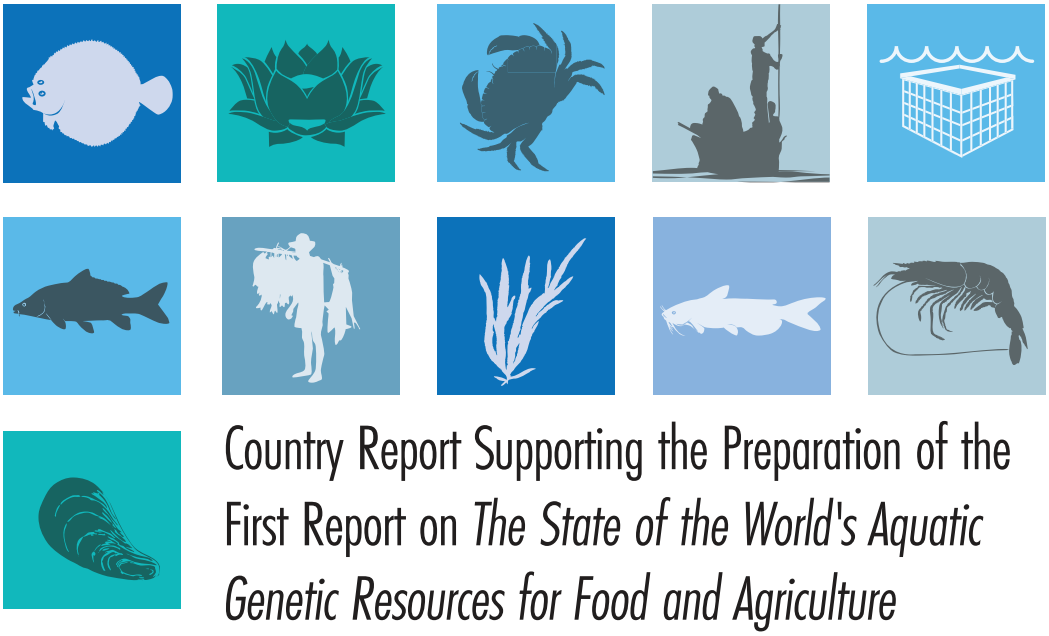
Food and Agriculture Organization of the United Nations

COUNTRY REPORTS

Australia



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

Food and Agriculture Organization of the United Nations

COMMISSION ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE

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

COMMISSION ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE

INSTRUCTIONS FOR COMPLETING THE DYNAMIC GUIDELINES

How do I complete the dynamic guidelines?

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

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

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

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

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

I. INTRODUCTION

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

II. COUNTRY REPORTS

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

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

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

Country Reports should:

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

Timeline and process

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

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

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

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

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

Country report supporting the preparation of

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

Country	Australia
Prepared By	Graham Mair
Date	Jun 23, 2017

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I. EXECUTIVE SUMMARY

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

Please include the Executive Summary here.

To be converted into narrative form:

- Australia's aquaculture sector is growing and is expected to continue to do so
- Australia has an active R&D community working on characterisation and improvement of AqGR
- We have genetic data available for the majority of our cultured species and many of the wild relatives (that occur in Australia) of species cultured elsewhere
- Most of our cultured fish are either domesticated or subject to forms of genetic improvement, primarily selective breeding and thus most of the production and value of Australia's aquaculture in base on genetically improved organism
- Whilst initial work on selective breeding has been publicaly funded most genetic improvement is now privately resourced by industry
- Australia has four or five leading breeding programs for our key aquaculture species which are applying world's best practice breeding programs
- Australia has 49 species which are cultured (excluding microalgae) and genetic data is available for approximately 2/3 of these species
- Population genetics and selective breeding are the most common forms of genetics R&D
- A further 68 species (most of them indigenous) have been identified as having potential for aquaculture in Australia
- Australia has limited exchange of genetic resources with imports being highly controlled and limited to an existing list of permitted species, almost of all of which related to ornamental fish for the aquarium industry. Ornamental fish are excluded from this report due to the difficulty in obtaining data. There is some export of AqGR including commercial aquaculture species such as Barramundi, Murray Cod and Pacific Oyster. Data on these exports is still be compiled.
- Australia has over 170 aquatic species that occur in Australia (either indigenous or introduced), are not currently cultured here, but are cultured elsewhere in the world.
- Australia has a number of drivers that impact on our AqGR with commercial fishing, competition for resources and climate change likely to be having the most negative impacts.
- We apply a range of biotechnologies to our cultured species but selective breeding is the main technology which is most widely used and impacts most on our AqGR
- Australia's strong record of accomplishment in fisheries management (with 75% of our fisheries considered to be fished sustainable) and our extensive network of Marine Protected Areas impact significantly on in situ conservation of our AqGR.
- Australia does have some specific recovery plans be implemented to improve genetic resource that have been impacted by anthropogenic effects or environmental challenges. These recovery plans (or enhancement activities), apply to a small number of inland (finfish) and marine species (abalone and sea cucumber).
- Australia has few ex situ collections of live or quiescent genetic resources.
- Preservation of AqGR and retention of capacity to adapt to future environmental change are the priorities for both in situ and ex situ conservation
- Australia's Environment Protection and Biodiversity Conservation Act (1999) or EPBC are good fisheries management are the principal mechanisms for protecting our vulnerable/threatened and exploited AqGR
- Other than these mechanisms (above), Australia is not particularly proactive in specifically protecting its AqGR although protection is explicit in our programs to conserve aquatic biodiversity.
- Australia has a globally strong research community and capacity for R&D on our AqGR
- Australia can improved its capacity for effective AgGR through improved networking, data sharing, information systems and communication both nationally and internationally.
- Australia has relatively few education and training programs focused no AqGR management
- Australia is a signatory to a range of interregional and international agreements/conventions and treaties that promote conservation of AqGR
- Relatively few of these mechanisms are having verifiable and quantifiable impact of our AqGR with the transboundary stock of Southern Bluefin Tuna, which are now recovering.
- Completion of this report, subject to review, has been a useful exercise in understanding what AqGR we have in Australia and the strengths and weakness in our management of these resources.

II. INTRODUCTION

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

Please write the overview here

TBA

(an overview of aquaculture and fisheries and AqGR in Australia.)

III. MAIN BODY OF THE COUNTRY REPORT

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

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

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

Farmed aquatic species

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

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

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

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

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

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

Please include any explanation or additional information here.

Australia has developed the Australian Fish Names Standards (AS 5300-2015) which applies to over 4000 seafood species produced or traded in Australia. The standard defines common names based on species. The standard does not apply to sub-species or domesticated or improved lines. There are relatively few crossbreds or clearly identified strains available and no standard protocols apply for their nomenclature.

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

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

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

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

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

Please add any explanation here.

Some genetic data are recorded in one form or another for the majority of Australia major aquacultured species. Where genetic analyses are applied to species using public or public-private funding the data are generally made available through reports and scientific publication. Where genetic analyses are primarily funded by industry, genetic data may not be widely shared. Where available genetic data are commonly used in the genetic management and improvement of stocks. Genetic data take the form of phenotypic values (e.g. performance evaluation for one or more commercially important traits), information of comparative levels of genetic variation, pedigree data and genomic data.

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

Please mark appropriate box.

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

Please add any explanation here.

Most aquaculture stock is produced from domesticated or genetically improved broodstock but there are some significant aquaculture sectors which still rely on wild caught seed, most notably Southern Bluefin Tuna (Thunnus maccoyii) (100%) and Sydney Rock Oysters (Saccostrea glomerata) (~70%).

There are some sectors which still collect some of their broodstock from the wild, most notably Giant Tiger Prawn (Penaeus monodon) and a small proportion of Barramundi, Silver Perch and Murray Cod.

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

- Percent managed by public sector. **Please Enter Percentage Here** 0
- Percent managed by private sector**.** **Please Enter Percentage Here** 70
- Percent managed by private /public partnership. **Please Enter Percentage Here** 30

Total 100

Please add any explanation here.

There are an estimated 10 significant breeding programs running in Australian aquaculture of which 7 are privately run/resourced and three could be considered as a Public – Private partnerships. The percentages above are estimated purely on the number of breeding programs and is not corrected for value or scale of production. Several of our breeding program have been initiated and developed as publicly funded or public-private partnerships but have evolved to be purely private.

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

Please mark appropriate box.

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

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

Add Row

Species	Type of genetic improvement *mark all that apply*	Developed By *mark all that apply*	
Salmo salar	☒ Traditional selective breeding	☒ Private Sector ☐ Public Sector ☐ Private/Public partnership	
	☐ Hybrids	☐ Private Sector ☐ Public Sector ☐ Private/Public partnership	
	☒ Triploids and other polyploids	☒ Private Sector ☐ Public Sector ☐ Private/Public partnership	X
	☒ Mono-sex production	☒ Private Sector ☐ Public Sector ☐ Private/Public partnership	
	☒ Other	☒ Private Sector ☐ Public Sector ☐ Private/Public partnership	
Crassostrea gigas	☒ Traditional selective breeding	☒ Private Sector ☒ Public Sector ☐ Private/Public partnership	
	☐ Hybrids	☐ Private Sector ☐ Public Sector ☐ Private/Public partnership	
	☒ Triploids and other polyploids	☒ Private Sector ☐ Public Sector ☐ Private/Public partnership	X
	☐ Mono-sex production	☐ Private Sector ☐ Public Sector ☐ Private/Public partnership	
	☐ Other	☐ Private Sector ☐ Public Sector ☐ Private/Public partnership	

	☒ Traditional selective breeding	☒ Private Sector ☐ Public Sector ☐ Private/Public partnership	
	☐ Hybrids	☐ Private Sector ☐ Public Sector ☐ Private/Public partnership	
Saccostrea glomerata	☐ Triploids and other polyploids	☐ Private Sector ☐ Public Sector ☐ Private/Public partnership	X
	☐ Mono-sex production	☐ Private Sector ☐ Public Sector ☐ Private/Public partnership	
	☐ Other	☐ Private Sector ☐ Public Sector ☐ Private/Public partnership	
Haliotis spp	☒ Traditional selective breeding	☒ Private Sector ☐ Public Sector ☐ Private/Public partnership	
	☒ Hybrids Specify parental species in the box below Haliotis rubra Haliotis laevigata	☒ Private Sector ☐ Public Sector ☐ Private/Public partnership	
	☐ Triploids and other polyploids	☐ Private Sector ☐ Public Sector ☐ Private/Public partnership	X
	☐ Mono-sex production	☐ Private Sector ☐ Public Sector ☐ Private/Public partnership	
	☐ Other	☐ Private Sector ☐ Public Sector ☐ Private/Public partnership	

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

9. Please fill in table 1.1

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

Add Row

Farmed species	Genetic type	Availability of genetic data	Trends in production	Future trends in production	Genetic improvement	Future genetic improvement	Comments
List species (scientific names), strains and varieties as scientific names (put in brackets the most widely used national common name or names) and indicate whether native or introduced	*Indicate all genetic types that apply to the species*	Are genetic data available for farmed populations? If yes, give summary details in comments	Over the last 10 years, production has been ***(mark one)***	Expected trend over the next 10 years is that production will ***(mark one)***	Which genetic technologies are currently being used on the species ***(mark all that apply)***	***mark all that apply***	For example important traits improved, how data are used in management or name of breed, source of information, etc.

