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منظمة
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COMMISSION ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE

AD HOC INTERGOVERNMENTAL TECHNICAL WORKING GROUP ON AQUATIC GENETIC RESOURCES FOR FOOD AND AGRICULTURE

Second Session

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SUMMARY OF COMMENTS RECEIVED ON THE REVISED DRAFT REPORT ON *THE STATE OF THE WORLD'S AQUATIC GENETIC RESOURCES FOR FOOD AND AGRICULTURE*

I. INTRODUCTION

The Revised Draft Report on *The State of the World's Aquatic Genetic Resources for Food and Agriculture* was put online for comment on 13 March 2017. Various stakeholders, including members of the COFI Sub-Committee on Aquaculture, members of the COFI Advisory Working Group on Aquatic Genetic Resources and Technologies, FAO technical staff, and National Focal Points were invited to comment. This document summarizes and itemizes the comments received effective 17 April 2018.

II. SUMMARY OF COMMENTS RECEIVED

Comments were received from four stakeholders and were classed in two categories by the Secretariat.

The first category is for comments that requested or indicated substantive change to any section of the text that could change the intent or meaning of that text. No comments were received that requested or required a major change in the text or in the interpretation of the data. Comments were limited to relatively minor changes requiring redrafting of single sentences, and in one case a section of several paragraphs. A total of 31 substantive comments were received, which are included in Appendix 1 along with the proposed response from the Secretariat.

The second category of comment related to minor errors including typographical errors and errors in grammar; such comments would not change the meaning or intention of the original text. A total of 26 non-substantive changes were suggested. These comments and the proposed response from the Secretariat are included in Appendix 2.

In addition to these comments, a response was received from the Republic of Guinea in the form of a request for assistance, which will be forwarded to the appropriate FAO Representation and Permanent Representative.

Based on guidance received during the Second Session of the Ad Hoc Intergovernmental Technical Working Group on Aquatic Genetic Resources, the Secretariat will incorporate revisions proposed in Appendixes 1 and 2 into the final draft of the Report.

APPENDIX 1

Substantive comment or comment requiring substantive response

Source of feedback	Section of the report referred to	Comment	Secretariat response	Notes
Network of Aquaculture Centres in Asia-Pacific (NACA)	Whole report	It is a highly commendable survey of the current state of aquaculture genetic resources and represents a huge amount of work by all concerned. A very useful resource indeed.	The feedback is appreciated. No response required.	
Belgium	Chapter 5 (<i>Ex situ</i> conservation)	<p>Suggestion for adding the following species of <i>Artemia</i> in Table 5.5 (page 148): <i>Artemia parthenogenetica</i>, <i>A. tibetiana</i> and <i>A. sinica</i>, as listed in Lavens, P.; Sorgeloos, P. (eds.) Manual on the production and use of live food for aquaculture. FAO Fisheries Technical Paper. No. 361. Rome, FAO. 1996. 295 pp.</p> <p>Suggestion to add the strong recommendation for more sustainable exploitation of all natural <i>Artemia</i> resources, especially in Asia (numerous salt lakes in China, Kazakhstan, Uzbekistan, Russia) from where more than 50 % of the commercial cyst sources originate. Strong recommendation to ensure preservation of the large diversity of <i>Artemia</i> species and strains in one or more cyst banks (<i>Artemia</i> Reference Center, Ghent University, Belgium and Asia Regional <i>Artemia</i> Reference Center, Tianjin University, China).</p> <p>Always available for more information if needed.</p>	<p>The cited report lists four species not listed in Table 5.5, <i>A. tunisiana</i>, <i>A. parthenogenetica</i> and <i>A. sinica</i>, and <i>A. persimilis</i>. The suggested additions need thus to be confirmed. Given that Table 5.5 is based in listings in the country reports and includes the number of listings, it is not appropriate to add these species if they were not cited in a country report. Propose adding a footnote, referencing the Technical paper, indicating that these other species occur and also that they may have been included as <i>A. salina</i> which is used in some countries to cover all <i>Artemia</i> species.</p> <p>Regarding the recommendation, this can be integrated into the text of the chapter or we could consider inviting Professor Sorgeloos to include a box on the importance of <i>artemia</i> and its conservation.</p>	Table 5.5 lists a microalgae <i>Isochrysis galbana</i> as an <i>Artemia</i> , needs to be moved to the microalgae section of the table.

