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REPORT OF THE EXPERT WORKSHOP ON "INCORPORATING INFORMATION ON WILD RELATIVES OF AQUACULTURE SPECIES INTO AN INFORMATION SYSTEM FOR AQUATIC GENETIC **RESOURCES**"



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Report of the

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Virtual Workshop, 2-3 August 2022

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PREPARATION OF THIS DOCUMENT

This report describes the activities and outputs of the FAO Expert Workshop on "Incorporating information on wild relatives of aquaculture species into an information system for aquatic genetic resources" held from 2 to 3 August 2022.

This document was prepared by Mr Graham Mair and Ms Daniela Lucente. The report was reviewed by participants in the workshop and their feedback incorporated prior to its finalization.

ABSTRACT

This report summarizes the proceedings and outcomes of the Expert Workshop on "Incorporating information on wild relatives of aquaculture species into an information system for aquatic genetic resources" held from 2 to 3 August 2022.

The workshop aimed to discuss the expansion of the FAO Aquatic Genetic Resources Information System (AquaGRIS) in order to also include information on wild relatives (i.e. wild stocks) of aquaculture species. AquaGRIS, the system being developed by the FAO Fisheries and Aquaculture Division, will help countries and stakeholders to inventory national aquatic genetic resources (AqGR) used for aquaculture and monitor the status of their management.

The main objectives of the workshop were to identify the main stakeholders that will benefit from having access to information on wild relatives of aquaculture species; identify and define the scope of the main unit of data collection, management and monitoring for inclusion in AquaGRIS, in the context of the stakeholders and existing definitions relating to stocks of AqGR (e.g. evolutionary significant unit, conservation unit etc.); and identify key information on wild stocks to be collected in AquaGRIS and possible indicators of the status of wild relative stocks that could be generated by AquaGRIS.

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ABBREVIATIONS AND ACRONYMS

AqGR	aquatic genetic resources
AquaGRIS	Aquatic Genetic Resources Information System
Commission	FAO Commission on Genetic Resources for Food and Agriculture
FAO	Food and Agriculture Organization of the United Nations
GPA	Global Plan of Action for the Conservation, Sustainable Use and Development of Aquatic Genetic Resources for Food and Agriculture
NFI	Fisheries and Aquaculture Division
NFIAT	Technology and Production (Team)
NFISI	Information and Knowledge Management (Team)
NFP	National Focal Point for Aquatic Genetic Resources
SoWAqGR	The State of the World's Aquatic Genetic Resources for Food and Agriculture
SDGs	Sustainable Development Goals

Introduction

1. FAO is developing AquaGRIS (Aquatic Genetic Resources Information System), a global information system to collect and share information on aquatic genetic resources $(AqGR)^1$ and particularly on farmed types and wild relatives of farmed aquatic species within national jurisdiction. A prototype information system containing information on farmed types is already available (FAO, 2022) and work is ongoing to develop this into a fully fledged system.

2. An expert workshop held in 2016 was the first to recommend the development of such an information system (FAO, 2016), recognizing that genetic information, especially below the species level (e.g. stocks and strains), is not commonly available or used in fishery and aquaculture management, although there are some exceptions, particularly for high-value species such as Atlantic salmon.

3. In 2018, the Members of the Intergovernmental Technical Working Group on Aquatic Genetic Resources for Food and Agriculture (ITWG-AqGR), a working group of the Commission on Genetic Resources for Food and Agriculture (the Commission), recommended FAO "to assess, explore and develop mechanisms to monitor the status and trends of AqGR including, as appropriate, through the establishment of a global information system and a registry of farmed types as well as stocks of wild relatives".²

4. FAO published a global assessment of the status of AqGR (FAO, 2019). This global assessment was based on country reports from 92 aquaculture producing countries and also on thematic background studies including one that looked at the monitoring needs for farmed types and their wild relatives (FAO, 2021).

5. At the request of the Commission, FAO has developed, following extensive consultation, a *Global Plan of Action for the Conservation, Sustainable Use and Development of AqGR for Food and Agriculture* (GPA) (FAO, 2022b). The GPA aims to enhance the effective management of both farmed types and wild relatives of aquaculture species and its implementation (which remains voluntary and non-binding) should act as a catalyst for countries to develop or update national and regional strategies and promote global cooperation. A central component of the GPA will be a global information system that can inform the identification of strategic priorities and important actions for FAO Members and also enable monitoring of the implementation of the GPA and its impacts on the national, regional and global status of AqGR.