○ Native ◉ Introduced Salmo salar	☐ Wild Type ☒ Selective bred type ☐ Hybrids ☐ Cross breeds ☒ Strains ☐ Varieties ☒ Polyploids	◉ Yes ○ No ○ Not Known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☒ Selective breeding ☐ Hybridization ☒ Polyploidy (chromosome set manipulation) ☒ Monosex ☐ Marker assisted selection ☒ Other (specify in comment)	☒ Selective breeding ☒ Hybridization ☐ Polyploidy (chromosome set manipulation) ☒ Monosex ☒ Marker assisted selection ☒ Other (specify in comment)	Australia has an industry wide selective breeding program for the introduced Atlantic Salmon with over 90% of salmon produced being genetically improved from this breeding program. This industry owned breeding program is primarily selecting for traits of growth rate and resistance to AGD (Amoebic gill disease) but also includes traits of early maturation at sea, fillet colour and fillet fat levels. All production is monosex female and triploids are grown in one particular growing area. Recently whole genome selection has been introduced into the breeding program. There has been some research interest in producing hybrids between Atlantic salmon and Brown trout which are expected to be resistant to AGD but this has not progressed beyond preliminary research. Current genetic data on selective breeding is not widely available outside industry but past genetic research that was publically funded is available via reports and publications.	X

◯ Native ◉ Introduced Oncorhynchus mykiss	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ◯ No ◯ Not Known	◉ Increasing ◯ Stable ◯ Fluctuating ◯ Decreasing ◯ Stopped ◯ Not known	◉ Increasing ◯ Stable ◯ Fluctuating ◯ Decreasing ◯ Stopped ◯ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☒ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☒ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	Rainbow trout (sometimes marketed as ocean trout) is produced in small quantities in some of the southern states of Australia (including some caviar production in Victoria), particularly in Tasmania. The species is introduced from New Zealand and is not subject to any specific genetic improvement programs other than production of monosex females. There are currently no plans to commence genetic improvement of this species.	X
◯ Native ◉ Introduced Salmo trutta	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◯ Yes ◉ No ◯ Not Known	◯ Increasing ◉ Stable ◯ Fluctuating ◯ Decreasing ◯ Stopped ◯ Not known	◯ Increasing ◉ Stable ◯ Fluctuating ◯ Decreasing ◯ Stopped ◯ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☒ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	Brown trout was introduced to Australia in the 19th century (together with Atlantic Salmon) and have been introduced into freshwater streams in Tasmania and into private farms and state hatcheries in some other southern states. There is some small scale farm production and some stocking into lakes for recreational fishing. There is no known genetic program for Brown trout nor any plans for genetic improvement. Proposals have been suggested to hybridise Brown Trout with Atlantic salmon to produce an AGD resistant hybrid for production in Tasmania.	X

○ Native ◉ Introduced Salvelinus fontinalis	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	○ Yes ◉ No ○ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	Brook trout was first introduced to Australia in the 19th century (together with Atlantic Salmon) and have been reintroduced in 1962 They have been introduced into freshwater streams in Tasmania and into private farms and state hatcheries in some other southern states (including caviar production in Victoria). There is some stocking into lakes for recreational fishing. There is no known genetic program for Brook trout nor any plans for genetic improvement.	X
○ Native ◉ Introduced Oncorhynchus tshawytscha	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	○ Yes ◉ No ○ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	Chinook Salmon as first introduced to Australia in the 19th century and have been reintroduced as late as 1966. They are thought to be produced in only one state hatchery in Victoria for stocking in some lakes. There is no known genetic program for Brook trout nor any plans for genetic improvement.	X

◉ Native ○ Introduced	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	Australian shortfin eel. There is an active but small aquaculture and stock enhancement sector for this more temperate eel in Victoria, Tasmania and NSW. The sector is based on wild caught seedstock. An FRDC report in 2004 indicated potential for growth of eel farming in Australia and provided strategic guidelines to develop this sector. The development strategy for the sector includes R&D to develop propagation techniques which would involve domestication of the species. A population genetics study has been published for this species in East Australia and New Zealand based on microsatellite loci (Shen and Tzeng, 2007).	X
Anguilla australis								
◉ Native ○ Introduced	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	Australian longfin eel. There is an active but small aquaculture sector for this more tropical eel in Queensland and NSW (and extending in to Victoria). The sector is based on wild caught seedstock. An FRDC report in 2004 indicated potential for growth of eel farming in Australia and provided strategic guidelines to develop this sector. The development strategy for the sector includes R&D to develop propagation techniques which would involve domestication of the species. A population genetics study has been published for this species in East Australia based on microsatellite loci (Shen and Tzeng, 2006).	X
Anguilla reinhardtii								

◉ Native ○ Introduced Maccullochella peelii	☒ Wild Type ☐ Selective bred type ☒ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☒ Selective breeding ☒ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☒ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	Murray Cod is a large inland freshwater species cultured principally in NSW and Victoria. Production in NSW has more than doubled in recent years whilst aquaculture production in Victoria has fluctuated. Current production is estimated to be around 400 tonnes per annum. There is also significant production of seed for restocking in the Murray Darling river system. Populations of Murray Cod in the wild had been in decline due to anthropogenic effects (watershed management, overfishing and competition from imported common carp) but there are recent reports of a recovery in numbers. There has been a significant amount of genetic work in recent years as a basis for a selective breeding program including a genetic linkage map and QTL markers. Broodstock resulting from this research were turned over to the private sector but have not been commercialisaed and there is no on-going breeding program.	X

◉ Native ○ Introduced Maccullochella macquariensis	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	○ Yes ◉ No ○ Not Known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	Trout cod is a relative of the Murray Cod and indigenous to the Murray Darling river basin and is listed as endangered due to anthropogenic effects associated with watershed management and overfishing. It is protected and wild capture is prohibited. It is produced in hatcheries in Victoria and NSW for restocking purposes (no commercial aquaculture). There is a national recovery plan for the species but it is thought the restocking is having limited impact on wild populations. There are no on-going or planned genetic programs for Trout cod although it has been used in experimental hybridisations with Murray Cod and hybrid introgression is known to have occured in waters were both species are stocked together.	X
◉ Native ○ Introduced Bidyanus bidyanus	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	The Silver Perch is a species promoted for many years for low input extensive and semi-intensive aquaculture in Southern Australia, particularly in NSW. Production has fluctuated in recent years and it appears unlikely that production will expand without significant investment from the private sector to generate economies of scale. Populations of Silver Perch in the wild have been in decline and a recovery plan was produced in 2006. There have been some limited studies of population genetics of Silver Perch but no genetic breeding	X

							programs have been implemented.	
◉ Native ○ Introduced Scortum barcoo	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☒ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	The Barcoo Grunter (also commonly known as Jade Perch) is a minor aquaculture species in Australia being produced in a few farms in NSW and Queensland. There is anecdotal information about the presence of distinct varieties. There is some published information on genetics from China including on the mitochondrial genome and AFLP analysis of three distinct stocks of this species.	X
◉ Native ○ Introduced Macquaria ambigua	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	○ Increasing ○ Stable ◉ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ○ Stable ◉ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	The Golden Perch is a minor aquaculture species in Australia being produced in a few farms mainly in NSW. There is anecdotal information about the presence of distinct varieties. There are a couple of published studies on the population genetics of this species.	X

◉ Native ○ Introduced Thunnus maccoyii	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	Southern Bluefin Tuna (SBT) aquaculture is Australia's second most valuable aquaculture sector. The sector is dependent on wild caught juveniles with the quota being set as part of the intergovernmental agreements under the Indian Ocean Tuna Commission. A program to commence artificial propagation of SBT did not progress to commercialisation. Genetic markers were developed (but not published) for parentage assignment. Close kin analysis using DNA samples is not routinely practiced to estimate the size of spawning stock and may eventually enable recruitment estimates.	X
◉ Native ○ Introduced Lates calcarifer	☒ Wild Type ☒ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☒ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☒ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☒ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	Barramundi is one of the third most valuable finfish aquaculture sector in Australia with production of 2,500 to 4.500 tonnes per annum. There is significant background information on genetics and a breeding program is a high priority for the sector. Attempts to initiate an industry wide selective breeding program have to date failed. Currently at least two private sector farms are initiating small scale selective breeding programs.	X

◉ Native ○ Introduced Seriola lalandi	☒ Wild Type ☒ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	○ Increasing ○ Stable ◉ Fluctuating ○ Decreasing ○ Stopped ○ Not known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☒ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☒ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	Yellowtail Kingfish aquaculture is an emerging sector. Current production is estimated at 2,500 tonnes, primarily in South Australia but production is expanding to other southern states. Data on population genetics of the species in Australia and globally is available and genetic markers have been developed for parentage assignment. Until recently production relied on wild caught broodstock but has switched to domesticated stock over the past 4-5 years with some genetic management and selective breeding being applied for commercially important traits.	X

◉ Native ○ Introduced Penaeus monodon	☒ Wild Type ☒ Selective bred type ☐ Hybrids ☐ Cross breeds ☒ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	○ Increasing ○ Stable ◉ Fluctuating ○ Decreasing ○ Stopped ○ Not known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☒ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☒ Marker assisted selection ☒ Other (specify in comment)	☒ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☒ Monosex ☒ Marker assisted selection ☒ Other (specify in comment)	The Giant Tiger Prawn is a significant aquaculture sector in Australia based in Queensland with production of 3,000 - 4,000 tonnes per annum. Production is based on a combination of wild caught broodstock, broodstock domesticated for one or more generations and broodstock domesticated and selected for growth traits over many generations. An outbreak of WSSV (the first in Australia) in early 2017 wiped out the mature breeding program. Now the industry in restarting one or more breeding programs with domesticated stock. The industry is expected to expand when it recovers from the effects of the WSSV outbreak. Some data on the population genetics of Australian Giant Tiger Prawn is published but the performance data from breeding and selection is generally not publically available. There is currently a large genetics project (the Prawn hub) which will be publishing full transcriptome and genome data for this species leading to integration of genomic selection into breeding programs.	X

◉ Native ○ Introduced Penaeus merguiensis	☒ Wild Type ☒ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☒ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☒ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	The Banana Prawn is farmed on one of the larger prawn farms in Queensland. The stock has been domesticated for several generations and subject to genetic management to avoid inbreeding with some degree of selection for commercially important traits. A range of studies are published on the Australia cultured Banana Prawn including on managing genetic diversity, the impacts of domestication, heritability of traits and transcriptomics.	X
◉ Native ○ Introduced Penaeus pulchricaudatus	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ◉ Stopped ○ Not known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ◉ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	The Australian Karuma Prawn (more commonly referred to as Penaeus japonicus) was farmed on a small scale in Queensland but it is thought that production has now ceased. There have been several published research studies on Australian Karuma Prawns including estimation of heritability, gene mapping and applications of genetic markers.	X

◉ Native ○ Introduced Cherax cainii	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☒ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☒ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	The classification of Marron is currently under review with the consensus that the smooth Marron used in aquaculture is C. cannii, with the hairy marron C. tenuimanus, being less widely used. Marron is cultured in Western Australia and South Australia with total production around 80 tonnes. Some work has been published on the population genetics of marron and the development of a synthetic cultured stock from Marron collected from different locations.	X
◉ Native ○ Introduced Cherax quadricarinatus	☐ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☒ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	The Red Claw is a tropical freshwater crayfish cultured predominently in Queensland. Some genetic work is reported including population genetics, genetic variation of stocks and the development of a genetic improvement program. The initial output from a selective breeding program was distributed to industry but the program has not continued.	X

