the Decision (EU) 2016/1701. It is intended to specify which reseach surveys at sea set out in Table 10 of the multiannual Union programme will be carried out. Member States shall specify whether the research survey is included in Table 10 of the multiannual Union programme or whether it is an additional survey.
General comment: This box is applicable to the Annual Report. This box should provide complementary information on the performance of the surveys, the results and their main use.
Not applicable, Austria is a land-locked country.

Text Box 2A: Fishing activity variables data collection strategy

General comment: This box fulfills paragraph 4 of Chapter III of the multiannual Union programme and Article 2, Article 4 paragraph (2) point (b) and Article 5 paragraph (2) of the Decision (EU) 2016/1701. It is intended to describe the method used to derive estimates on representative samples where data are not to be recorded under Regulation (EU) No 1224/2009 or where data collected under Regulation (EU) No 1224/2009 are not at the right aggregation level for the intended scientific use.
General comment: This box is applicable to the Annual Report. This box should provide information on the implementation of the data collection of fishing activity variables of Member States.
Not applicable, Austria is a land-locked country.

Text Box 3A: Population segments for collection of economic and social data for fisheries

General comment: This box fulfils paragraph 5 points (a) and (b) of Chapter III of the multiannual Union programme and Article 2, Article 4 paragraphs (1), (2) and (5) and Article 5 paragraph (2) of the Decision (EU) 2016/1701. It is intended to specify data to be collected under Tables 5(A) and 6 of the multiannual Union programme.

General comment: This box is applicable to the Annual Report. This box should provide information on the implementation of the fleet socio-economic data collection of Member States.

Not applicable, Austria is a land-locked country.

Pilot Study 3: Data on employment by education level and nationality

General comment: This box fulfills paragraph 5 point (b) and paragraph 6 point (b) of Chapter III of the multiannual Union programme and Article 2 and Article 3 paragraph (3) point (c) of the Decision (EU) 2016/1701.It is intended to specify data to be collected under Table 6 of the multiannual Union programme.

General comment: This box is applicable to the Annual Report. This box is intended to provide information on the results obtained from the implementation of the pilot study (including deviations from planned and justifications as to why if this was not the case).

Not applicable, aquaculture is below threshold.

Text Box 3B: Population segments for collection of economic and social data for aquaculture

General comment: This box fulfills paragraph 6 points (a) and (b) of Chapter III of the multiannual Union programme and Article 2, Article 4 paragraphs (1) and (5) and Article 5 paragraph (2) of the Decision (EU) 2016/1701.It is intended to specify data to be collected under Tables 6 and 7 of the multiannual Union programme.

General comment: This box is applicable to the Annual Report. This box should provide information on the implementation of the socio-economic data collection for aquaculture of Member States.

Not applicable – Austria is looking by means of Pilot study 3a for methodologies and data sources for the collection of economic and social data for aquaculture

Pilot Study 3a: Socio-economic data in the fisheries and aquaculture sectors in Austria

General comment: This box fulfills paragraph 5 point (b) and paragraph 6 point (b) of Chapter III of the multiannual Union programme and Article 2 and Article 3 paragraph (3) point (c) of the Decision (EU) 2016/1701.It is intended to specify data to be collected under Table 6 of the multiannual Union programme.

General comment: This box is applicable to the Annual Report. This box is intended to provide information on the results obtained from the implementation of the pilot study (including deviations from planned and justifications as to why if this was not the case).

1. Aim of pilot Study

Being a landlocked country, Austria is currently largely exempt from data collection in the fisheries and aquaculture sectors. This is why for this sector, when compared with other Member States, only few data sets are available and/or there is comparably little knowledge on the development potential of existing social and economic data sets that could be evaluated for the sector. By way of a pilot project on the collection of socio-economic data, a comprehensive picture of data availability regarding the Austrian fisheries and aquaculture sectors is to be created, and, moreover, possibilities for collecting currently not yet (sufficiently) existing data sets are to be pinpointed and, to the extent possible, made operational (first pilot collections going beyond feasibility). This way, not only the basic possibility of collecting data and generating pilot data sets and/or a political monitoring system, but also the practicability, proportionality as well as the technical optimisability of data collection are to be identified.