6. Several information systems that incorporate genetic information on AqGR are available from the web and address different needs, such as: providing genetic information for traceability (e.g. FishPopTrace, FishTrace, AquaTrace, BOLD); supporting policymakers in making decisions based on stock status assessment (e.g. RAM Legacy stock, iMarine); and assisting resource managers in identifying which farmed types and wild populations will be most suited to production or which require conservation management (e.g. National Inventory of Aquatic Genetic Resources of the German Federal Agency for Agriculture and Food, National Fish Strain Registry of the United States of America Fish and Wildlife Service). However, none of these databases has the broad scope of collecting information for all the existing AqGR (i.e. plant, algal, animal and microorganisms) used for food and agriculture, and specifically in the aquaculture sector, at the global scale. Most of the current databases usually have limited geographic and/or taxonomic scope and, in some cases, information is not easily

¹ Aquatic genetic resources (AqGR) include DNA, genes, chromosomes, tissues, gametes, embryos and other early life history stages, individuals, strains, stocks and communities of organisms of actual or potential value for food and agriculture. FAO currently limits its activities to farmed species and their wild relatives under national jurisdiction.

² In the context of AqGR "a wild relative is defined as an organism of the same species as a farmed organism (conspecific) found and established in the wild, i.e. not in aquaculture facilities". This applies irrespective of where the species is farmed, not just in relation to the same country where it is farmed.

accessible and they are not harmonized in the scope of information they contain nor in the terminology they use to describe genetic resources. Furthermore, they do not include indicators to measure and monitor the status of conservation, sustainable use and development of AqGR at the different scales: national, regional and international.

7. Therefore, the available information on aquaculture species and the status (including genetic status) of farmed types and wild relatives remains limited and scattered. A global and user-friendly reference database that can be used by the different sector stakeholders for a range of purposes that support monitoring is missing.

8. Based on these premises, at end of 2018, FAO started a project (funded by the Government of Germany) for the development of AquaGRIS, a global information system for AqGR (FAO, 2022c). The original project was funded for two years and its scope was limited to the development of a prototype information system mainly populated with initial information only on farmed types of a small group of aquaculture species. The prototype of AquaGRIS was released in March 2022 (FAO, 2022d).

9. The project was subsequently extended for other two years with the goal to transform the current prototype into a fully functional global information system for regular reporting and monitoring by countries and for which all data will be validated by national focal points.

10. In addition beyond its application in monitoring the implementation of the GPA AquaGRIS has the potential to be an important tool to make available information relevant to the SDG target 2.5 ("Maintain the genetic diversity in food production") and the targets and indicators of the Post-2020 Biodiversity Framework.

Adding wild relatives to AquaGRIS: scope of information and workshop objectives

11. An important objective of this two-year extension of the project is the addition of information on wild stocks of aquaculture species.

12. The global assessment clearly identified the importance of the link between farmed type and wild relative genetic resources, with the latter representing an important reservoir of genetic diversity for aquaculture and, for some species, a direct source of broodstock and seed for aquaculture. Furthermore, aquaculture can impact wild populations in both positive (e.g. *ex situ* conservation and stock enhancement) and negative ways (e.g. genetic contamination arising from escapes or release of farmed types). Thus, the knowledge of wild relatives of aquaculture species will be an important and valuable addition to information on farmed types in AquaGRIS.

13. By adding information on wild stocks to AquaGRIS we aim to:

- develop a unique inventory of wild relatives (of farmed aquatic species) in order to monitor changes in their genetic status over time;
- identify key reservoirs of genetic diversity of wild relatives that can be important future resources for aquaculture;
- identify wild stocks that might be under threat and therefore have conservation priority;
- provide baseline data for implementation, by countries, of relevant actions in the GPA; and
- provide countries and relevant stakeholders (policymakers, researchers, international organizations, consumers etc.) with updated and readily accessible information for their daily work.

14. There has been some prior discussion on what information on wild stocks could be included in an AqGR information system. The expert workshop held in 2016 proposed possible information and

associated indicators for the status of AqGR. This recommendation was then revised by another expert workshop held in 2019.³

15. Subsequent to the completion of the aforementioned workshops, the GPA was developed and published. Given that AquaGRIS will also be used to monitor the implementation of the GPA in future, we conducted an internal exercise in which we first identified those GPA strategic priorities, and related recommended actions, that are focused on wild relative genetic resources. We have then identified information on wild relatives that could be collected from countries, through AquaGRIS, and related indicators of progress against the GPA goals. The input from previous workshops and the results of the internal exercise were made available to workshop delegates and are integrated into the outputs from Session 5 (see Annex 5).

16. Information collection will be limited to wild relatives of aquaculture species but it is crucial to develop a clear definition of "stock" (or an alternative term) to be used in determining what genetic resources will be included as wild relative stocks in AquaGRIS.

17. Once that AquaGRIS will be completed and operative, we expect the information (both on farmed types and wild relatives) will be collected as part of the next global assessment and updated biennially thereafter. FAO national focal points for AqGR will be the main agents responsible for reporting and validating information for their countries.

- 18. This Expert Workshop had the following specific objectives:
 - identify a clear definition for "wild stock" in the context of AquaGRIS to be used in determining which genetic resources will be included as wild stocks;
 - identify and prioritize beneficiary stakeholders of information on wild relatives in AquaGRIS and possible ways in which they will use it;
 - identify information on wild stocks to include in AquaGRIS and potential indicators of the genetic status of the wild stocks by using the lists in Annex to the workshop prospectus as a starting point for discussion; and
 - identify potential sources of information on wild stocks and/or mechanisms for its collection.