◉ Native ○ Introduced Cherax destructor	☐ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	○ Increasing ○ Stable ○ Fluctuating ◉ Decreasing ○ Stopped ○ Not known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	The Yabby is the most ubiquitous freshwater crayfish commonly held in farm dams. There is published genetic information on levels of genetic variation in Australian yabbies. There are no on-going genetic development of Yabbies.	X
◉ Native ○ Introduced Paratya australiensis	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	Known as glass shrimp and an excellent food organism for finfish. Details of culture are not available but some culture is recorded and at least one hatchery exists in Australia. There are several published studies on the population genetics of this species.	X

◉ Native ○ Introduced Thenus australiensis	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	○ Yes ◉ No ○ Not Known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ◉ Not known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	The Moreton Bay Bug is a new species for aquaculture although it has an established fishery. There is one aquaculture farm being established in New South Wales to initiate production. with commercial production commencing in 2017.	X
◉ Native ○ Introduced Argyrosomus japonicus	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ◉ Stopped ○ Not known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ◉ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	Mulloway was briefly cultured in NSW, South Australia and Western Australia in the late 2000s but did not prove economical and was shelved in favour or culture of Yellowtail Kingfish. Population genetic data is published for Australian Mulloway.	X

○ Native ◉ Introduced Crassostrea gigas	☐ Wild Type ☒ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☒ Polyploids	◉ Yes ○ No ○ Not Known	○ Increasing ○ Stable ◉ Fluctuating ○ Decreasing ○ Stopped ○ Not known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☒ Selective breeding ☐ Hybridization ☒ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☒ Selective breeding ☐ Hybridization ☒ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	Pacific Oyster is a major aquaculture species in Australia being commercially cultured in South Australia, Tasmania and NSW. Combined with SRO current production is over 10,000 tonnes. Production has been stable until a recent outbreaks of Pacific Oyster Mortality Syndrome caused but the Ostreid Herpes Virus (OHSV-1) in NSW and Tasmania. There is an industry owned commercial breeding program for Pacific Oysters in Australia with 10 generations of selection. The current selected stock has some resistance to OHSV and is now being used by over 90% of industry. Genetic data from the early development of this breeding program is available in project reports. A relatively small proportion of production (~20%) is of sterile triploid oysters produced from 4n broodstock.	X

◉ Native ○ Introduced Saccostrea glomerata	☒ Wild Type ☒ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☒ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	The Sydney Rock Oyster is a species endemic to warm temperate and sub-tropical eastern Australia and is the major aquaculture species in NSW with current production at 5 million dozens. An industry lead mass selection program has been running for the past decade and is now maturing into a family selection program with up to 100 families, in a public private partnership with State Government. The breeding program focusses on disease resistance, specifically QX protozoan parasite) and winter mortality sydrome. Genetic data on the early breeding program, population genetics and gene expression is available. it is estimated that up to 30% of industry is growing the improved oyster.	X
◉ Native ○ Introduced Epinephelus lanceolatus	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	○ Yes ◉ No ○ Not Known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	Queensland Groper is produced on a small scale (at least 50 tonnes pa) in Queensland. There is one hatchery that is able to propagate this species using wild caught broodstock. This hatchery is also developing propagation of Goldspotted Rockcod (Epinephalus coioides), Tiger Grouper and Coral Trout (Plectropomus sp.)	X

◉ Native ○ Introduced Ostrea angasi	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ◉ Stopped ○ Not known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☒ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	The Native Oyster is the species that made up the major part of the early oyster fishery in southern Australia and was fished almost to extinction. There is currently some hatchery production and some commercial grow out and the species is being actively considered as an alternative to aquaculture species to Pacific oyster in southern states. There is a commercial hatchery established in Victoria which is conducting a basic mass selection program. There is also a project in South Australia to re-establish Native oyster reefs which are considered important habitat which has been destroyed by overfishing. There is a small amount of genetic data on karyotype and gene flow for the species. There are no plans for genetic improvement for this species.	X
◉ Native ○ Introduced Pinctada maxima	☒ Wild Type ☒ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☒ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☒ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	Silverlip Pearl Oyster is the major aquacultured pearl oyster in Australia (mainly in Western Australia) accounting for production valued at over $1M per annum (depending on intl. prices and exchange rates). Most pearl oysters are wild stock but there is some hatchery production incorporating a selection program for commercially important traits. There are several published studies on genetic markers and population genetics in this species but breeding program data are not publically available.	X

◉ Native ○ Introduced Pinctada margaritifera	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	○ Yes ◉ No ○ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	The Blacklip Peal Oyster is a minor cultured species in Australia with some culture in Western Australia. There is some published work on the population genetics of the species. There are no genetic programs	X
◉ Native ○ Introduced Pinctada fucata martensii	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	○ Yes ◉ No ○ Not Known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	This Pearl Oyster produces the Akoya pearls (small and white), produced in small amounts in Western Australia. There is one published study on the population genetics of this species complex.	X

◉ Native ○ Introduced Pinctada imbricata	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	This Pearl Oyster is produced in small amounts in NSW. There is osome published work on the population genetics of this species complex.	X
◉ Native ○ Introduced Pinctada albina	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	This Pearl Oyster produces small yellow pearls, produced in small amounts in Western Australia. There is some published work on the species identification of this species.	X

◉ Native ○ Introduced Pteria penguin	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	○ Yes ◉ No ○ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	The Penguin Wing Oyster is used for small scale production of pearls in Western Australia. There appears to be no published genetic data for this species in Australia	X
◉ Native ○ Introduced Mytilus galloprovincialis	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	The Blue Mussel is the only marine mussel farmed in Australia with the industry producing 15,000 tonnes in 2014/15 across the southern states. There are some studies on population genetics and heritabilty of commercial traits on Australian mussels. The population studies indicate that the cultured Blue mussel is native but also has genetic variation derived from introduced European populations.	X

◉ Native ○ Introduced Velesunio ambiguus	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	○ Yes ◉ No ○ Not Known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ◉ Stopped ○ Not known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	This River Floodplain Mussel (freshwater) is produced in at least one hatchery in NSW and is promoted for bioremediation purposes. No genetic information is available on Australian stocks.	X
◉ Native ○ Introduced Haliotis rubra	☒ Wild Type ☒ Selective bred type ☒ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☒ Selective breeding ☒ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☒ Selective breeding ☒ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	Blacklip abalone is one of two cultured abalone species making up ~10% of production. Annual production is estimated to be around 150 tonnes. Its hybrid with Greenlip Abalone (known as the Jade Tiger Abalone) makes up a further 20% of production. This species is mainly cultured in Victoria. There are numerous publications on the population genetics and application of genetic markers in this species in Australia. There is a selection program for the hybrid abalone in which both species are selected for their combining ability in the hybrid. Genetic data on the hybrid breeding program is not publically available.	X

◉ Native ○ Introduced Haliotis laevigata	☒ Wild Type ☒ Selective bred type ☒ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	Greenlip abalone is the major cultured abalone species representing ~70% of production. Annual producdtion is estimated to be around 1,050 tonnes (total abalone production is 1,500 tonnes). Its hybrid with Blacklip Abalone (known as the Jade Tiger Abalone) makes up a further 20% of production. This species is mainly cultured in South Australia, Victoria and Tasmania. There is some published information on species discrimination and genetic improvement but detailed genetic data are not widely available. There is a privately funded selection program for the hybrid abalone in which both species are selected for their combining ability in the hybrid. There is also a privately funded selection program within Greenlip Abalone. Genetic data from the breeding programs are not publically available.	X

◉ Native ○ Introduced Holothuria scabra	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☒ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☒ Other (specify in comment)	The Sandfish forms an important fishery in the Northern Territory. A fishing operator has initiated a commercial hatchery to produce juveniles for ranching. A population genetic study was done to understand genetic structure in the wild and a genetic management plan has been implemented in the hatchery to ensure that the ranching does not introduce significant genetic change to the receiving populations.	X
◉ Native ○ Introduced Heliocidaris erythrogramma	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	○ Yes ◉ No ○ Not Known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	The purple sea urchin is an emerging species for aquaculture in Australia. There is currently a small producer growing and marketing wild caught urchins which have been fattened and matured on an artificial diet. The objective for aquaculture of sea urchins is to remove urchins where they are a pest affective reef systems and associated fisheries and potentially providing for diversification for oyster farmers. There is no genetic work nor plans for any breeding program.	X

◉ Native ○ Introduced Diopatra aciculata	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	○ Yes ◉ No ○ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	The marine tube worm have been farmed for over 15 years as bait for recreational fishing. There is only one farm located in New South Wales. There are no genetic data on this species and no plans for any breeding programs.	X
◉ Native ○ Introduced Ulva ohnoi	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	Sea lettuce. This species is currently cultured on a small scale in the effluent water of a tropical prawn farm. It is produced for use production of organic fertiliser. There is a small amount of genetic work done in relation to taxonomy and species identification.	X

◉ Native ○ Introduced Ulva tepida	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	Sea lettuce. This species is currently cultured on a very small scale in the effluent water of a tropical prawn farm. It is produced for use production of organic fertiliser. There is a small amount of genetic work done in relation to taxonomy and species identification.	X
◉ Native ○ Introduced Ulvaceae	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ◉ Not known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	There is an unnamed (commercial in confidence) Ulvaceae species being cultured in NSW for food and extraction of bioactive compounds. There has been a genetic barcode study applied to identify species within the Ulvaceae family.	X

◉ Native ○ Introduced Haliotis roei	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ◉ Not known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	Roe's Abalone is currently not commercially cultured but there is a hatchery in Western Australia which produces juveniles for restocking a fishery that was affected by a warmwater event.	X
◉ Native ○ Introduced Tandanus tandanus	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	○ Increasing ○ Stable ◉ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ○ Stable ◉ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	The Freshwater Catfish is not commercially cultured but there is some hatchery production in most years from state hatcheries in Victoria for restocking in the Murray river. There are several published studies on the taxonomy and population genetics of this species.	X

◉ Native ○ Introduced Rachycentron canadum	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☒ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	Cobia is an emerging aquaculture species in Australia. Currently only produced in one farm (as an alternative produce on a prawn farm) in ponds. Current production is small at ~100 tonnes. Population genetic information is published for this species in Australia and genetic markers for pedigree assignment have been developed (unpublished). A selection program may be initiated following if significant further growth in Cobia production occurs.	X
○ Native ◉ Introduced Chaetoceros muelleri	☐ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☒ Strains ☐ Varieties ☐ Polyploids	○ Yes ◉ No ○ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	This is one of the microalgal species supplied to Australia's aquaculture industry by the Australian National Algae Supply Service. The supplied strain (Strain code CS176) of this species was introduced from the USA. This algae is very commonly supplied to aquaculture hatcheries as live food for fish and zooplankton.	X

◉ Native ○ Introduced Nitzschia closterium	☐ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☒ Strains ☐ Varieties ☐ Polyploids	○ Yes ◉ No ○ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	This is one of the microalgal species supplied to Australia's aquaculture industry by the Australian National Algae Supply Service. The supplied strain of this species (Strain code CS-5) was collected in NSW. This algae is very commonly supplied to aquaculture hatcheries as live food for fish and zooplankton.	X
○ Native ◉ Introduced Pavlova salina	☐ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☒ Strains ☐ Varieties ☐ Polyploids	○ Yes ◉ No ○ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	This is one of the microalgal species supplied to Australia's aquaculture industry by the Australian National Algae Supply Service. The supplied strain of this species (Strain Code CS-49) was introduced from the Sargasso sea. This algae is sometimes supplied to aquaculture hatcheries as live food for fish and zooplankton.	X