The aim of the proposed pilot study is the creation of a suitable starting point for ensuring optimum response in the event of landlocked countries being subject to mandatory collection of socio-economic data in the future.

2. Duration of pilot study

The implementation period of the pilot study is scheduled for appr. 18 months. The pilot study is to be completed, in any event, by the end of 2019.

3. Methodology and expected outcomes of pilot study

The basis for the pilot study is constituted by the variables given in Table 6: Social variables for the fishing and aquaculture sectors and Table 7: Economic variables for the aquaculture sector, by taking into account Table 9: Segmentation to be applied for the collection of aquaculture data of the Annex to the Commission Implementing Decision adopting a multiannual Union programme for the collection, management and use of data in the fisheries and aquaculture sectors for the period 2017-2019.

In a first step, existing databanks and databases are screened to identify the availability of the mentioned variables and/or the respective modification/evaluability of these databases. In this process, the following databases are important in particular:

- Labour Market Database (AMDB) of the Austrian Public Employment Service (AMS) and of the Federal Austrian Ministry of Labour, Social Affairs and Consumer Protection (BMASK) (based on a pooling of insurance data of the Main Association of Austrian Social Security Institutions (HVSV) and AMS data)

- Coordinated labour statistics (including published indicators from the areas of demographics, education, labour statistics as well as households and families)

For those data for which no database exists, a suitable collection method is to be considered in a next step. In this process, different methods may be used:

- Additional information may be collected e.g. by way of direct interviews with companies (on-site, over the phone or by mail) (presumably mainly concerning cost data). To keep collection costs as well as the effort expended by the companies low, the prerequisite for and significance of a suitable sample are to be verified in this context (concentration sample).

- Another option is constituted by the collection of data by way of contribution-margin calculations, as they are currently carried out e.g. for agricultural holdings practising cash crop production, cattle farming or pig farming. The possibilities for the application of the methods are to be assessed in the course of the implementation of the study.

In particular with regard to the area of employment data for gainfully employed persons, valid and comparably easy-to-collect data sets are expected, as the Labour Market Database – that provides information on the employment status of all persons who have a registered address in Austria – constitutes a reliable and comprehensive instrument.

The pilot study is to serve also the purpose of assessing and subsequently minimising the effort caused by longer-term data collection regarding the indicators given in Tables 6 and 7 of the Commission Implementing Decision. Thus, it shall be ensured that data collection is designed in such a way as to not entail any disproportionate effort. This is to minimise the risk that the cooperation of companies in terms of data collection is discouraged. It shall also be considered that due to the small-scale nature of the sector in Austria, a collection of company indicators according to the individual predetermined segments (salmon, trout, carp etc. pursuant to Table 9) is to be analysed for usefulness. It is reasonably expected that difficulties will arise mainly with regard to the surveying of unpaid labour.

4. Achievement of the original expected outcomes of pilot study and justification if this was not the case.

Due to delays in officials' data delivery, the intended participation in activities at EU level and postponed appointments of company interviews, the project was extended to October 2019.

Besides useful administrative data, the initial screening showed that some data sets do not entail the particular information requested in Table 6 and Table 7 of the Annex to the Commission Implementing Decision. Furthermore, the differentiations in Table 9 cannot be applied on most

of the administrative datasets. Additionally, existing data is partially reported for fisheries and aquaculture combined (NACE 03), as the sectors are small and variability would be high.

Data evaluation from the Labour Market Database was less fruitful than expected, which is due to the sector's size. Companies are listed according to their main activity (NACE); as fishery and aquaculture are often a side activities, many companies are listed in other sectors than 03.12 or 03.22.