SESSION 1: OPENING OF THE WORKSHOP

19. The Expert Workshop on "Incorporating information on wild relatives of aquaculture species into an information system for aquatic genetic resources" was held from 2 to 3 August 2022. The agenda of the workshop is given in Annex 1. The workshop, conducted virtually, was attended by 19 participants. The list of participants is provided in Annex 2.

20. Mr Xinhua Yuan, Senior Fishery Officer and Team Leader of the Technology and Production Team (NFIAT) of the FAO Fisheries and Aquaculture Division (NFI), opened the meeting and welcomed all participants. He highlighted the FAO's commitment to the intensification and expansion of sustainable aquaculture to satisfy the global demand for aquatic food and to the equitable distribution of its benefits in support of the Sustainable Development Goals (SDGs). He recalled that the NFIAT's work is focused on the role of aquaculture technology and innovation to support aquaculture production, with one important focal area being effective management of aquatic genetic resources (AqGR) in aquaculture. He noted that NFI works closely with the Commission on Genetic Resources for Food and Agriculture (Commission), and has developed some important resources, upon request from the Commission's Members, to support them in enhancing the management of AqGR. In this context, the

³ This Expert Workshop on the Development of a Global Information System for Farmed Types of AqGR was organized at the beginning of the project and was mainly focused on identifying the target stakeholders of an information system on AqGR and the information on farmed types to include in AquaGRIS and therefore did not look at the wild relative section in any depth.

FAO Aquatic Genetic Resources Information System (AquaGRIS) (FAO, 2022d) is a central component and will enable countries to record information on the status of their AqGR. He thanked the Government of the Federal Republic of Germany for supporting the development of AquaGRIS and reported that a prototype version focused on farmed types was launched in May 2022, while waiting for a full-functional version that will include information on wild relatives of aquaculture species.

21. Mr Dan Leskien, Senior Liaison Officer for the Commission, welcomed participants and thanked them for their participation in the Expert Workshop. He recalled that a significant achievement for the FAO's work on AqGR was the publication of The State of the World's Aquatic Genetic Resources for Food and Agriculture (SoW-AqGR) (FAO, 2019), resulting from a country-driven process that contributed to building national capacity on AqGR management. He also remarked that the GPA (FAO, 2022b), prepared in response to the findings of the SoW-AqGR, was adopted last year by the FAO Conference, the highest FAO body. He highlighted that AquaGRIS will be fundamental to measure countries progress in implementing the GPA recognizing that it is relatively easy to identify the status of genetic resources but more difficult to monitor it.

22. Mr Graham Mair, Senior Fishery Officer with NFI, presented a brief overview of the scope of FAO's past work and highlighted the three main workshop objectives, specifically:

- to identify the main stakeholders that will benefit from accessing to information on wild stocks;
- to identify the scope of information to be collected on wild stocks and develop and agree on a definition of wild stock; and
- to identify what information should be captured in AquaGRIS in relation to wild stocks.

23. He then outlined the structure of the workshop and the mechanisms for interaction among participants. He finally invited the experts and the other participants to introduce themselves and provide some information on their background and expertise.

SESSION 2: AquaGRIS – AQUATIC GENETIC RESOURCES INFORMATION SYSTEM

Presentation of AquaGRIS: background, structure and functions

24. Ms Daniela Lucente, Aquaculture Specialist (aquatic genetic resources), provided an overview of AquaGRIS background and scope, its current status of development and future steps for its finalization. She recalled that AquaGRIS is an FAO-hosted information system to collect, organize and make freely available data on farmed types and wild stocks of aquaculture species. AquaGRIS is being developed with the IT technical support of the Information and Knowledge Management Team (NFISI). The first phase of the project for the development of AquaGRIS aimed at developing a prototype system covering only data on farmed types of aquaculture species.

25. The prototype, released in May 2022, is currently populated with: country data from the SoW-AqGR; aquaculture production statistics from FishStatJ (FAO, 2022e); and farmed type data for a group of key aquaculture species, representative of the different taxonomic groups, that were collected by species experts through an online questionnaire developed for data entry into the database.

26. FAO is now working to expand the prototype and transform it into a fully functional information system that will be released in 2023. The new version will have: an expanded interface and a new system for data entry, more information on farmed types, a new section focused on the wild relatives (or wild stocks) of farmed aquatic species (the development of which is the focus of this workshop) and a series of indicators to monitor the status of management of these resources and to measure progress towards the implementation of the FAO GPA.

27. Ms Lucente then provided a live demonstration of the current prototype identifying how data can be accessed and filtered by species, by country and region and also how reports can be generated on specific subject areas and how to generate fact sheets by species and by country.