○ Native ◉ Introduced Skeletonema pseudocostatum	☐ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☒ Strains ☐ Varieties ☐ Polyploids	○ Yes ◉ No ○ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	This is one of the microalgal species supplied to Australia's aquaculture industry by the Australian National Algae Supply Service. The supplied strain of this species (Strain Code CS-252) was collected from a Prawn farm in Queensland. This algae is very commonly supplied to aquaculture hatcheries as live food for fish and zooplankton.	X
○ Native ◉ Introduced Tetraselmis chuii	☐ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☒ Strains ☐ Varieties ☐ Polyploids	○ Yes ◉ No ○ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	This is one of the microalgal species supplied to Australia's aquaculture industry by the Australian National Algae Supply Service. The supplied strain of this species (Strain code CS-26) was introduced from the USA. This algae is sometimes supplied to aquaculture hatcheries as live food for fish and zooplankton.	X

○ Native ◉ Introduced Tisochrysis lutea	☐ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☒ Strains ☐ Varieties ☐ Polyploids	○ Yes ◉ No ○ Not Known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	This is one of the microalgal species supplied to Australia's aquaculture industry by the Australian National Algae Supply Service. The supplied strain of this species (Strain code CS-177) was introduced from French polynesia. This algae is very commonly supplied to aquaculture hatcheries as live food for fish and zooplankton.	X
○ Native ◉ Introduced Chaetoceros calcitrans	☐ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☒ Strains ☐ Varieties ☐ Polyploids	○ Yes ◉ No ○ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	This is one of the microalgal species supplied to Australia's aquaculture industry by the Australian National Algae Supply Service. The supplied strain of this species (Strain code CS-178) was introduced from Japan via the USA. This algae is very commonly supplied to aquaculture hatcheries as live food for fish and zooplankton.	X

○ Native ◉ Introduced Chaetoceros simplex	☐ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☒ Strains ☐ Varieties ☐ Polyploids	○ Yes ◉ No ○ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	This is one of the microalgal species supplied to Australia's aquaculture industry by the Australian National Algae Supply Service. The supplied strain of this species (Strain code CS-251) was introduced from and unknown location. This algae is very commonly supplied to aquaculture hatcheries as live food for fish and zooplankton.	X
○ Native ◉ Introduced Thalassiosira pseudonana (USA)	☐ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☒ Strains ☐ Varieties ☐ Polyploids	○ Yes ◉ No ○ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	This is one of the microalgal species supplied to Australia's aquaculture industry by the Australian National Algae Supply Service. The supplied strain of this species (Strain code CS-173) was introduced from the USA. This algae is sometimes supplied to aquaculture hatcheries as live food for fish and zooplankton.	X

◉ Native ○ Introduced Thalassiosira pseudonana (Tasmania)	☐ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☒ Strains ☐ Varieties ☐ Polyploids	○ Yes ◉ No ○ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	This is one of the microalgal species supplied to Australia's aquaculture industry by the Australian National Algae Supply Service. The supplied strain of this species (Strain code CS-20) was collected from Tasmania. This algae is commonly supplied to aquaculture hatcheries as live food for fish and zooplankton.	X
◉ Native ○ Introduced Navicula jeffreyae	☐ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☒ Strains ☐ Varieties ☐ Polyploids	○ Yes ◉ No ○ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	This is one of the microalgal species supplied to Australia's aquaculture industry by the Australian National Algae Supply Service. The supplied strain of this species (Strain code CS-46) was collected in NSW. This algae is commonly supplied to aquaculture hatcheries as live food for fish and zooplankton.	X

○ Native ◉ Introduced Diacronema lutheri	☐ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☒ Strains ☐ Varieties ☐ Polyploids	○ Yes ◉ No ○ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	This is one of the microalgal species supplied to Australia's aquaculture industry by the Australian National Algae Supply Service. The supplied strain of this species (Strain code CS-182) was introduced from The Baltic Sea via USA. This algae is very commonly supplied to aquaculture hatcheries as live food for fish and zooplankton.	X
○ Native ○ Introduced Pavlova pinguis	☐ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☒ Strains ☐ Varieties ☐ Polyploids	○ Yes ◉ No ○ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	This is one of the microalgal species supplied to Australia's aquaculture industry by the Australian National Algae Supply Service. The supplied strain of this species (Strain code CS-375) was collected in Tasmania. This algae is very sometimes supplied to aquaculture hatcheries as live food for fish and zooplankton.	X

○ Native ◉ Introduced Dunaliella Tertiolecta	☐ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☒ Strains ☐ Varieties ☐ Polyploids	○ Yes ◉ No ○ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	This is one of the microalgal species supplied to Australia's aquaculture industry by the Australian National Algae Supply Service. The supplied strain of this species (Strain code CS-175) was introduced from the USA. This algae is sometimes supplied to aquaculture hatcheries as live food for fish and zooplankton.	X
○ Native ◉ Introduced Nannochloropsis oceanica	☐ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☒ Strains ☐ Varieties ☐ Polyploids	○ Yes ◉ No ○ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	This is one of the microalgal species supplied to Australia's aquaculture industry by the Australian National Algae Supply Service. The supplied strain of this species (Strain code CS-179) was introduced from Japan This algae is commonly supplied to aquaculture hatcheries as live food for fish and zooplankton.	X

○ Native ◉ Introduced Tetraselmis suecica	☐ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☒ Strains ☐ Varieties ☐ Polyploids	○ Yes ◉ No ○ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	This is one of the microalgal species supplied to Australia's aquaculture industry by the Australian National Algae Supply Service. The supplied strain of this species (Strain code CS-187) was introduced from France via the USA. This algae is commonly supplied to aquaculture hatcheries as live food for fish and zooplankton.	X
◉ Native ○ Introduced Proteomonas sulcata	☐ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☒ Strains ☐ Varieties ☐ Polyploids	○ Yes ◉ No ○ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	This is one of the microalgal species supplied to Australia's aquaculture industry by the Australian National Algae Supply Service. The supplied strain of this species (Strain code CS-412) was icollected from Queensland. This algae is sometimes supplied to aquaculture hatcheries as live food for fish and zooplankton.	X

◉ Native ○ Introduced Rhodomonas salina	☐ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☒ Strains ☐ Varieties ☐ Polyploids	○ Yes ◉ No ○ Not Known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	○ Increasing ◉ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	This is one of the microalgal species supplied to Australia's aquaculture industry by the Australian National Algae Supply Service. The supplied strain of this species (Strain code CS-24) was collected from NSW. This algae is sometimes supplied to aquaculture hatcheries as live food for fish and zooplankton.	X
◉ Native ○ Introduced Crocodylus porosus	☒ Wild Type ☐ Selective bred type ☐ Hybrids ☐ Cross breeds ☐ Strains ☐ Varieties ☐ Polyploids	◉ Yes ○ No ○ Not Known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	◉ Increasing ○ Stable ○ Fluctuating ○ Decreasing ○ Stopped ○ Not known	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	☐ Selective breeding ☐ Hybridization ☐ Polyploidy (chromosome set manipulation) ☐ Monosex ☐ Marker assisted selection ☐ Other (specify in comment)	Saltwater crocodile. Australia produces approx. 60% of the global trade in saltwater crocodile skins, with about two thirds being grown and exported in the Northern Territory. Most crocodiles are produced in hatcheries with a small proportion collected in the wild where they are a protected species. Genetic data is available on population genetics and sex determination. Whilst there is an industry plan it does not appear to include a genetic component.	X

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

Add Row

Species ***Type and select a species***	Is the species native to your country?	Comments ***For example main sources of information***	
Pagrus auratus	(•) Yes ( ) No ( ) Not Known	Known commonly as Snapper. A workshop in 1996 demonstrated that culture of this species was feasible. Some past work on hatchery production proved the propagation and grow out was viable but the species was not selected for aquaculture with preference going to Yellowtail Kingfish and Mulloway.	X
Lutjanus spp	(•) Yes ( ) No ( ) Not Known	Tropical snappers have been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway.	X
Latris lineata	(•) Yes ( ) No ( ) Not Known	Striped trumpeter was researched over a period of 10 years due to its potential to be cultured in Tasmania as an alternative to Atlantic salmon. Key aspects of culture were shown to be viable from hatchery propagation through to grow out. However, to date culture has not been adopted by industry due to concerns over economic competiveness.	X

Sillaginodes punctatus	(•) Yes ( ) No ( ) Not Known	King George Whiting is a highly prized recreational fish and a high value species in the market, particularly in southern Australia. King George Whiting has been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway. Research in South Australia in 2003 concluded that the propagation and grow out is feasible but identified three specific challenges that would need to be addressed including supply of quality eggs, larval rearing surivival and relatively slow grow-out rates.	X
Sillago ciliata	(•) Yes ( ) No ( ) Not Known	Sand whiting have been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway. Studies have been conducted in Queensland using Sand whiting as a diversification option and/or polyculture option for prawn farms.	X
Sillago spp	(•) Yes ( ) No ( ) Not Known	Other Whiting have been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway.	X

Glaucosoma hebraicum	(•) Yes ( ) No ( ) Not Known	West Australian Dhufish have been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway.	X
Thunnus albacares	(•) Yes ( ) No ( ) Not Known	Yellowfin Tuna has been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway.	X
Neoplatycephalus spp	(•) Yes ( ) No ( ) Not Known	Tropical flathead have been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway.	X

Acanthopagrus spp	(•) Yes ( ) No ( ) Not Known	Several bream species have been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway.	X
Epinephelus spp	(•) Yes ( ) No ( ) Not Known	Several Australia Grouper and Rockcod species have been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway. Some hatchery development research is underway for some of these species.	X
Plectropomus leopardus	(•) Yes ( ) No ( ) Not Known	The Common Coral Trout has been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway.	X

Cromileptes altivelis	(•) Yes ( ) No ( ) Not Known	The Barramundi cod has been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway.	X
Othos dentex	(•) Yes ( ) No ( ) Not Known	The Harelequin Fish has been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway.	X
Genypterus blacodes	(•) Yes ( ) No ( ) Not Known	The Pink Ling has been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway.	X

Mugil cephalus	(•) Yes ( ) No ( ) Not Known	Sea Mullet have been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway.	X
Siganus spinus	(•) Yes ( ) No ( ) Not Known	The Scribble Rabbitfish has been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway.	X
Rhombosolea tapirina	(•) Yes ( ) No ( ) Not Known	The Greenback Flounder has been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway.	X

Coryphaena hippurus	(•) Yes ( ) No ( ) Not Known	The common dolphin fish has been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway.	X
Lutjanus argentimaculatus	(•) Yes ( ) No ( ) Not Known	The Mangrove Jack has been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway.	X
Hippocampus spp	(•) Yes ( ) No ( ) Not Known	Several Australian sea horse species have been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture development (for the ornamental fish market) and an audit of past research is underway.	X

Macquaria novemaculeata	(•) Yes ( ) No ( ) Not Known	The Australia Bass has been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway.	X
Neoarius midgleyi	(•) Yes ( ) No ( ) Not Known	The Silver Cobbler, a freshwater catfish, has been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway.	X
Acipenser baerii	( ) Yes (•) No ( ) Not Known	The Siberian Sturgeon has been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway. This species has also been targeted for aquaculture development by the South Australian Government. A feasibility study is currently underway as to its suitability for culture in Australia.	X