For the pilot data collection, a questionnaire was prepared and pre-tested, following EU MAP-variables and the corresponding definitions. The questionnaire was very detailed, serving the target of the pilot study to gain as many information as possible to evaluate and reduce the scope for potential future surveys, where reasonable. The questionnaire's extent and level of detail is challenging for most companies. This has to be taken into account for potential future surveys. Most of the data was collected in face-to-face interviews; phone interviews (satisfying results) and postal data collection (dissatisfying results) were tested, too.

Pilot data was collected for aquaculture companies. Fisheries were not included in the pilot survey, as freshwater fisheries are not part of the DCF. Nonetheless, the pilot study provides important information on the existing data availability regarding Austrian fisheries. To get further insight into the actual data situation, an exemplary sample survey was carried out for lake fishing.

- Population: According to the implementing decision, data should be collected from companies with NACE 03.22 as their main activity. Unfortunately, there is no complete data set of this classification, so the overall list of fish-producing entities (aquaculture survey) was used as basis. Thereby, this approach takes better account of the structure of the sector in Austria.
- Sampling: Due to the sector's structure, the survey was carried out using a stratified sample instead of a concentration sample. Thereby, companies with similar characteristics (turnover level, fish species) were combined in strata. From these strata, companies were selected by random sampling. Strata that exhibit a very small number of companies (highest share of total production; recirculation systems) were attempted to be covered entirely. To ensure a reasonable distinction between production, processing and marketing, the collected data refers to aquaculture primary production (from live fish to fish half, not further processed).

Overall, socio-economic data were collected for 66 companies, representing 13.4% of the population. The collected data vary strongly regarding accuracy and consistency. This is due to the voluntary cooperation of the companies, who might refuse submission. Further, small part-time farms mostly report estimations. In the case of large companies with different branches, the segregation of aquaculture data from the overall values is challenging. Data on produced quantities, operating revenue from aquaculture production, expenditure on fish feed and livestock, as well as social variables (employment including age, education, nationality) were very well available. Depreciation and capital value did not lead to satisfying reporting. The expected values were extrapolated at sector level by means of a stratified random sample and linear models (best fitting model chosen for each variable).

The results show that, due to the heterogeneity of the sector, standard deviation for some variables is quite high (range between 3% for feed; 99% for non-EU/EWR employment). The method used would require significantly larger samples in order to obtain valid data for variables currently exhibiting a high standard deviation.

It is recommended to use existing administrative data for reporting, where available, as they are valid and robust, despite the trade-off between the use of reliable sources and sector coverage. The methodology is currently further elaborated in a proceeding pilot study, especially by testing the typical farm approach method, which besides virtual data for the given variables should lead to more explanatory variables and thus to lower standard deviations.

5. Incorporation of results from pilot study into regular sampling by the Member State

Several options were discussed with stakeholders:

- Extending EUROSTAT data collection: This collection is well established and likely to result in good response rates. According to the National Statistic's Office, collection would only be possible if based on legal obligation.

- EMFF funding applications: Filling out application forms is mandatory, sound responses can be expected. Applicants currently cover 30 % of the sector's turnover and 25 % of the sector's output. However, applications are distributed over several years. Depending on the funding guidelines, some company types would be over-/under-represented.

- Extending Austrian Agricultural Structure Survey: Every 10 years a full survey of all agricultural and forestry holdings exceeding a certain threshold is carried out. Currently, only marginal information on aquaculture is collected. Data collection is well established, but time intervals between survey dates are considerable.

- Surveys with longer time intervals, interpolated by typical farm approach data: This might be a constructive solution for the small-scale Austrian sector, avoiding the otherwise overburdening of farmers while gaining only subordinate relevant data compared to EU level.

At present, regular sampling is not mandatory. The current focus lies on improving the methodology and finding a suitable solution, meeting the sector's characteristics.