Germany/ Advisory Working Group (AWG) member	Ch 1. P 4, paragraph below Table C	In this context, the relative proportion of responses by the member states from respective economic classes should have the higher significance than the total number of responses. This means that the member states from developed countries have with 43% the lowest response rate.	Redraft to emphasize the proportions ahead of the absolute numbers.	
Germany/ AWG member	Ch 1. All bar charts	In most column charts of Chapter 1, the label is inaccurate.	Review Figures 1.4 to 1.8, update data using latest FishstatJ data and provide more descriptive captions.	
Germany/ AWG member	Ch 2. P 42. Table 2.5	We are missing the hybrid <i>Salvelinus alpinus</i> x <i>S. fontinalis</i> reported in the German Country Report in this table.	Cross reference with German report and add missing hybrid.	
Germany/ AWG member	Ch 2. P 43. First paragraph after Table 2.6	On the other hand, species are listed in the FAO aquaculture statistics which are no longer cultivated. In some cases it could be useful to delete this species or to mark them, so that it is clear that these species are not part of the current aquaculture species inventory of the countries concerned.	This is an issue for the team maintaining ASFIS. The species list is global and applies for aquaculture and wild catch fisheries.	
Germany/ AWG member	Ch 3. P 91	Please add EIA to the abbreviation list.	Add EIA (Environmental Impact Assessment) to the list of acronyms.	
Germany/ AWG member	Ch 3. P 109 Paragraph 4. Sentence Germany reports.....	The relevant answer in the German National Report actually only refers to the inland fisheries sector and is not reproduced properly at this point. Please delete the first sentence "Germany reports that...". This sentence could be misinterpreted.	Review German report. Delete misleading sentence.	

Germany/ AWG member	Ch 6. P 160. Section	We wonder why this is puzzling for FAO - Fishers are existentially dependent on AqGR. In many cases fishers stand up for preservation of habitats or conduct catch and carry at river obstacles. From our view it is not a fundamental contradiction that fishers play a role in conservation.	Remove or redraft comment.	
Germany/ AWG member	Ch 7. P 168. First three paragraphs under section 7.3.1	We wonder why the example of the former ABS contract between Merck and INBIO in Costa Rica is cited here because it is an ABS example that took place prior to the entry into force of the Nagoya Protocol and does not show any specific guiding principles for access to aquatic genetic resources.	Review first three paragraphs under section 7.3.1 and revise as appropriate or remove.	
Germany/ AWG member	Ch 7. P 168. First paragraph under section 7.3.3.	Chapter 7.3.3 indicates that the most widely obstacle to accessing AqGR is “national legislation in the receiving country”. Perhaps it would be useful to clarify what is meant with “national legislation in receiving country” and “national legislation in the exporting country”. Our first question is if “national legislation” in this context means “Access and Benefit Sharing legislation” or if any other legislation is included here. If ABS legislation is meant we would like to understand if the national ABS law hampers users in the own country or why from whom it is seen as the main obstacle for Access to AqGR.	Based on the format of the questionnaire it is not possible to drill down to this level of understanding. Text will be modified to note that national legislation can include ABS and other legislation	Column title needs to be changed to National laws <u>of</u> donor country.
Norway/ AWG member	Ch 2. P 29. Key messages bullet point 12.	Should also put the English names of the ten species listed.	Based on ASFIS list, change this sentence to read: “Striped mullet (<i>Mugil cephalus</i>); Pike-perch (<i>Sander lucioperca</i>); European perch (<i>Perca fluviatilis</i>); Nile perch (<i>Lates niloticus</i>); Milkfish (<i>Chanos chanos</i>); African bony-tongue (<i>Heterotis niloticus</i>);	