Incorporating information on wild relatives: why and what?

28. Mr Graham Mair, provided background information on the reasons for including information on the wild relatives of aquaculture species into AquaGRIS. He highlighted that these AqGR:

- are important components of biodiversity and provide ecosystem services, and should thus be conserved but information on their genetic status is lacking;
- are vastly used in fisheries but there are often many gaps in the knowledge of their genetic status;
- represent reservoirs of genetic diversity for aquaculture and as sources of seed, and information on their genetic status is valuable in incorporating them into aquaculture; and
- can be threatened by aquaculture activities and therefore knowledge on their genetic status can inform risk assessment.

29. There are many information systems collecting data on wild stocks but no specific data source that can provide genetic information on wild relative stocks of aquaculture species for all countries.

30. Mr Mair highlighted that it is critical to develop a clear definition of 'stock' to unambiguously determine what genetic resources will be included as wild stocks in AquaGRIS. There are many existing definitions of "stock", but few consider the genetic information within the definition. The expert group was challenged with some critical questions:

- Are evolutionary significant units (ESUs) the answer?
- Should we limit inclusion of stock to those that have genetic information?

- Is it possible in some cases to infer genetic status even without evidence from genetic analysis (e.g. due to geographic isolation or behavioral differences)?
- If we consider all stocks irrespective of information on genetic status, is this achievable in terms of data collection burdens?
- Can we arrive at a suitable definition of 'stock' or 'genetic stock' for AquaGRIS?

31. Mr Mair noted that some elements of the definition of stock in relation to AquaGRIS are already defined by the scope of AquaGRIS with regard to farmed types. The scope should be limited only to wild relatives of farmed species (irrespective of where they are farmed) and should focus on information by country and where national jurisdiction applies, irrespective of whether the stock may be considered transboundary.

SESSION 3: STAKEHOLDERS IN AN INFORMATION SYSTEM FOR WILD RELATIVES OF AQUACULTURE SPECIES

32. This session was facilitated by Ms Maria Rowena R. Eguia, Scientist and Program Leader at the Southeast Asian Fisheries Development Centre. Ms Eguia first presented the topic of the session and the objectives of the group discussion that were to:

- identify the potential stakeholders in genetics related information on wild stocks;
- list the information needs of these stakeholders; and
- identify the priority stakeholders on which to focus AquaGRIS.

33. To achieve the session objectives, the experts agreed that the list of stakeholders for information on farmed types was a good basis for developing a list of stakeholders for information on wild stocks. The experts identified some new stakeholders specific to wild stocks and reviewed and adapted a list of stakeholders in farmed types, including key information on wild relatives that each stakeholder might seek from AquaGRIS and also information that each stakeholder could provide to populate the database.

34. It was important not just to list all stakeholders with their information needs but also to understand the priority stakeholders who stood to benefit most from the information in AquaGRIS. Thus, at the end of the plenary discussion the experts ranked, through a Zoom poll, the 16 stakeholders to identify priority potential users of AquaGRIS. The full list of stakeholders is provided as Annex 3 whilst the result of the priority ranking of stakeholders is illustrated in the graph below identifying the following priority stakeholders: resource managers; policymakers and regulators; aquaculture producers (including broodstock and seed collectors); conservation groups; and research, academia, educators and students.

Figure 1. Ranked score for the importance of stakeholders in the context of the benefits that AquaGRIS information on wild relatives can provide (based on ranking provided by experts).



SESSION 4: WILD STOCK DEFINITION

35. This session was facilitated by Mr Devin Bartley, from Michigan State University and had the following objectives:

- to discuss and agree, taking the stakeholders into account, on the scope of the wild relative stocks for which information should be included in AquaGRIS; and
- to identify and define the biological unit and related term (e.g. "stocks", "wild stocks", "wild relative stocks", "stocks of wild relatives", or "genetic stocks") to be used in AquaGRIS as the main unit for which to collect wild relatives data.

36. Following active discussion the following assumptions were agreed upon concerning the scope for definition of stocks to be entered into AquaGRIS:

- Wild stocks for entry into AquaGRIS are limited to cultured species present in the respective countries that are under national jurisdiction. These include fishes, molluscs, crustacean and algae (microalgae such as seaweeds and microalgae).
- There are many different types of management or assessment units identified as applicable to stocks (including evolutionary significant units, management units, fisheries stocks, conservation stocks, and regional management units etc.) and there are multiple definitions of these management or assessment units.
- Management units are not normally equivalent to genetic resources (although this can be the case in some circumstances).
- Management units may include one or more genetically discrete stocks and genetically discrete stocks may be represented within more than one management unit.
- Whilst genetically verified stocks (i.e. identified via some form of molecular analysis) are the most robust definitions of genetic stocks, there are other means whereby genetic stocks can be identified/assumed/inferred (e.g. morphological differences, reproductive isolation, various adaptations, etc.).