SECTION 3: ECONOMIC AND SOCIAL DATA

Pilot Study 4: Environmental data on aquaculture

General comment: This box fulfills paragraph 6 point (c) of Chapter III of the multiannual Union programme and Article 2 and Article 4 paragraph (3) point (d) of the Decision (EU) 2016/1701. It is intended to specify data to be collected under Table 8 of the multiannual Union programme.

General comment: This box is applicable to the Annual Report. This box is intended to provide information on the results obtained from the implementation of the pilot study (including deviations from planned and justifications as to why if this was not the case).

1. Aim of pilot study

- Ecosystem services assessment of Austrian aquaculture
- Assessment of fish mortalities caused by predators focusing on the European otter
- Identifying key factors to increase national fish production
- Identification of country-wide production potential for aquaculture based on environmental data

2. Duration of pilot study

24 months

3. Methodology and expected outcomes of pilot study

- **Ecosystem services assessment of Austrian aquaculture**

An assessment of the Ecosystem Services (ESS) of Austria`s aquaculture will be compiled. The Environment Agency Austria has already developed a methodology for the assessment of ESS in Agriculture. This includes the estimation of different ESS in qualitative, quantitative and monetary terms. For the issue of aquaculture this methodology will be adapted. The Study "Ponds in the landscape – IMPORTANCE, FUNCTION & THREATS" (http://www.wasseraktiv.at/resources/files/2014/9/10/6668/teiche-landschaft-ebook.pdf) provides the data basis for the ESS assessment.

The main outcome will be values for different ESS, as example provisioning functions (production), regulation functions (i.a. water protection), cultural functions (i.a. recreation) or habitat functions (i.a. biodiversity).

The study will also take account of the specific conditions of production in organic aquaculture and its effects on the environment. Therefore the number of organic fish farms, production volume etc. will be collected and processed by official statistics and qualitative interviews with sector experts and representative entrepreneurs.

The ESS of Austria's aquaculture can be compared to the current situation of supply with seawater and freshwater fish from abroad, if related results of studies are available.

- **Assessment of fish mortalities caused by predators focusing on the European otter**

Conflicts arising from otter (Lutra lutra) predation on commercial fish are nowadays a common phenomenon in many European countries. At fish farms, damage is usually defined as loss of stocked fish revealed when a pond is drained. Since a fish farming period expands usually over several months, the recorded losses at the moment of pond draining represent damage accumulated during a longer period. At this time the causes of damage are not necessarily evident any more.

A number of different reasons for losses (other fish predators, fish diseases etc.) exist and the otter is only one of them. Therefore, it is extremely difficult to properly assign the correct amount of damage to the different causes of loss. A standardized method to estimate fish mortalities caused by otters will be applied which provides information on the damage and losses in fish farms due to specific predators.

Methodological approach:

   a. Semi-qualitative questionnaire-based survey among commercial fisheries in Austria
   b. Estimation of otter densities in the area of 3-5 selected and representative fish farms
   c. Estimation of fish mortalities taking into consideration following factors: Disease, parasites, injuries, fishery, predators
   d. Assessment of the effects on fish populations caused by predators, particularly the otter
   e. Comparison between the survey and the empiric investigation

- **Identifying key factors to increase the national fish production**

In 2014 Austria adopted the strategy paper "Aquaculture 2020 – Austrian strategy to increase the national fish production". The key target within this strategy is to raise the degree of self-supply with freshwater fish from then 34 % to 60 % until 2020. At present it seems that this objective cannot be attained. There are various reasons discussed, but none of these reasons is verified. A survey as described below will identify key factors and barriers for the sustainable increase of production. In any case, the parameters "Medicines or treatments administered" and "Mortalities" must be recorded, analysed, and all the necessary statistical metadata of the pilot survey as required by the EC are mandatory. The variables to be collected are set out in Table 8 (Environmental variables for the aquaculture sector) in Implementing Decision (EU) 2016/1251.