			Cobia (<i>Rachycentron canadum</i>); North African catfish (<i>Clarias gariepinus</i>); Common sole (<i>Solea solea</i>) and Turbot (<i>Psetta maxima</i>).	
Norway/ AWG member	Ch 2. P 29. Key messages bullet point 13.	Is it not right to rather say that 60% of AqGR are farm type, and then define farm type in brackets.	Change “Aquatic genetic resources are being managed in aquaculture in about 60 percent of the responses, which is significantly greater than the often-cited figure of only 10 percent” to: “Nearly 60% of responses on cultured species indicate that these are non-wild type and thus subject to some form of genetic change. <i>Refer to comments on Section 2.5.2.1. below for more detail on this issue....</i>	There are multiple comments that refer to the same broader issues, see comment below.
Norway/ AWG member	Ch 2. P 35. Paragraph 4 in 2.5.1.1	I would also highlight that Nile tilapia is almost as much framed as common carp, by e.g. putting: 'The two most commonly reported species being farmed are common carp and Nile tilapia. They are both introduced into 16 out of 20 and ? out of ?? countries, respectively.'	We can include this useful suggestion on tilapia but will require new query on the database.	Note: This paragraph indicates that common carp is farmed in 20 countries but Figure 2.2. indicates 50 countries.
Norway/ AWG member	Ch 2. P 46. Table 2.7. Row 1 (Growth rate)	Should a salmon reference be listed in the right column? We suggest much better and updated reference on selection response for growth in A. salmon. See Thodesen et al. (1999),	Left column should just reference the trait for consistency. Consider inclusion of salmon and tilapia examples in RH column.	Look for geographic distribution of examples.

		or refer to Gjedrem and Rye (2016) reporting Average genetic gain from 67 estimates of 12.7% per generation in harvest body weight for fish and shellfish. Response of GIFT tilapia could also be good here (Bentsen et al., 2017)		
Norway/ AWG member	Ch 2. P 46. Table 2.7. Row 4. (Disease resistance)	The example of marker assisted selection (QTL selection) against IPN in salmon. See Moen et al (2009) and https://aquagen.no/en/2013/01/29/use-of-qt-eggs-results-in-an-ipn-reduction-for-the-whole-of-norway/ . I guess it should be 'Increased survival after selection for survival in challenge test against Taura syndrome ...'	QTL selection can be referenced here. Adopt suggested change to original wording.	The title of this table relates to farmed types. Is this intended to imply that these technologies have been used to improve cultured fish where are used on farm. Maybe this can be clarified with a more detailed caption?
Norway/ AWG member	Ch 2. P 46. Table 2.7. Row 4. (gene transfer)	This row should not be listed under '*Long term strategies using Selective breeding'. It should rather be in the section below of Short term strategies. For Atlantic salmon example: The increase was only up the size of ca 1 kg as far as I am informed by AquaBounty.	Shift to short term strategies and either review or delete Fox reference.	Or provide alternative non salmonid examples such as mud loach (Korea) or tilapia (Cuba).
Norway/ AWG member	Ch 2. P 46. Table 2.7. Short term strategies.	Could also refer to the method of gene editing of A. Wargelius et al (2016 Scientific Reports volume 6, Article number: 21284 (2016) doi:10.1038/srep21284) to make A salmon sterile.	This is research study and whilst it represents and early example of application of gene editing in a cultured species, it is not	Author to review the intent of this table with regard to technologies used in research, application