- There may be some situations for species/countries where management units and/or genetic stocks are very numerous (e.g. salmonid river-specific stocks) for which it would not be feasible to enter details for all units into AquaGRIS.
- Stocks for inclusion in AquaGRIS should be limited to self-replicating stocks and thus exclude those sustained by stocking of farmed types.
- 37. Further, it was considered that the information system must:
 - focus on genetics-related information and providing this information of interest to the identified stakeholders, particularly the priority stakeholders;
 - relate primarily to the role of these genetic resources in providing food and in addressing the SDGs; and
 - be relatively straightforward, simple to comprehend and use and not be too prescriptive, but above all provide information of value to the stakeholders.

38. The expert group agreed that the main core unit for data collection on wild relatives in AquaGRIS (equivalent to 'farmed type' for farmed AqGR) should be the **"genetic stock"** and developed a definition for its identification as per below:

"Having one or more distinguishing and heritable characteristics that distinguish the wild stock from other wild stocks of the same species within the country. These characteristics could include one or more of:

- genetic differences (i.e. identifiable molecular signatures);
- morphological/phenotypic characteristics for one or more traits; and
- proxies for genetic differences such as geographic/reproductive isolation, behavioural isolation, various adaptations, or localized parasitic infestation".

39. However, the group also recognized that a genetic stock can also be part of – or correspond to – a named management or assessment unit (for which countries may have several different definitions and management criteria) and it is therefore important, in order to not lose critical identifiers and information, to collect information on whether a genetic stock is part of a recognizable management or assessment unit. The expert group defined "management/assessment unit" very broadly as follows:

"A stock of a species in a country that is identified as a management or assessment unit and thus subject to some form of management, monitoring or assessment. This may include fisheries stocks, conservation units, evolutionary significant units, regional management unit or other".

40. The expert group agreed that the AquaGRIS questionnaire should present questions to identify management/assessment units and genetic stocks at the same level, rather than hierarchical as a hierarchical arrangement will result in the loss of information on genetic stocks or management units that are mutually exclusive and that the questions at the level of the genetic stock should identify whether the genetic stock is included in one or more management/assessment units.

41. The expert group also considered that, in the cases where management/assessment units or genetic units for a species in a country are numerous, that the country may apply some identified criteria to record information on only a subset of these units or stocks or they may not enter this information. In the case that information on management/assessment units or genetic stocks are not recorded individually it would nevertheless be preferable that their identification is explained and that they are at least listed.

SESSION 5: INFORMATION AND INDICATORS

42. After outlining the scope of wild stocks to be included in AquaGRIS and defining the key terms of "genetic stock", the experts discussed the questions that can be added to the questionnaire to collect the relevant information on wild relatives. Questions were identified at the level of species, management/assessment unit and genetic stock levels. A summary of the questions identified are shown in Annex 4.

CLOSING REMARKS

43. Mr Mair thanked all the participants for their attendance and active participation in the workshop, and gave a short review of the workshop outcomes. Mr Mair requested the experts to provide further feedback, over the weeks following conclusion of the Expert Workshop, specifically on the draft outputs of the workshop derived from the discussions of the expert group. The feedback received was incorporated into this report.

44. Mr Mair confirmed that this report will form the basis of the expansion of AquaGRIS to include information on wild stocks of AqGR which will be further reviewed and validated through trial application. On behalf of FAO he again thanked the experts and hoped that, if required, they may be called upon for further specific input in relation to the ongoing development of AquaGRIS.

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Time	Workshop session	Specific objectives
Day 1 14.00–17.00 (CET time)	Session 1: Opening (30 min)	 Welcome addresses: Xinhua Yuan, Senior Fishery Officer and NFIAT Team Leader Dan Leskien, Senior Liaison Officer, Commission on Genetic Resources for Food and Agriculture. Workshop objectives, context and process (Graham Mair) Introductions by participants and secretariat (all)
	Session 2: AquaGRIS – Aquatic Genetic Resources Information System (40 min)	 Presentation of AquaGRIS: background, structure and functions (Daniela Lucente) Incorporating information on wild relatives: why and what? (Graham Mair)
	Session 3: Stakeholders (40 min)	 Facilitator: Maria Rowena Romana-Eguia Main stakeholders of farmed types information vs stakeholders of wild stocks information Group discussion to identify and prioritize stakeholders
	Break (10 min)	
	Session 4: Wild stock definition (60 min)	Facilitator: Devin BartleyGroup discussion to identify wild stock definition
Day 2 14.00–17.00 (CET time)	Recap (15 min)	• Summary outputs of Day 1 (Graham Mair)
	Session 5: Information and indicators (60 min)	 Facilitator: Graham Mair Group discussion to identify possible information to collect on wild stocks
	Break (15 min)	
	Session 5 (cont): Information and indicators (80 min) Wrap-up and closing remarks	 Facilitator: Graham Mair Group discussion to identify possible indicators of the status of wild stocks. Facilitator: Graham Mair