Methodological approach:

   a. Quantitative questionnaire-based survey among authorizing authorities of Austrian Provincial Governments
   b. Semi-qualitative questionnaire-based survey among commercial fisheries and business sector representatives in Austria
   c. Identifying key factors (and barriers) to increase national fish production.

- **Identification of country-wide production potential for aquaculture based on environmental data**

Austria is a country with rich water resources that can support aquaculture in a sustainable way. The future potential of aquaculture production depends on the local water availability, environmental conditions, current water uses and legal constrains. A country-wide assessment of the aquaculture

potential would help to estimate the total aquaculture potential and to identify areas with the highest potential for future aquaculture development.

Methodological approach:

a. Development of a detailed methodology for a country-wide assessement of aquaculture potential in Austria
b. Assessement of water availability and important water quality parameters (e.g. water temperature) based on environmental data and models for rivers and streams
c. Assessment of current water uses and potential conflicts
d. Legal boundary conditions and environmental protection issues
e. Integrative assessement of country-wide aquaculture potential

4. Achievement of the original expected outcomes of pilot study and justification if this was not the case.

A steering group was installed in order to accompany the pilot study and evaluate the results.

Ecosystem services of aquaculture in Austria

For this purpose, existing data were systematically collected and summarised. Additional ecosystem services were presented separately for two types of aquaculture, the pond and the flow-through system, and compared with the services of recirculating systems. Moreover, case studies were used to describe the assessment of ecosystem services and additional services on fish farms, differentiating between organic and conventional farms. It was found that especially pond systems offer a wide variety of potential ecosystem services, depending on how they are managed. Moreover, many of these ecosystem services represent public goods that are not available on the market. The extensive management of pond systems in particular makes a positive contribution to landscape conservation, nature protection and biodiversity. In addition to the farmed fish, a large number of plants and aquatic animals find their habitat there.

Flow-through systems such as basins and channels provide ecosystem services on a smaller scale. The extent to which public goods are provided is thus also smaller. The services provided by recirculating systems are dependent on how the system is operated. Therefore, additional services, such as the further use of waste¬water or the offer of guided tours and training on the farm, are provided on the operator's own

Assessment of fish mortalities caused by predators focusing on the European otter

Module 2a: This module comprised the documentation and evaluation of mortality and production losses due to predators. At the centre of the study was a case study (AquaOtter) carried out at the University of Life Sciences, in cooperation with the University of Graz and the University of Veterinary Medicine of Vienna. In two ponds in the Waldviertel region with different degrees of predator pressure, an experimental approach was used to study the development of a defined fish stock, consisting of carp (Cyprinus carpio) and white fish, for the period of one year. . At the end of the experiment the carp population in the pond, which was equipped with access points for otters, had decreased by 30 individuals (17.1%). Five of them were found dead without showing signs of any animals eating them, so that predation as a cause of mortality can be excluded. The fate of the other 14.3%, however, is not clear and cannot be attributed for certain to otters alone or to predation in general. In any case, the 2.8% decline in carp stocks is still below the "natural" mortality expected for carp ponds.

Identifying key factors to increase national fish production and Identification of country-wide production potential for aquaculture based on environmental datatification of key factors to increase the national fish production

The third module was dedicated to the identification of obstacles, but also to the identification of potentials for a future increase in production. In qualitative interviews, 20 operators of aquaculture farms were able to reveal obstacles and potentials. It was found that currently predation, climate change and water regulations are the biggest obstacles to fish production.

In 60 quantitative surveys, further aspects such as the use of medicines, mortality in fish farming and the desired increase in production were addressed. The results of the feedback were presented and discussed at a stakeholder workshop in October 2019.