			yet generating farmed types. Consider referencing this study in the narrative text.	or contributing to adoption on farms.
Norway/ AWG member	Ch2, p47 Box on hybridization terminology	I think it should be explained that crossing inbred strains gives heterosis effects that are being reduced after F1, and that the heterosis effects from such crossing only reappear for the inbreeding depression if not combined with selection of specific favorable crosses	The intent of this box is to present terminology around hybridization and crossbreeding but not to explain its merits or outcomes. To add this detail will potentially detract from the focus on usage of terminology. Consider inclusion of this information elsewhere.	
Norway/ AWG member	Ch 2. P 47. Section 2.5.2.1.	<p><i>3rd sentence of 1st paragraph:</i></p> <p>This sentence has to be corrected to the following: 'It has been stated that in 2010, it was reported that less than 10% of the aquaculture production was based on genetically improved stocks resulting from family based selective breeding programs (Gjedrem and Robinson, 2014).'</p> <p><i>4th sentence of 1st paragraph:</i></p> <p>I will add that these referred organized selective breeding programs facilitate genetic improvement while controlling inbreeding and hence limiting genetic erosion that prevents the long-term improvement.</p> <p><i>5th sentence of 1st paragraph:</i></p> <p>I have not seen or heard this statement, so I do not know what this refers to, and suggest to delete it.</p> <p><i>2nd sentence of 2nd paragraph:</i></p> <p>This sentence has to be revised as it is just explained above that this type of comparisons is based on a</p>	<p>These comments relate to a common issue, namely:</p> <p>The interpretation of the finding from the SoW that nearly 60% of species cultured are reported as non wild type (and thus subject to some form of genetic change), in the context of an oft cited report in Gjedrem and Robinson, 2014 that only 10% of aquaculture production is based on genetically improved stocks.</p> <p>The comments and clarifications noted here are all valid and should be dealt with in a redrafting of this section.</p> <p>The secretariat is aware that this statistic from Gjedrem and Robinson is often taken out of context and interpreted that 90% of production is unimproved. The finding that the majority of species reports (acknowledging that species reports and production are not directly comparable) are of genetically changed farmed types is a</p>	Devin to carefully review this response.

		<p>misinterpretation. As explained above, this reference refer to production and not to farmed species. Also, it is about family based selection, and not just being managed or a farm type. I suggest to rather put: 'The Country reports indicate that genetic resources are being managed in one way or another in about 60% of the farmed populations.' Then the following highlighted sentence about the increase in using genetically improved or managed organisms must be deleted, as there is no basis in these figures or reference to justify it. And it makes no sense to make a comparison based on a misunderstanding of the reference of Gjedrem and Robinson).</p>	<p>valuable finding and presents an alternative perspective on this issue of the extent of genetic improvement in modern day aquaculture.</p> <p>The redrafting of this section will reflect the comments provided, in the context of the aforementioned perceptions.</p>	
Norway/ AWG member	Ch 2. P 47. Section 2.5.2.1. 2 nd paragraph, last sentence	Can insert: ', and an extremely cost effective' before 'long-term strategy for breed improvement...'	<p>It is acknowledged that selective breeding, done well, can provide excellent returns on investment but is not always cost effective.</p> <p>Change to:</p> <p>It is therefore a good long-term, <u>and often highly cost effective</u>, strategy for breed improvement and domestication.</p>	
Norway/ AWG member	Ch 2. P 47. Section 2.5.2.1, last sentence of last paragraph	The selection intensity is independent of the genetic variation, but the selection differential is proportional to the phenotypic variance. Hence, this sentence should be corrected. Perhaps just deleted the last part of the sentence after comma.	Delete 2 nd part of the sentence, after the comma.	Selection intensity is independent of genetic variation but the larger the family/population size and the more variation present within that population, the harder you can select

				without deleterious effect.
Norway/ AWG member	Ch 2. P 48. Figure 2.8	<ul style="list-style-type: none"> a) Genetic improvement and wild type resources used in aquaculture (number of responses). I think percentages will be more informative than numbers here. b) An overview of type of technology for improvement and wild type according to species could also be very interesting c) The closest we may get to a comparison of % based on family based selection (of Gjedrem and Robinson, 2014) could be derived from these figures. However it will be important to emphasize that these are based on number of responses whether Gjedrem and Robinson based on production. 	<ul style="list-style-type: none"> a) Change graph to show percentage rather than numbers. b) This is outside of the scope of the SoW but might be worthwhile for a follow up article. c) This comment will be incorporated into the redraft of section 2.5.2.1 	
Norway AWG member	Ch 2. P 47. Section 2.5.2.2. 2nd paragraph	What challenges? These should be mentioned and discussed.	Delete sentence or expand on the challenges or link to sections of this chapter that do reference challenges.	
Norway/ AWG member	Ch 2. P 53. Paragraph following Figure 2.14c.	<ul style="list-style-type: none"> a) Could add somewhere here that in both the GIFT and A salmon in Norway approximately 20% increase in growth per generation was obtained by selection. b) What? Scandinavian Airlines in this connection is new to me. This should be checked. What reference is this? c) institute (rather than group), and in brackets, please put currently Nofima as I can see above it is referred to the current Worldfish and not former ICLARM. 	<ul style="list-style-type: none"> a) Change to: “The impressive gains in <u>production of farming</u> Atlantic salmon in Norway were due in large to private public partnerships”. b) Change to: “that also involved Scandinavian Airlines, a government research institute (Akvaforsk, now Nofima) and <u>several</u> other private companies 	For consistency change the previous sentient on GIFT to read ICLARM (now Worldfish) developed the