Annex 1 – Agenda for the Expert Workshop

Annex 2 – List of participants

LIST OF EXPERTS

Ms Rose Komugisha BASIITA WorldFish scientist Researcher in aquaculture and fish genetics. Zambia

Mme Malika CHLAIDA National Focal Point Chief Marine Biology Research and Development Unit National Institute of Fisheries Research Morocco

Mr Clemens FIESELER Senior officer Federal Office for Agriculture and Food Germany

Mr Kevin GLOVER Professor Research Group Leader, Institute of Marine Research, Bergen Norway

Mr Eric HALLERMAN Professor Department of Fish and Wildlife Conservation Virginia Polytechnic Institute and State University United States of America

EXPERT FACILITATORS

Mr Devin BARTLEY World Fisheries Trust United States of America Mr Alexandre W. S. HILSDORF, Integrated Center of Biotechnology, University of Mogi das Cruzes, Brazil

Mr Daud KASSAM Associate Professor and Deputy leader for AquaFish Centre Lilongwe University of Agriculture and Natural Resources Aquaculture and Fisheries Science Malawi

Ms Kerry NAISH Director of Marine Biology, College of the Environment School of Aquatic and Fishery Sciences University of Washington United States of America

Ms Rachel RAVAGO-GOTANCO Associate Professor, Marine Science Institute, University of the Philippines Philippines

Ms Naiara RODRÍGUEZ-EZPELETA Senior Researcher Marine Ecosystem AZTI Basque Research and Technology Alliance Spain

Ms Maria Rowena R. EGUIA Scientist and Program Leader, Quality Seed for Sustainable Aquaculture Southeast Asian Fisheries Development Center Aquaculture Department (SEAFDEC/AQD) Philippines

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Mr Anton ELLENBROEK Senior Fisheries Resources Officer Fisheries and Aquaculture Department Italy

Mr Kim FRIEDMAN Senior Fisheries Resources Officer Fisheries and Aquaculture Department Italy

Mr Dan LESKIEN Senior Liaison Officer Commission on Genetic Resources for Food and Agriculture (CGRFA) Italy

Ms Daniela LUCENTE Project Coordinator Aquaculture Branch Fisheries and Aquaculture Division Italy Mr Graham MAIR Senior Aquaculture Officer Aquaculture Branch Fisheries and Aquaculture Division Italy

Mr Kiran VIPARTHI Fishery Systems Developer Fisheries and Aquaculture Department Italy

Mr Xinhua YUAN Senior Aquaculture Officer Team Leader Technology and Production Team Fisheries and Aquaculture Division Italy

Annex 3 – Outputs from the group discussion on stakeholders (Session 3)

 Table of identified stakeholders, the types of genetic related information they would seek from AquaGRIS and the information they could potentially provide to AquaGRIS

Name	Potential information to be accessed/used	Potential information to be provided
Aquaculture producers and breeders	 Species status: e.g. native or introduced species Genetic relationship to farmed types Identification of genetically discrete wild stocks as potential resources for aquaculture Phenotypic characteristics of the wild stock including characteristics relevant to aquaculture 	• Past and ongoing collection for aquaculture
Wild broodstock and seed collectors	 Genetic relationship to farmed types Identification of genetically discrete wild stocks as potential resources for aquaculture Phenotypic characteristics of the wild stock including characteristics relevant to aquaculture Growth information of the wild species 	 Fisheries-related data (e.g. catch logs)
Fishers and collectors (commercial, recreational, ornamental)	 Lists of stocks (wild relatives) including evolutionary significant units and fishery stocks Status of stocks (location, trends, fished status) Threats to stocks Stock enhancement activities 	 Observations on characteristics of stocks and interaction with cultured stocks Fisheries-related data (e.g. catch logs)
Fisheries and aquaculture associations including angling associations	 Lists of stocks (wild relatives) including evolutionary significant units and fishery stocks Status of stocks (location, trends, fished status) Threats to stocks Stock enhancement activities 	 Fisheries-related data and use of catch logs Observations on characteristics of wild stocks and interaction with cultured stocks

Name	Potential information to be accessed/used	Potential information to be provided
Research institutions, academia, educators and students	 Characteristics and biological description of stocks Status of stocks (fishery and conservation) Genetic information on the stocks Level of introgression with cultured stocks Collaboration opportunities Research information on the stock All data 	 Relevant scientific information on wild stocks (information related to genetics) Stock assessment Validated nomenclature Science based advice to policymakers and other stakeholders Capacity for AqGR management Education and capacity building Status and characteristics of stocks Level of use/harvest Genetic information on stocks Status of wild genetic stocks as exposed to threats (indicate types of threats – impact of invasive species, adverse environmental changes, anthropogenic activities etc.) Information on conservation and stocking efforts; information on completed/ongoing programs on sustainable management and conservation of wild stocks Information on biotechnology use in relation to the stocks
Resource managers (normally public sector but private managers may also apply in some countries)	 Valid scientific name of species and nomenclature of stocks Characteristics and biological description of stocks Risks and threats to the stocks including by fishing Regulatory issues applied to the stocks Interactions with aquaculture Wild stock status Minimum spawning target Population abundance 	 Use of wild types in country Production/market data
Conservation groups (including aquatic protected area managers)	 List of stocks of wild relatives and their conservation status and geographic range Distribution and control measures for stocks Any known impact of farmed types on the environment or biodiversity including on the wild relative stocks 	 Conservation status (if known) Conservation or stocking activities Distribution of wild relatives Status of stocks Threats to stocks and farmed types