Huso huso	○ Yes ◉ No ○ Not Known	The Beluga Sturgeon has been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway. This species has also been targeted for aquaculture development by the South Australian Government. A feasibility study is currently underway as to its suitability for culture in Australia.	X
Penaeus latisulcatus	◉ Yes ○ No ○ Not Known	The Western King Prawn been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway.	X
Penaeus esculentus	◉ Yes ○ No ○ Not Known	The Brown Tiger Prawn has been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway.	X

Penaeus semisulcatus	(•) Yes ( ) No ( ) Not Known	The Grooved Tiger Prawn has been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway.	X
Panulirus cygnus	(•) Yes ( ) No ( ) Not Known	Western Rock Lobster is an important and valuable fishery in Western Australia. This species has been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway.	X
Jasus edwardsii	(•) Yes ( ) No ( ) Not Known	The Southern Rock Lobsters is an important and valuable fishery in South Australia, Victoria and Tasmania. This species has been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway.	X

Panulirus ornatus	(•) Yes ( ) No ( ) Not Known	The Ornate Rock Lobster is a smaller tropical rock lobster fishery. The species has been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway.	X
Portunus armatus	(•) Yes ( ) No ( ) Not Known	The Blue Swimmer Crab forms significant fisheries in several state. The species has been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway.	X
Scylla serrata	(•) Yes ( ) No ( ) Not Known	The Mud Crab has been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway.	X

Artemia salina	(•) Yes ( ) No ( ) Not Known	This brine shrimp has been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway.	X
Macrobrachium spinipes	(•) Yes ( ) No ( ) Not Known	This freshwater prawn (similar to M. rosenbergii) has been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway.	X
Saccostrea cuccullata	(•) Yes ( ) No ( ) Not Known	This tropical oyster has been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway.	X

Striostria mytiloides	(•) Yes ( ) No ( ) Not Known	This tropical oyster has been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway.	X
Pinna bicolor	(•) Yes ( ) No ( ) Not Known	This Razor Clam has been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway.	X
Katelysia spp.	(•) Yes ( ) No ( ) Not Known	Several species of these marine claims have been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway.	X

Donax deltoides	(•) Yes ( ) No ( ) Not Known	The Pipi (a marine bivalve cockle) has been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway. Initial research into the feasibility of the culture of this species has indicated significant constraints to economic viability of its culture.	X
Tridacna squamosa	(•) Yes ( ) No ( ) Not Known	The Giant Clam has been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway. An experimental scale hatchery and grow-out facilties have been established for this species in the Northern Territory with some success but to date there has been no commercial culture.	X
Octopus spp.	(•) Yes ( ) No ( ) Not Known	Several Octopus species have been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway. Some initial research in Western Australia on ranching, grow-out, breeding and feeding has met with some success but significant constraints remain to be addressed.	X

Sepioteuthis spp	(•) Yes ( ) No ( ) Not Known	The Northern and Southern Calamari have been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway.	X
Haliotis scalaris	(•) Yes ( ) No ( ) Not Known	The staircase abalone has been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway.	X
Haliotis cyclobates	(•) Yes ( ) No ( ) Not Known	The whirling abalone has been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway.	X

Haliotis rubra conicopora	(•) Yes ( ) No ( ) Not Known	The Brownlip Abalone have been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway.	X
Haliotis asinina	(•) Yes ( ) No ( ) Not Known	The Tropical Abalone has been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as a species with potential for Aquaculture Development and an audit of past research is underway.	X
Pecten fumatus	(•) Yes ( ) No ( ) Not Known	The Commercial Scallop have been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway.	X

Equichlamys bifrons	(•) Yes ( ) No ( ) Not Known	The queen scallop has been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as a species with potential for Aquaculture Development and an audit of past research is underway.	X
Mimachlamys asperrima	(•) Yes ( ) No ( ) Not Known	The doughboy scallop has been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as a species with potential for Aquaculture Development and an audit of past research is underway.	X
Amusium spp	( ) Yes ( ) No ( ) Not Known	Saucer scallops have been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway.	X

Holothuria lessoni	(•) Yes ( ) No ( ) Not Known	The Golden Sandfish (sea cucumber) has been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway. This species is considered to be a high value sea cucumber for export and my be cultured in a similar way to H. scabra which is already propagated in Australia.	X
Centrostephanus rodgersii	(•) Yes ( ) No ( ) Not Known	This sea urchin which can be a pest in some marine reefs has been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway.	X
Tripneustes gratilla	(•) Yes ( ) No ( ) Not Known	This sea urchin has been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway.	X

Perinereis vallata	(•) Yes ( ) No ( ) Not Known	This temperate marine polychaete has been the subject of research in South Australia as a candidate for baitworm culture. Plans are underway to commercialise its culture in South Australia. The species has been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway.	X
Perinereis helleri	(•) Yes ( ) No ( ) Not Known	The tropical marine polychaete has been the subjecti of research in Queensland as a candidate species for bioremediation. Research has shown that significant improvements in the efficiency of polychaete assisted sand filters in the treatment of waste water from prawn farming. Commercialisation is undeway. The species has been identified by the Fisheries Research Development Corporation (FRDC) sub-program on New and Emerging Aquaculture Opportunities (NEAO) as species with potential for Aquaculture Development and an audit of past research is underway.	X
Ecklonia spp	(•) Yes ( ) No ( ) Not Known	Macroalgae aquaculture has been clearly identified as having potential in Australia due to our wide diversity of endemic species and extensive coastline. Currently marine bases seaweed aquaculture is not permitted and there is limited land based culture. It is considered that Australia's opportunity lies primarily in low volume production of high value product. Potential applications include bioremediation, Integrated multi trophic aquaculture (IMTA), bioactives, neutraceuticals, cosmeceuticals, pharmaceuticals,. seafood and animals feeds. There are several published studies reviewing these opportunities in Australia and include this species among many potential culturable species.	X

Gelidium spp	(•) Yes ( ) No ( ) Not Known	Macroalgae aquaculture has been clearly identified as having potential in Australia due to our wide diversity of endemic species and extensive coastline. Currently marine bases seaweed aquaculture is not permitted and there is limited land based culture. It is considered that Australia's opportunity lies primarily in low volume production of high value product. Potential applications include bioremediation, Integrated multi trophic aquaculture (IMTA), bioactives, neutraceuticals, cosmeceuticals, pharmaceuticals,. seafood and animals feeds. There are several published studies reviewing these opportunities in Australia and include this species among many potential culturable species.	X
Solieria spp	(•) Yes ( ) No ( ) Not Known	Macroalgae aquaculture has been clearly identified as having potential in Australia due to our wide diversity of endemic species and extensive coastline. Currently marine bases seaweed aquaculture is not permitted and there is limited land based culture. It is considered that Australia's opportunity lies primarily in low volume production of high value product. Potential applications include bioremediation, Integrated multi trophic aquaculture (IMTA), bioactives, neutraceuticals, cosmeceuticals, pharmaceuticals,. seafood and animals feeds. There are several published studies reviewing these opportunities in Australia and include this species among many potential culturable species.	X
Cystophora spp	(•) Yes ( ) No ( ) Not Known	Macroalgae aquaculture has been clearly identified as having potential in Australia due to our wide diversity of endemic species and extensive coastline. Currently marine bases seaweed aquaculture is not permitted and there is limited land based culture. It is considered that Australia's opportunity lies primarily in low volume production of high value product. Potential applications include bioremediation, Integrated multi trophic aquaculture (IMTA), bioactives, neutraceuticals, cosmeceuticals, pharmaceuticals,. seafood and animals feeds. There are several published studies reviewing these opportunities in Australia and include this species among many potential culturable species.	X

Undaria spp	○ Yes ◉ No ○ Not Known	Macroalgae aquaculture has been clearly identified as having potential in Australia due to our wide diversity of endemic species and extensive coastline. Currently marine bases seaweed aquaculture is not permitted and there is limited land based culture. It is considered that Australia's opportunity lies primarily in low volume production of high value product. Potential applications include bioremediation, Integrated multi trophic aquaculture (IMTA), bioactives, neutraceuticals, cosmeceuticals, pharmaceuticals,. seafood and animals feeds. There are several published studies reviewing these opportunities in Australia and include this species among many potential culturable species.	X
Grateloupia spp	○ Yes ◉ No ○ Not Known	Macroalgae aquaculture has been clearly identified as having potential in Australia due to our wide diversity of endemic species and extensive coastline. Currently marine bases seaweed aquaculture is not permitted and there is limited land based culture. It is considered that Australia's opportunity lies primarily in low volume production of high value product. Potential applications include bioremediation, Integrated multi trophic aquaculture (IMTA), bioactives, neutraceuticals, cosmeceuticals, pharmaceuticals,. seafood and animals feeds. There are several published studies reviewing these opportunities in Australia and include this species among many potential culturable species.	X
Macrocystis spp	◉ Yes ○ No ○ Not Known	Macroalgae aquaculture has been clearly identified as having potential in Australia due to our wide diversity of endemic species and extensive coastline. Currently marine bases seaweed aquaculture is not permitted and there is limited land based culture. It is considered that Australia's opportunity lies primarily in low volume production of high value product. Potential applications include bioremediation, Integrated multi trophic aquaculture (IMTA), bioactives, neutraceuticals, cosmeceuticals, pharmaceuticals,. seafood and animals feeds. There are several published studies reviewing these opportunities in Australia and include this species among many potential culturable species.	X

Lessonia spp	(•) Yes ( ) No ( ) Not Known	Macroalgae aquaculture has been clearly identified as having potential in Australia due to our wide diversity of endemic species and extensive coastline. Currently marine bases seaweed aquaculture is not permitted and there is limited land based culture. It is considered that Australia's opportunity lies primarily in low volume production of high value product. Potential applications include bioremediation, Integrated multi trophic aquaculture (IMTA), bioactives, neutraceuticals, cosmeceuticals, pharmaceuticals,. seafood and animals feeds. There are several published studies reviewing these opportunities in Australia and include this species among many potential culturable species.	X
Sargassum spp	(•) Yes ( ) No ( ) Not Known	Macroalgae aquaculture has been clearly identified as having potential in Australia due to our wide diversity of endemic species and extensive coastline. Currently marine bases seaweed aquaculture is not permitted and there is limited land based culture. It is considered that Australia's opportunity lies primarily in low volume production of high value product. Potential applications include bioremediation, Integrated multi trophic aquaculture (IMTA), bioactives, neutraceuticals, cosmeceuticals, pharmaceuticals,. seafood and animals feeds. There are several published studies reviewing these opportunities in Australia and include this species among many potential culturable species.	X
Seirococcaceae	(•) Yes ( ) No ( ) Not Known	Macroalgae aquaculture has been clearly identified as having potential in Australia due to our wide diversity of endemic species and extensive coastline. Currently marine bases seaweed aquaculture is not permitted and there is limited land based culture. It is considered that Australia's opportunity lies primarily in low volume production of high value product. Potential applications include bioremediation, Integrated multi trophic aquaculture (IMTA), bioactives, neutraceuticals, cosmeceuticals, pharmaceuticals,. seafood and animals feeds. There are several published studies reviewing these opportunities in Australia and include this species among many potential culturable species.	X

Ulvaceae	(•) Yes ( ) No ( ) Not Known	Macroalgae aquaculture has been clearly identified as having potential in Australia due to our wide diversity of endemic species and extensive coastline. Currently marine bases seaweed aquaculture is not permitted and there is limited land based culture. It is considered that Australia's opportunity lies primarily in low volume production of high value product. Potential applications include bioremediation, Integrated multi trophic aquaculture (IMTA), bioactives, neutraceuticals, cosmeceuticals, pharmaceuticals,. seafood and animals feeds. There are several published studies reviewing these opportunities in Australia and include this species among many potential culturable species.	X