Norway/ AWG member	Chapter 8	I missed the section on INGA network here or elsewhere in the report.	A case study on INGA has been drafted for inclusion in the Framework of Minimum Requirements for Sustainable Management, Development, Conservation and Use of Aquatic Genetic Resources. An abridged version of this case study will be included in a box in Chapter 8 in the final version of the SoW report.	
Norway/ AWG member	Ch 8. P 173. Key messages. Bullet point 8	How many at MSc and lower levels?	Query data to see if this information is provided and include in the text within the section itself.	
Norway/ AWG member	Ch 8. P 173. Key messages. Bullet point 9	for example ???	Examples are generally not provided in the summary of key messages but should be included in the main body of the chapter.	
Norway/ AWG member	Ch 8. P 173. Key messages. Bullet point 9	What is this, give example.	See above.	
Norway/ AWG member	Ch 8. P 194. Key finding on main areas of training at global level	Here it should be added that least covered genetic evaluation and genetic improvement.	Table 8.15 clearly indicates that training in economic evaluation of AqGR is substantively lower than the other areas. No change.	

APPENDIX 2

Non-substantive comment requiring editorial review

Source of feedback	Section of the report referred to	Comment	Secretariat response	Notes
Germany/ AWG member	Ch 1. P 21. Section 1.4, first line.	94.000.000 tonnes!	Correct data point using updated data.	
Germany/ AWG member	Ch 5. P 129. Key message bullet point 6	90.9%	Change 909 percent to 90.9%	
Germany/ AWG member	Ch 8. P 176. First paragraph under section 8.2.1	9290 countries?	Change to “92 countries”	
Germany/ AWG member	Ch 9. P 197. Final bullet point under key messages	Atlantic salmon	Change to “Atlantic salmon”	
Norway/ AWG member	Ch 2. P 30. Key messages, second bullet	delete 'more' or put 'countries with lower production'?	Change to: “Major producing countries (i.e. those countries that contribute more than 1 percent to global aquaculture production) reported a higher use of genetically improved organisms than more minor producing countries”	

Norway/ AWG member	Ch 2. P 30. Key messages, 11 th bullet	First part of sentence: Insert here such that it reads: '... for which catch was most frequently reported to be declining, ..'? Second part of sentence: Declining trend??	Change to: “Of the wild relatives ranked on the basis of frequency of reports of declining catch, only three of the top 10 are listed as having any conservation concerns in the IUCN Red List.” (remainder of sentence deleted)	
Norway/ AWG member	Ch 2. P 34. Third bullet point after Table 2.1	International <u>and national</u> organizations becoming centers of excellence...	Make suggested change.	
Norway/ AWG member	Ch 2. P 37. Figure 2.3	But total number of species farmed was not > 500. How can it be 694 here?	The reports indicate total number of species (or species items) reported as farmed = 694	Check if there is inconsistency in reporting this number.
Norway/ AWG member	Ch 8. P 174. Introduction, paragraph 3. Last sentence	I suggest to add 'and how we can manage and improve the cultured strains' And develop	Change sentence to: “It is generally accepted that if we do not know what we have, what we culture, or what we intend to culture in the near future, we will hardly be able to <u>develop it and</u> use it in an efficient, effective and sustainable manner.	
Norway/ AWG member	Ch 8. P 174. Introduction, paragraph 6	This sentence is not entirely clear. Is it with focus on cultured AqGR, or if not what is the AqGR developed and implemented? Or is it the research and education that is developed and implemented? Perhaps some commas will help to clarify?	Change sentence to: “The present chapter aims to better understand existing research, education, training and networking programs on aquaculture, with special emphasis on aquatic genetic resources developed and <u>programs implemented in</u> by surveyed countries”	