Name	Potential information to be accessed/used	Potential information to be provided
	• Interactions with aquaculture including risk of escapees and introgression.	
Policymakers and regulators (law makers)	 Use and distribution of wild stocks within country's national jurisdiction Any known threat to the wild stock diversity Stock differentiation and characteristics Status of stocks (including fishery status) Evidence-based information about the threats to wild stocks (as basis for establishing protection legislation) 	• Relevant national or international policies regulating use and protection of stocks
Non-governmental organizations (NGOs)	 Valid scientific name of species and names of wild stocks Characteristics of stocks Any known threat or impact on wild stocks Information on conservation and sustainable use status of the stock 	 Production and occurrence data Information on social and environmental impacts Use and distribution of stocks within national jurisdiction
Intergovernmental organizations (IGOs) e.g. Regional Fisheries Bodies	 Valid scientific species and nomenclature of wild stocks Characteristics of stocks Range distribution and use of shared stocks Information on management units Any known threat or impact on wild stocks Monitoring the progress in implementing international agreements/instruments and generation of associated indicators 	 Information on local nomenclature Information on stock status Information on shared/transboundary stocks including co-management of management units Information on ongoing/completed regional programs relevant to the use and sustainable management of wild stocks
Marketers of fish and fish products; processors; retailers	 Conservation/sustainability status of stocks Characteristics of farmed types and stocks relevant to consumers Consumer perception of the farmed types vs stocks Storage and stacking techniques Traceability sanitary control of fishery and aquaculture products (traceability) 	 Consumer perception of the species or stocks Occurrence of product substitution and mislabeling
General public including consumers	 Valid scientific and common name of species and stocks Stock status and sustainability of harvests 	 Consumer preferences & interests Use and distribution data

Name	Potential information to be accessed/used	Potential information to be provided
	 Genetic and biological description of stocks Controls or certifications in relation to stock 	
Indigenous people/ local communities	 Traditional knowledge Information on stock status Information on which wild stocks are important to the local community/IPs Status (e.g. of exploitation) of fished wild stocks Information on management units and stocks including indigenous protection reserves Threats to and impacts on stocks important to indigenous/local people 	 Information on the involvement of IPs/local communities in wild stock conservation/management initiatives Genetic status of fish stocks in indigenous reserve areas
Food control agencies	 Traceability; origin of the AqGR (e.g. if coming from the wild or from aquaculture) Information related to detection of product substitution and mislabelling 	 Information on misidentified/mislabeled wild stocks Molecular tools to identify mislabeling
Women's cooperative	 Valid scientific and common name of species and stocks Distribution range Harvesting seasons Stacking and commercialization Information on stock status, Information on which wild stocks are important to women organizations/cooperatives Status (e.g. of exploitation) of fished wild stocks 	• Information on the involvement of women's cooperatives in wild stock conservation/management initiatives

Annex 4 - Questions to collect stakeholder relevant information on wild stocks for
AquaGRIS (Session 5)

Question	Answer	Notes/indicators
Species level		
Is the species fished?	Yes or No	
• Value of the harvest	Total value in USD	Extract from FishstatJ
• Volume of the harvest	Total volume in tonnes	Extract from FishstatJ
• Trends in harvest	 Increasing Stable Fluctuating Decreasing Depleted Not known 	Same question and answers is asked for aquaculture
• What is the main use for fished product?	 Human food consumption Fish feed Sport fishing Ornamental trade Other 	Answers the same options as for cultured AqGR
• Type of fishery	 Artisanal (SSF) Commercial Recreational Traditional use 	If more than one category applies indicate estimated proportion of national harvest
What is the conservation status of the species in the wild?	 Extinct Threatened Least concern No threat Under threat Other (provide details) 	Add free text field to identify the basis for identifying it as under threat including national or intl. listings. Note: might be risky to use IUCN Red List for conservation status. Better to use national lists
Are there recognizable management or assessment units for this species in your country?	Yes or No	If Yes go to MU/AU level questions
Are there identified genetic stocks for this species in your country?	Yes or No	If Yes go to genetic stock level questions