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

Add Row

Species	Genetic alteration of exchanged material **Mark all that apply**	Details of transfer or exchange	Type of genetic material exchanged **Mark all that apply**	Country or countries involved with exchange **Hold CTRL button to select more than one country**	Comments ***Please add main purpose or objective of the exchange and main sources of information***	
Lates calcarifer	☒ No deliberate genetic alteration ☐ Traditional selective breeding ☐ Hybrids ☐ Triploids and other polyploids ☐ Mono-sex production ☐ Other	☐ Import ☒ Export	☐ DNA ☐ Genes ☐ Gametes ☐ Tissues ☐ Embryos ☐ Living specimens ☐ Other	Belarus Belgium Belize Benin Bhutan Bolivia (Plurinational S Bosnia and Herzegovi Brazil Brunei Darussalam Bulgaria Burkina Faso Burundi Cabo Verde Cambodia Cameroon Canada Central African Repub	Commercial hatcheries are selling stock overseas as simple commercial transactions. These shipments represents a good spread of genetic diversity of stocks across the country. Information provided by commercial hatcheries.	X
Maccullochella peelii	☒ No deliberate genetic alteration ☐ Traditional selective breeding ☐ Hybrids ☐ Triploids and other polyploids ☐ Mono-sex production ☐ Other	☐ Import ☒ Export	☐ DNA ☐ Genes ☐ Gametes ☐ Tissues ☐ Embryos ☒ Living specimens ☐ Other	Kazakhstan Kenya Kiribati Kuwait Kyrgyzstan Lao People's Democra Latvia Lebanon Lesotho Liberia Libya Lithuania Luxembourg Madagascar Malawi Malaysia Maldives	These are commercial exports of live fingerlings of Murray Cod for research or aquaculture. It is believed that breeding populations of this species have subsequently been established, at least in China.	X

Crassostrea gigas	☐ No deliberate genetic alteration ☒ Traditional selective breeding ☐ Hybrids ☐ Triploids and other polyploids ☐ Mono-sex production ☐ Other	☐ Import ☒ Export	☐ DNA ☐ Genes ☐ Gametes ☐ Tissues ☐ Embryos ☒ Living specimens ☐ Other	Guatemala Guinea Guinea-Bissau Guyana Haiti Hungary Iceland India Indonesia Iran (Islamic Republic Iraq Ireland Israel Italy Jamaica Japan Jordan	Commercial purposes. Spat sold by commercial hatcheries to Japanese partners.	X
Bidyanus bidyanus	☒ No deliberate genetic alteration ☐ Traditional selective breeding ☐ Hybrids ☐ Triploids and other polyploids ☐ Mono-sex production ☐ Other	☐ Import ☒ Export	☐ DNA ☐ Genes ☐ Gametes ☐ Tissues ☐ Embryos ☒ Living specimens ☐ Other	Bhutan Bolivia (Plurinational S Bosnia and Herzegovi Brazil Brunei Darussalam Bulgaria Burkina Faso Burundi Cabo Verde Cambodia Cameroon Canada Central African Repub Chad Chile China Colombia	These are commercial exports of live fingerlings of Silver Perch for research or aquaculture. Breeding populations of this species may have subsequently been established in the receiving countries	X
Macquaria ambigua	☐ No deliberate genetic alteration ☐ Traditional selective breeding ☐ Hybrids ☐ Triploids and other polyploids ☐ Mono-sex production ☐ Other	☐ Import ☐ Export	☐ DNA ☐ Genes ☐ Gametes ☐ Tissues ☐ Embryos ☐ Living specimens ☐ Other	Trinidad and Tobago Tunisia Turkey Turkmenistan Tuvalu Uganda Ukraine United Arab Emirates United Kingdom United Republic of Ta United States of Amer Uruguay Uzbekistan Vanuatu Venezuela (Bolivarian Viet Nam Yemen	These are commercial exports of live fingerlings of Golden Perch for research or aquaculture. Breeding populations of this species may have subsequently been established in the receiving countries	X

Oxyeleotris lineolata	☒ No deliberate genetic alteration ☐ Traditional selective breeding ☐ Hybrids ☐ Triploids and other polyploids ☐ Mono-sex production ☐ Other	☐ Import ☒ Export	☐ DNA ☐ Genes ☐ Gametes ☐ Tissues ☐ Embryos ☒ Living specimens ☐ Other	Bhutan Bolivia (Plurinational S Bosnia and Herzegovi Brazil Brunei Darussalam Bulgaria Burkina Faso Burundi Cabo Verde Cambodia Cameroon Canada Central African Repub Chad Chile China Colombia	These are commercial exports of live fingerlings of Sleepy Cod for research or aquaculture. Breeding populations of this species may have subsequently been established in the receiving countries	X
Scortum barcoo	☒ No deliberate genetic alteration ☐ Traditional selective breeding ☐ Hybrids ☐ Triploids and other polyploids ☐ Mono-sex production ☐ Other	☐ Import ☒ Export	☐ DNA ☐ Genes ☐ Gametes ☐ Tissues ☐ Embryos ☒ Living specimens ☐ Other	Republic of Moldova Romania Russian Federation Rwanda Saint Kitts and Nevis Saint Lucia Saint Vincent and the Samoa San Marino Sao Tome and Princip Saudi Arabia Senegal Serbia Seychelles Sierra Leone Singapore Slovakia	These are commercial exports of live fingerlings of Barcoo Grunter for research or aquaculture. Breeding populations of this species may have subsequently been established in the receiving countries	X
Salmo trutta	☒ No deliberate genetic alteration ☐ Traditional selective breeding ☐ Hybrids ☐ Triploids and other polyploids ☐ Mono-sex production ☐ Other	☐ Import ☒ Export	☐ DNA ☐ Genes ☒ Gametes ☐ Tissues ☐ Embryos ☐ Living specimens ☐ Other	Afghanistan Albania Algeria Andorra Angola Antigua and Barbuda Argentina Armenia Australia Austria Azerbaijan Bahamas Bahrain Bangladesh Barbados Belarus Belgium	Records show shipment of ova of Rainbow Trout which would almost certainly be fertilised.	X

Salmo salar	☒ No deliberate genetic alteration ☐ Traditional selective breeding ☐ Hybrids ☐ Triploids and other polyploids ☐ Mono-sex production ☐ Other	☐ Import ☒ Export	☐ DNA ☐ Genes ☒ Gametes ☐ Tissues ☐ Embryos ☐ Living specimens ☐ Other	Afghanistan Albania Algeria Andorra Angola Antigua and Barbuda Argentina Armenia Australia Austria Azerbaijan Bahamas Bahrain Bangladesh Barbados Belarus Belgium	Records show shipment of ova of Atlantic salmon which would almost certainly be fertilised.	X
Anguilla australis	☐ No deliberate genetic alteration ☐ Traditional selective breeding ☐ Hybrids ☐ Triploids and other polyploids ☐ Mono-sex production ☐ Other	☐ Import ☒ Export	☐ DNA ☐ Genes ☐ Gametes ☐ Tissues ☐ Embryos ☐ Living specimens ☐ Other	Cameroon Canada Central African Repub Chad Chile China Colombia Comoros Cook Islands Costa Rica Côte d'Ivoire Croatia Cuba Cyprus Czech Republic Republic of Korea Democratic Republic	Short finned eel is recorded as being shipped to Republic of Korea in 2014 and 2016, fate unknown.	X

Wild relatives of farmed aquatic species

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

Add Row

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

Species	Use *(mark all that apply)*	Comments	
Lateolabrax japonicus	☒ Capture fisheries ☒ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Japanese seabass	X
Rutilus rutilus	☐ Capture fisheries ☒ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Roach (introduced)	X
Chanos chanos	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Milkfish	X

Seriola dumerili	☒ Capture fisheries ☒ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Amberjack	X
Seriola rivoliana	☒ Capture fisheries ☒ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Highfin Amberjack	X
Oreochromis mossambicus	☐ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☒ Other (specify in comments)	Mozambique Tilapia (introduced). An invasive species in QLD, declared a noxious pest	X
Tilapia zillii	☐ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☒ Other (specify in comments)	Redbelly Tilapia (introduced). An invasive species in QLD, declared a noxious pest	X

Tinca tinca	☐ Capture fisheries ☒ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Tench (introduced)	X
Synagrops analis	☐ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Threespine seabass. Non-commercial	X
Synagrops japonicus	☐ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Blackmouth splitfin. Non commercial.	X
Synagrops philippinensis	☐ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Sharptooth seabass also known as Parascombrops philippinensis. Non commercial	X

Synagrops serratospinosus	☐ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Roughspine seabass also known as Parascombrops serratospinosus. Non commercial.	X
Lutjanus erythropterus	☐ Capture fisheries ☒ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Crimson snapper	X
Liza macrolepis	☒ Capture fisheries ☒ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Largescale mullet	X
Liza melinoptera	☐ Capture fisheries ☒ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Otomebora mullet	X

Chelon planiceps	☒ Capture fisheries ☒ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Tade Gray mullet	X
Coryphaena equiselis	☐ Capture fisheries ☒ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Tade Gray mullet	X
Coryphaena hippurus	☒ Capture fisheries ☒ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Common dolphinfish	X
Coryphaenoides dossenus	☐ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Humpback whiptail	X

Coryphaenoides fernandezianus	☐ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Fernandez whiptail	X
Coryphaenoides filicauda	☐ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Grenadier	X
Coryphaenoides grahami	☐ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Graham's whiptail	X
Coryphaenoides mcmillani	☐ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	McMillan's whiptail	X

Coryphaenoides murrayi	☐ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Abyssal rattail	X
Coryphaenoides rudis	☐ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Rudis rattail	X
Coryphaenoides serrulatus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Serrulate whiptail	X
Coryphaenoides striaturus	☐ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Striate whiptail	X

Coryphaenoides subserrulatus	☐ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Longrayed whiptail	X
Prototroctes maraena	☐ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☒ Other (specify in comments)	Australian Grayling (endemic). Formerly a recreational fishery but now protected under Environmental Protection and Biodiversity (EPBC) Act.	X
Trachinotus blochii	☒ Capture fisheries ☒ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Snubnose pompano	X
Trachinotus anak	☐ Capture fisheries ☒ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Oyster pompano	X

Trachinotus baillonii	☐ Capture fisheries ☒ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Small spotted dart	X
Trachinotus botla	☐ Capture fisheries ☒ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Largespotted dart	X
Trachinotus coppingeri	☐ Capture fisheries ☒ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Swallowtail dart	X
Lutjanus johnii	☐ Capture fisheries ☒ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Swallowtail dart	X

Lutjanus monostigma	☐ Capture fisheries ☒ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	One spot snapper	X
Lutjanus rivulatus	☐ Capture fisheries ☒ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Blubberlip snapper	X
Lutjanus sebae	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Emperor red snapper	X
Lutjanus argentimaculatus	☐ Capture fisheries ☒ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Mangrove red snapper	X

Lutjanus adetii	☐ Capture fisheries ☒ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Yellow banded snapper	X
Lutjanus biguttatus	☒ Capture fisheries ☒ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Two spot banded snapper	X
Lutjanus bitaeniatus	☐ Capture fisheries ☒ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Indonesian snapper	X
Lutjanus bohar	☒ Capture fisheries ☒ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Two spot red snapper	X