Norway/ AWG member	Ch 8. P 176. Table 8.2	Can the term 'Economic coverage' be misunderstood as it can be interpreted whether the economics are covered rather than what development level of countries. Took at least me some time to figure out	Change caption to: “Presence or absence of national research programs supporting use, conservation and management of aquatic genetic resources, by economic class of countries” and change column titles from Yes/No to Present/Absent.	
Norway/ AWG member	Ch 8. P 183. Table 8.14	Rather put: 'Average number of different types of courses for countries...' rather than 'Ration of number of types per country ..' ?	Change caption to: “Average number of courses, covering different key themes related to AqGR, by academic/technical level.	
Norway/ AWG member	Ch 8. P 183. Table 8.15	Why is last column in bold? Why is the last row in bold?	Will be picked up in copy editing	
The African Union - Interafrican Bureau for Animal Resources (AU-IBAR)	Ch 2. P 40 footnote	Change ...'organisms' to 'organism'	Make proposed change	
AU-IBAR	Ch 3. P 83, third line of second last paragraph	The sentence is not clear. Suggest change ‘genetic resources of farmed organisms is therefore greater attention to improving strains..’ to ..’indicates the need to place greater attention to’	Change sentence to read “.....was voiced that lack of government leadership on aquaculture genetic resources left too much....”	
AU-IBAR	Ch 3. P 87, paragraph three	The sentence is not clear. Suggest change ‘genetic resources of farmed organisms is therefore greater	The reader may have mis-interpreted the meaning of the sentence which needs to be clarified. Suggest the following change:	

		attention to improving strains..' to ..'indicates the need to place greater attention to'	"The impact of increased wealth on aquatic genetic resources of farmed organisms <u>is</u> thus that therefore greater attention <u>is paid</u> to improving strains, diversification and experimentation with new species, to address demands from niche markets"	
AU-IBAR	Ch 3. P 90. Section 3.2.1., paragraph 1, end of line two	Change ..'their country was activity addressing' to 'their country was actively addressing'..	Make proposed change	
AU-IBAR	Ch 3. P 96 second sentence, first paragraph immediately after the box.	Change ..'In one case perceived this as one opportunity..' to 'In one case, this was perceived as an opportunity...'. or 'One case perceived this..'	Change to "In one case <u>climate change was</u> perceived this as an opportunity to expand the range of brackishwater species in delta areas or <u>for expansion</u> in species that prefer warmer waters, where migration is possible."	Need to confirm intended meaning with author.
AU-IBAR	Ch 3. P 106, 2 nd bullet in fifth paragraph	There is a word missing in the bracket, ie.. (Golden Appel Snail in the and Bangladesh)	Change to: "use as aquaculture feeds (e.g. Golden Apple Snail in the <u>Philippines</u> and Bangladesh).	Confirm with chapter author that it was intended to be to be the Philippines
AU-IBAR	Ch 5. P 132, section 5.2.3., second sentence in first paragraph	Change 'T ranslocation' to Translocation	Make suggested change.	
AU-IBAR	Ch 5. P 132, section 5.2.3., first line in second paragraph	Change is to are	Do not make change, sentence is in the singular.	Change "is the relative low-cost methods used" to "is the relatively low-

				cost of <u>the</u> methods used
AU-IBAR	Ch 5. P 135, second line of first paragraph.	change ‘... threaten ..’ to ‘threatened’	Make suggested change.	
AU-IBAR/ Germany	Ch5. P 140, Section 5.4.1., First line of second paragraph	Change ‘n’ to ‘In’	Make suggested change.	Change “variety” to “strain” in the previous sentence to be consistent with nomenclature.
AU-IBAR	Ch5. P 142, Second last sentence in the last paragraph	Change ‘were only small difference found in average number’ to ‘was only a small difference found in the average number’	Actually refers to p141. Change to “there were only small differences...”	Note: In the first sentence of section 5.4.3 make this change “being conserved <u>through</u> in vitro conservation programs”
AU-IBAR	Ch6. P 154, Section 6.4.1., first line	Insert space between 196responded	Change to: “Almost half of all countries in the world (92/196) responded,”	
AU-IBAR	Ch 7. P 170, Section 7.3.3., 1st paragraph in section, fourth line	Change ‘patter’ to ‘pattern’	Make suggested change	