Question	Answer N	lotes/indicators	
Management/Assessment Unit Level Questions			
Name of MU/AU	Provide the name of the MU/AU		
Basis for classification as MU	Fishery Conservation Regional management unit Evolutionary significant unit Other	Free text field to explain the basis for the identification of the MU/AU with reference to the definition	
Brief description of the management/assessment of the MU/AU and its status in relation to the rationale for its management	Free text description	Guidance note will be provided on the type of information to provide here. This question may be refined in field testing of the questionnaire	
Who is the entity responsible for assessing and managing the MU?	Agency Name Category National Research Institute Regional body National Fishery Management Body subnational authority	Free text field naming responsible agency and we can develop categories for the type of agency)	
Is this a transboundary MU/AU?	Yes or No If yes please provide details	Free text field to identify other countries involved in management/assessment?	
Is genetic information used to monitor or manage his MU/AU?	Yes or No If yes please provide details	Free text field to explain if the answer is Yes	
Could the management/assessment of this MU/AU be improved with the availability of genetic information?	Yes or No If yes please provide details	Free text field to explain if the answer is Yes	
Genetic Stock Level Questions			
Name of the genetic stock	Provide name of the stock		

Question	Answer	Notes/indicators
In this genetic stock what is the rationale for defining it as a genetic stock?	 Genetic information available? Reproductive isolation? Evidence for adaptive or ecological differentiation? 	Add text explanation on how evidence was assessed including genetic markers used or evidence for isolation/differentiation. The guidance to answering this question would include what criteria were used to define genetic or reproductive distinctiveness (e.g. population genetic structure, phylogenetics, tagging, and behaviour)? Or what criteria were used to define ecological distinctiveness or adaptation (e.g. life history differences, environmental variation across range, molecular markers with evidence of local adaptation)
Description of the biological characteristics and geographic distributions of the genetic stock		Description should include characteristics and include geographic location and migrations
Is the genetic stock part of an MU/AU?	• Link to previously identified MU/AU	Hopefully find a way to link through to one or more MU/AUs named/listed at that level
What is the taxonomic status of the species and if there is any subspecies or ecotype ⁴ ?	Pure speciesHybrid ZoneSubspecies	Add free text field to provide more information and reference
Stock abundance/status	 Declining Stable Increasing Unknown 	
Is the stock Introgressed with a farmed type?	Yes or No If yes continue	

⁴ This question could be asked at the species level and/or at the stock level as it could apply to both, this will be evaluated during testing of the questionnaire.

Question	Answer	Notes/indicators
• What genetic resource is it Introgressed with?		See if possible to link question to an identified farmed type entered in the FT level questionnaire
Are there threats to the status of the stock (e.g. aquaculture, harvest, habitat)?	Yes or No	
• Is the risk level to the stock the same as at the species level?	• Same • Less • More	
• What is the nature of the risk?		Free text field explaining the source of the threat (e.g. overfishing, aquaculture, habitat destruction, invasive species, genetic contamination from farmed types). Could create a list of categories?
Is the stock subject to any conservation measure?	 No In situ conservation Ex situ in vivo conservation Ex situ in vitro conservation 	Under these selection there should be free text field to provide information and reference source of information
Is this genetic stock used in aquaculture, or has it been used in the past?	Yes or No	See if possible to link question to an identified farmed type entered in the FT level questionnaire
Possible additional questions li	inking to Global Plan of Action ⁵	
Does the species fall into one of the IUCN risk categories at the global level?	IUCN risk categories	Proposed species level question
What is the status of the habitat or range for this species?	 Increasing Stable Decreasing Unknown 	Proposed species level question

⁵ These questions were identified by FAO following an exercise identifying potential indicators of the status of wild relatives related to actions within the Global Plan of Action. There was no time to review these during the workshop but they were included in annexes to the workshop prospectus and are presented here for review.

Question	Answer	Notes/indicators
Is climate change having an impact on the wild stocks of this species?	• Yes • No • Not known	Proposed species level question. Add free text field to provide more details if answer is Yes
Is Ecosystem based management being applied to the fishery for this species?	Yes or No	Proposed as species level question for fished species
Estimated of the effective population size of this stock	Value for NeUnknown	Proposed as genetic stock level question for fished species
Is this genetic stock exchanged with other countries?	Yes, exchange recent or ongoing Yes, historically exchanged, not ongoing No If yes provide details such as is exchange one time only or ongoing.	Proposed as genetic stock level question. Provide free text field for details if answer is Yes

An Expert Workshop on "Incorporating information on wild relatives of aquaculture species into an information system for aquatic genetic resources" was held by FAO in August 2022.

The workshop discussed the expansion of the FAO Aquatic Genetic Resources Information System (AquaGRIS) in order to include information on wild stocks of aquaculture species.

The workshop: identified the main stakeholders that will benefit from having access to information on wild stocks of aquaculture species; identified and defined the scope of the main units of data collection, management and monitoring for inclusion in AquaGRIS; and identified key information on wild stocks to be collected in AquaGRIS and some possible indicators of the status of wild stocks that could be generated by AquaGRIS.

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