Lutjanus boutton	☐ Capture fisheries ☒ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Moluccan snapper	X
Lutjanus carponotatus	☐ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Spanish flag snapper	X
Lutjanus decussatus	☒ Capture fisheries ☒ Recreational fishery ☒ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Checkered snapper	X
Capture fisheries	☒ Capture fisheries ☒ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Blackspot snapper	X

Lutjanus fulviflamma	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Dory snapper	X
Lutjanus fulviflamma	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Blacktail snapper	X
Lutjanus gibbus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Humpback red snapper	X
Lutjanus kasmira	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Common bluestripe snapper	X

Lutjanus lemniscatus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Yellow streaked snapper	X
Lutjanus lutjanus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Bigeye snapper	X
Lutjanus malabaricus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Saddletail Snapper	X
Lutjanus quinquelineatus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Five lined snapper	X

Lutjanus rufolineatus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Yellow lined snapper	X
Lutjanus russelli	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Russell's snapper	X
Lutjanus semicinctus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Black banded snapper	X
Lutjanus timoriensis	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Timor snapper	X

Lutjanus vitta	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Brown stripe red snapper	X
Cromileptes altivelis	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Humpback Grouper	X
Epinephelus bleekeri	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Duskytail Grouper	X
Epinephelides armatus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Breaksea Cod (Endemic)	X

Epinephelus amblycephalus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Banded Grouper	X
Epinephelus areolatus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Areolate Grouper	X
Epinephelus bilobatus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Twinspot Grouper (Endemic)	X
Epinephelus coeruleopunctatus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	White Spotted Grouper	X

Epinephelus coioides	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Orange Spotted Grouper	X
Epinephelus corallicola	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Coral Grouper	X
Epinephelus cyanopodus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Speckled Blue Grouper	X
Epinephelus daemelii	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Saddletail Grouper	X

Epinephelus darwinensis	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Darwin Grouper	X
Epinephelus epistictus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Dotted Grouper	X
Epinephelus fasciatus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Blacktip Grouper	X
Epinephelus fuscoguttatus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Brown Marbled Grouper	X

Epinephelus heniochus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Bridled Grouper	X
Epinephelus hexagonatus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Star spotted Grouper	X
Epinephelus howlandi	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Blacksaddle Grouper	X
Epinephelus latifasciatus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Striped Grouper	X

Epinephelus macrospilos	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Snubnose Grouper	X
Epinephelus maculatus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Highfin Grouper	X
Epinephelus magniscuttis	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Speckled Grouper	X
Epinephelus malabaricus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Malabar Grouper	X

Epinephelus melanostigma	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	One Blotch Grouper	X
Epinephelus merra	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Honeycomb Grouper	X
Epinephelus miliaris	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Netfin Grouper	X
Epinephelus morrhua	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Comet Grouper	X

Epinephelus multinotatus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	White Blotched Grouper	X
Epinephelus ongus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	White Streaked Grouper	X
Epinephelus poecilonotus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Dot-Dash Grouper	X
Epinephelus polyphekadion	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Camouflage Grouper	X

Epinephelus polystigma	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	White Dotted Grouper	X
Epinephelus quoyanus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Longfin Grouper	X
Epinephelus radiatus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Oblique-Banded Grouper	X
Epinephelus retouti	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Red Tipped Grouper	X

Epinephelus rivulatus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Half-Moon Grouper	X
Epinephelus sexfasciatus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Sixbar Grouper	X
Epinephelus spilotoceps	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Four Saddle Grouper	X
Epinephelus stictus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Black Dotted Grouper	X

Epinephelus tauvina	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Greasy Grouper	X
Epinephelus timorensis	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Yellow-Spotted Grouper	X
Epinephelus trophis	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Plump Grouper	X
Epinephelus tukula	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Potato Grouper	X

Epinephelus undulatostriatus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Maori Grouper (Endemic)	X
Siganus argenteus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Streamlined Spinefoot	X
Siganus canaliculatus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	White spotted Spinefoot	X
Siganus corallinus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Blue spotted Spinefoot	X

Siganus doliatus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Barred Spinefoot	X
Siganus fuscescens	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Black Rabbitfish	X
Siganus guttatus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Orange Spotted Spinefoot	X
Siganus javus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Streaked Spinefoot	X

Siganus lineatus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Golden Lined Spinefoot	X
Siganus puellus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Masked Spinefoot	X
Siganus punctatissimus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Peppered Spinefoot	X
Siganus punctatus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Gold Spotted Spinefoot	X

Siganus spinus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Little Spinefoot	X
Siganus trispilos	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Threeblotched Rabbitfish	X
Siganus unimaculatus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Blotched Foxface	X
Siganus vermiculatus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Vermiculated Spinefoot	X

Siganus virgatus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Barhead Spinefoot	X
Siganus vulpinus	☐ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Foxface	X
Dentex spariformis	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☒ Research and develpment ☐ Other (specify in comments)	Yellowback Bream - commercial use, some species are being used experimentally	X
Hemichromis bimaculatus	☐ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Jewelfish/Jewel Cichlid (Introduced)	X

Psettodes erumei	☐ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Australian Halibut	X
Misgurnus anguillicaudatus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Pond Loach (Introduced)	X
Polydactylus macrochir	☐ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	King Threadfin	X
Polydactylus multiradiatus	☐ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Australian Threadfin	X

Polydactylus nigripinnis	☐ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Blackfin Threadfin	X
Polydactylus plebeius	☐ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Striped Threadfin	X
Oxyeleotris aruensis	☐ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Aru Gudgeon	X
Oxyeleotris fimbriata	☐ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Fimbriate Gudgeon	X

Oxyeleotris lineolata	☐ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Sleepy Cod	X
Oxyeleotris nullipora	☐ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Poreless Gudgeon	X
Oxyeleotris selheimi	☐ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Giant Gudgeon	X
Caranx bucculentus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Bluespotted Trevally	X

Caranx heberi	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Blacktip Trevally	X
Caranx ignobilis	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Giant Trevally	X
Caranx lugubris	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Blackjack	X
Caranx melampygus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Bluefin Trevally	X

Caranx papuensis	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Brassy Trevally	X
Caranx sexfasciatus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Bigeye Trevally	X
Caranx tille	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Tille Trevally	X
Gnathanodon speciosus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Golden Trevally	X

Lethrinus amboinensis	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Ambon Emperor	X
Lethrinus atkinsoni	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Pacific Yellowtail Emperor	X
Lethrinus erythracanthus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Orange Spotted Emperor	X
Lethrinus erythropterus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Longfin Emperor	X

Lethrinus genivittatus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Longspine Emperor	X
Lethrinus harak	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Thumbprint Emperor	X
Lethrinus laticaudis	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Grass Emperor	X
Lethrinus lentjan	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Pink Ear Emperor	X

Lethrinus microdon	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Smalltooth Emperor	X
Lethrinus miniatus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Trumpet Emperor	X
Lethrinus nebulosus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Spangled Emperor	X
Lethrinus obsoletus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Orange Striped Emperor	X

Lethrinus olivaceus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Longface Emperor	X
Lethrinus ornatus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Ornate Emperor	X
Lethrinus ravus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Drab Emperor	X
Lethrinus rubrioperculatus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Spot cheek Emperor	X

Lethrinus semicinctus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Black Botch Emperor	X
Lethrinus variegatus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Slender Emperor	X
Lethrinus xanthochilus	☒ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Yellowlip Emperor	X
Haematococcus pluvialis	☐ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☒ Other (specify in comments)	Freshwater species of Chlorophyta - used for antioxidants	X

Venerupis largillierti	☐ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☐ Other (specify in comments)	Saltwater Clam	X
Porphyra columbina	☐ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☒ Other (specify in comments)	Red algae species - food source	X
Macrocystis pyrifera	☐ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☒ Other (specify in comments)	Giant Kelp - Used in the production of food and cosmetics	X
Caulerpa spp	☐ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☒ Research and develpment ☒ Other (specify in comments)	Caulerpa racemosa - Sea Grapes - Can be used as mild anesthetics, also a food source in some places.	X

Tegillarca granosa	☐ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☒ Research and develpment ☒ Other (specify in comments)	Blood Cockle - Used for Red haemoglobin liquid in tissues	X
Eucheuma denticulatum	☐ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☒ Other (specify in comments)	Spiny Eucheuma - Red algae used as a food source	X
Kappaphycus alvarezii	☐ Capture fisheries ☐ Recreational fishery ☐ Aquaria ☐ Biological control ☐ Research and develpment ☒ Other (specify in comments)	Elkhorn Sea moss - used as a food source	X

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

Add Row

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

Species	Details of transfer or exchange ***mark all that apply***	Type of genetic material exchanged	Country **Hold CTRL button to select more than one country**	Comments ***main sources of information, if the transfer was legal or not***	
awaiting list from AQIS	☐ Import ☐ Export	☐ Tissues ☐ Gametes ☐ DNA ☐ Genes ☐ Embryos ☐ Living specimens ☐ Other	Afghanistan Albania Algeria Andorra Angola Antigua and Barbuda Argentina Armenia Australia Austria Azerbaijan Bahamas Bahrain Bangladesh Barbados Belarus		X

14. Please fill in table 1.2

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

Add Row

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

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

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

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

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

Driver impacting aquaculture	Effect on AqGR ***Mark appropriate box***	Comments ***List examples or other relevant information***
Human population increase	◯ Strongly positive ◯ Positive ◉ Negative ◯ Strongly negative ◯ No effect ◯ Unknown	Australia is relatively unpopulated country/continent with a population of only 24.5 million growing at ~1.5% per annum. This population across a landmass of 7.7million km^2 gives it one of the lowest population densities in the world. Whilst most of the population is coastal, human population impact on the marine environment is relatively minor and localised. With 66-70% of Australian seafood imported we are a net importer of seafood and thus the demand for seafood associated with a rising population does not have a strong effect on domestic fishing rates. Also with a very extensive coastline extending over 25,000km the population pressure on aquatic resources is relatively low and thus anthropogenic effects on genetic resources, such as population bottlenecks, related to population pressure are relatively minimal although there are localised impacts through habitat degradation and pollution such as agricultural run off.
Increased wealth and demand for fish	◯ Strongly positive ◯ Positive ◯ Negative ◯ Strongly negative ◉ No effect ◯ Unknown	Per capita seafood consumption (22g.day-1 in 2011-12) increased 45% from 1995 to 2011-12 . This growth is set to continue, with a further growth of 3.5% predicted from 2015-16 to 2012, fuelled by increases in disposable income and health consciousness, coupled with rising awareness about the health benefits of certain types of fish and seafood. However, for the reasons stated above the impacts of increasing wealth and demand for fish have not and are not expected to significantly impact on pressure on Australia's AqGR. There are likely to be some examples of both negative impacts (associated with overfishing or heavy recreational fishing) and positive associated with freedom to make choice associated with ethical and sustainability facilitiated by lack of concern over food security. Overall these effects may be broadly neutral.
Governance (ability of government, industry and the public to work together in managing resources)	◯ Strongly positive ◉ Positive ◯ Negative ◯ Strongly negative ◯ No effect ◯ Unknown	Australia has very wide ranging and strong environmental regulations that control impacts on the aquatic environment. Australia also has a strong R&D community focussed on aquaculture and fisheries development and characterisation of AqGR. A reflection of this is the state of Australia's wild catch fisheries. Of the 245 fished stock which have been classified, 184 (75%) are considered to be fished sustainable or are recovering whilst only 17 (7%) are considered overfished.