The interviewed persons were asked to report the use of medicines in kilogrammes (kg). However, as the survey progressed, the unit of litres (l) had to be included as well, as some of the medicines are only administered as liquids. In addition, due to the lack of definitions, it was unclear what the respondents had to declare as medicine. It was therefore not possible to perform an in-depth evaluation of the information. The average mortality rate of the fish in the surveyed fish farms (n=60) is 21.7% with a standard deviation of 18.8%.

At the same time, the University of Natural Resources and Life Sciences Vienna worked on the development of a method to identify the country-wide production potential for aquaculture. The process started with the identification and collection of relevant environmental data (e.g. water availability and -quality, existing uses, impacts, and legal restrictions) which were homogenized for futher processing. Furthermore, a conceptional model was developed based on three levels: (1) GIS-based identificaiton of suitable areas based on land landscape- and water parameters, (2) calculation of the production potential of salmonid flow-through systems under consideration of different development scenarios, and (3) assessment of the expected impacts on aquatic ecosystem and if necessary reduction of the production potential to meet environmental standards. The developed method and preliminary results were discussed in an expert workshop in April 2019 and the feedback was incorporated into the method. Futhermore, based on data of existing aquaculture facilities, a sensitivity analysis of the developed method was performed. The results indicate, that the remaining production potential for trout in flow-through systems is high in Austria and that the level of self-sufficiency for freshwater fish could be further increased.

5. Incorporation of results from pilot study into regular sampling by the Member State.

The aim of the pilot study 4 is to prepare data for a possible incorporation of results and establish a basis for the regular sampling. No decision has yet been made as to how the incorporation should take place.

SECTION 3: ECONOMIC AND SOCIAL DATA

Text Box 3C: Population segments for collection of economic and social data for the processing industry

General comment: This box fulfils footnote 6 of paragraph 1.1(d) of Chapter III of the multiannual Union programme, Article 2, Article 4 paragraphs (1) and (5) and Article 5 paragraph (2) of Decision (EU) 2016/1701. It is intended to specify data to be collected under Table 11 of the multiannual Union programme.

General comment: This box is applicable to the Annual Report. This box should provide information on the implementation of the socio-economic data collection for aquaculture of Member States.

SECTION 4: SAMPLING STRATEGY FOR BIOLOGICAL DATA FROM COMMERCIAL FISHERIES

Text Box 4A: Sampling plan description for biological data

General comment: This box fulfills Article 3, Article 4 paragraph (4) and Article 8 of the Decision (EU) 2016/1701 and forms the basis for the fulfilment of paragraph 2 point (a)(i) of Chapter III of the multiannual Union programme. This Table refers to data to be collected under Tables 1(A), 1(B) and 1(C) of the multiannual Union programme.

General comment: This box is applicable to the Annual Report. This box should provide information on the deviations from the planned sampling of Member States.

Not Applicable, Austria is a land-locked country.

SECTION 5: DATA QUALITY

Text Box 5A: Quality assurance framework for biological data

General comment: This box is applicable to the Annual Report. This box fulfills Article 5 paragraph (2) point (a) of the Decision (EU) 2016/1701. This box is intended to specify data to be collected under Tables 1(A), 1(B) and 1(C) of the multiannual Union programme.Use this box to provide additional information on Table 5A.

Not applicable, Austria is a land-locked country.

SECTION 5: DATA QUALITY

Text Box 5B: Quality assurance framework for socioeconomic data

General comment: This box fulfills Article 5 paragraph (2) point (b) of the Decision (EU) 2016/1701. This box is intended to specify data to be collected under Tables 5(A), 6 and 7 of the multiannual Union programme. Use this box to provide additional information on Table 5B.

Austria is under the threshold for the collection of social and economic data on aquaculture according to chapter V of regulation 2016/1251. However, a pilot study was conducted to develop a methodology. Due to the small size of the sector in Austria, this proved to be a challenge. Therefore, further work is necessary and will be continued in pilot Study 3a (part 2) "Socio-economic data in the fisheries and aquaculture sectors in Austria - Applicability of virtual data collection in Austrian aquaculture".