Driver impacting aquaculture	Effect on AqGR ***Mark appropriate box***	Comments ***List examples or other relevant information***
Climate change	○ Strongly positive ○ Positive ◉ Negative ○ Strongly negative ○ No effect ○ Unknown	Negative examples from Great Barrier Reef (coral bleaching) and Western Australia Roes abalone stocks which suffered a devastating mortality event as a result of a 2011 marine heatwave off the Western Australia coast. A sustained period of elevated sea surface temperatures caused severe mortality (>99.9%), initiating a closure of the fishery to both the commercial and recreational sectors. Attempt to enhance recovery of these populations are constrained by the limits remaining genetic diversity but potentially enhanced by a 'natural selection' for thermal tolerance. Awaiting feedback from Alistair Hobday.
Competition for resources, especially freshwater	○ Strongly positive ○ Positive ◉ Negative ○ Strongly negative ○ No effect ○ Unknown	Due to reasons outlined under human population increase above, competition for resources is relatively lower than it is in more populous countries, particularly in marine environments. However, competition for resources is more intense inland with Australia being a relatively dry country prone to drought and with large demand for water for irrigation of agriculture and horticulture. Major interventions in inland waterways such as with the Murray Darling basin have r(together with other anthropogenic effects such as overfishing) eportedly had significant impact on population sizes and thus genetic diversity of several commercially important inland species such as Murray Cod, Trout Cod and Silver Perch, with management plans in place to attempt to arrest declines and restore these populations in the wild.
Changes in values and ethics of consumers	○ Strongly positive ○ Positive ○ Negative ○ Strongly negative ○ No effect ○ Unknown	In recent decades there has been a strong shift in the Australian community in their environmental and health/nutrition awareness. This is reflected in an increased demand for sustainable food production which impacts aquaculture development significantly given that it is a sector which is developing in an era of increased consumer awareness. This increased consumer awareness is reflected in government legislation and policy which has constrained the pace of aquaculture development and helped ensure sustainability of both aquaculture and fisheries and reduce their potential negative impact on genetic resources.
Other ***Add other drivers as necessary*** Exotic and invasive species Add Row / Remove Row	○ Strongly positive ○ Positive ○ Negative ○ Strongly negative ○ No effect ○ Unknown	The inland waters of Australia have been colonized successfully by 20 species of freshwater fishes introduced to the continent, including 6 poeciliids, 3 salmonids, 4 cyprinids, 5 cichlids, 1 percid and 1 cobitid (Arthingto, 2011). There are also examples of the introduction of marine species. Some negative impacts of these introductions on indigenous genetic resources have been recorded. However, several of our exotic species have also become commercially important, not least two of our major aquaculture species, Atlantic Salmon and Pacific Oysters, who's genetic diversity has been enhanced by management associated with aquaculture. Probably the most impactful feral aquatic species is the Common Carp which has effectively colonised Australia's largest watershed, the Murray-Darling basin. The Common Carp forms up to 90% of fish biomass in parts of the basis and is thought to have played a role in the reduction of populations of several commercially important species in this river system including Murray Cod, Trout Cod and Silver Perch. Considerable R&D investment has been made in mechanisms to control and eradicate Common carp.

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

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

Driver impacting aquaculture	Effect on AqGR ***Mark appropriate box***	Comments ***List examples or other relevant information***
Human population increase	◯ Strongly positive ◯ Positive ◉ Negative ◯ Strongly negative ◯ No effect ◯ Unknown	These impacts are likely to be similar to those for aquaculture species indicated in Q15 above.
Increased wealth and demand for fish	◯ Strongly positive ◯ Positive ◯ Negative ◯ Strongly negative ◉ No effect ◯ Unknown	These impacts are likely to be similar to those for aquaculture species indicated in Q15 above.
Governance (ability of government, industry and the public to work together in managing resources)	◯ Strongly positive ◉ Positive ◯ Negative ◯ Strongly negative ◯ No effect ◯ Unknown	These impacts are likely to be similar to those for aquaculture species indicated in Q15 above.
Climate change	◯ Strongly positive ◯ Positive ◉ Negative ◯ Strongly negative ◯ No effect ◯ Unknown	These impacts are likely to be similar to those for aquaculture species indicated in Q15 above.
Competition for resources, especially freshwater	◯ Strongly positive ◯ Positive ◉ Negative ◯ Strongly negative ◯ No effect ◯ Unknown	These impacts are likely to be similar to those for aquaculture species indicated in Q15 above.

Driver impacting aquaculture	Effect on AqGR ***Mark appropriate box***	Comments ***List examples or other relevant information***
Changes in values and ethics of consumers	○ Strongly positive ◉ Positive ○ Negative ○ Strongly negative ○ No effect ○ Unknown	These impacts are likely to be similar to those for aquaculture species indicated in Q15 above.
Other ***Add other drivers as necessary*** Add Row / Remove Row	○ Strongly positive ○ Positive ○ Negative ○ Strongly negative ○ No effect ○ Unknown	

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

Describe countermeasures

The negative impacts arise from Human population, Climate change, Competition for resources and competition with exotic feral introductions.

Australia has strong environmental regulation that control impacts of human settlement, industry and agriculture on the aquatic environment. However, these rarely drill down to the level of impacts specifically on genetic resources.

Greater awareness of the structure of our aquatic genetic resources can help identify vulnerable stock that could be specifically protected or can help determine the potential consequence of on-going stresses to the environment.

Where species and their genetic resources are known to be threatened by any of these drivers action can be taken to project and enhanced surviving genetic diversity as is occurring for several of our freshwater species including Murray Cod and Silver Perch for which recovery plans exist and is also being attempted with the recovery of the Roe's abalone fishery. Such recovery efforts must be informed by adequate understanding of the genetic structure of surviving populations and genetic components to the recovery plan and can include stock enhancement and restocking. Creation of live and cryopreserved gene banks (the latter currently limited to sperm) can be a useful adjunct to recovery plans.

The impacts of the Climate Change drivers are only just starting to be understood and will likely result in significant changes to the distribution of species which might support the diversification of genetic resources for some species and contraction in others. Clearly it is important to maintain R&D to ensure that changes are recorded and impacts on genetic resources understood.

In the case of feral introductions, these need to be controlled where possible. At present Australia is planning a campaign to reduce or eradicate the exotic Common Carp from the Murray Darling River basin through biological control. Prior to this, measures have already been taken to control spread of feral and invasive exotics such as Common Carp and Tilapia including the prohibition on the movement of live fish and certainly of culturing them. Identifying and promoting markets for invasive pests to encourage their harvest is another option.

The creation of Marine Protected Areas (MPAs) can impact on preserving key elements of aquatic genetic resources but the location and management of these MPAs need to be underpinned by knowledge of AqGR if they are to be effective in conserving these resources, which is often not the case where data are not available.

Biotechnologies

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

Biotechnology	Extent of use	Comments ***main sources of information, important species for which the biotechnology is applied***
Selective breeding	○ Not at all ○ To a minor extent ○ To some extent ◉ To a great extent	Our major aquaculture species by volume and value, with the exception of Southern Bluefin Tuna, are subject to selective breeding which is considered as the core of genetic improvement. This includes four of the five most valuable aquaculture sectors Atlantic Salmon, Pacific & Sydney Rock Oysters, Prawns, Pearl Oysters and Abalone. Most of these programs would be considered close to world's best practice combined selection. The Prawn breeding program suffered a hiatus in 2017 due to an outbreak of WSSV which wiped out the most mature and long running domestication/selection program. The recently concluded
Hybridization	○ Not at all ◉ To a minor extent ○ To some extent ○ To a great extent	Whilst there has been some R&D on hybrids there is only one hybrid in commercial production, the Jade Tiger Abalone which is a hybrid between Greenlip and Blacklip Abalone
Polyploidy (chromosome set manipulation)	○ Not at all ◉ To a minor extent ○ To some extent ○ To a great extent	Some production of Atlantic Salmon and Pacific Oysters is triploid. Whilst precise data are not available production of triploids in these two sectors is less likely to be less than 20%
Monosex production	○ Not at all ○ To a minor extent ◉ To some extent ○ To a great extent	All Atlantic Salmon production, Australia's most valuable aquaculture sector, is all female.
Marker assisted selection	○ Not at all ○ To a minor extent ○ To some extent ○ To a great extent	Whilst there has been some R&D on MAS there are currently no markers being used in commercial selection programs.
Gynogenesis/androgenesis	◉ Not at all ○ To a minor extent ○ To some extent ○ To a great extent	In recent years there has been minimal R&D on chromosome set manipulations other than through triploidy and these techniques are not used in an commercial production and nor are stock derived from gynogens or androgens
Other **Continue adding row as necessary** Genomic selection Add Row | Remove Row	○ Not at all ◉ To a minor extent ○ To some extent ○ To a great extent	Genomic selection has recently been integrated into the Atlantic Salmon breeding program and is currently and element of R&D with a plan to incorporate it into a selection program for the Giant Tiger Prawn.

Other **Continue adding row as necessary**	◯ Not at all ◉ To a minor extent ◯ To some extent ◯ To a great extent	Use of genetic markers (Microsatellites and SNPs) occurs to identify parentage in several selective breeding programs.
Genetic markers for parentage assignment		
Add Row / Remove Row		

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

Drivers that are changing aquatic ecosystems	Effect on AqGR ***mark appropriate box***	Countermeasures and effects
Habitat loss and degradation	○ Strongly positive ○ Positive ◉ Negative ○ Strongly negative ○ No effect ○ Unknown	Note: There is a list of 170+ wild relatives of farmed aquatic species (Q12). It is not feasible to review impacts on all of these species so the answers here are generic to potential impacts on all those listed species). Strong environmental regulation limit the degree of habitat loss and degradation in the current era. Where this has occured (see previous examples in answer to Q 15 & 16) corrective measures can be taken to restore habitats where feasible.
Pollution of waters	○ Strongly positive ○ Positive ◉ Negative ○ Strongly negative ○ No effect ○ Unknown	Again strong environmental regulations limit pollution of waters although pollution events still occur (e.g. report of impacts on the Great Barrier Reef and associated AqGR).
Increased frequency of extreme climatic events and long-term climate change	○ Strongly positive ○ Positive ○ Negative ○ Strongly negative ○ No effect ◉ Unknown	This is covered in the answer to Q15 & 16 (and awaiting response from Alistair Hobday)
Establishment of invasive species	○ Strongly positive ○ Positive ◉ Negative ○ Strongly negative ○ No effect ○ Unknown	This is covered in the answer to Q15 & 16.
Introductions of parasites and pathogens	○ Strongly positive ○ Positive ○ Negative ○ Strongly negative ◉ No effect ○ Unknown	In Australia, there are 49 reportable aquatic diseases (23 for finfish, 13 for molluscs, 11 for crustaceans, 2 for amphibians), 34 of which are exotic (DAWR 2015). Whilst there are examples of impacts of parasites and pathogens affecting wild populations of species that are cultured in Australia there are few if any examples of diseases affecting wild relatives of cultured stocks. One example is the cyprinid herpesvirus 3 (CyHV-3). This virus is being actively considered as a biological control agent to reduce or eradicate populations of Common carp from the Murray Darling River.

Drivers that are changing aquatic ecosystems	Effect on AqGR ***mark appropriate box***	Countermeasures and effects
Impacts of purposeful stocking and escapes from aquaculture	○ Strongly positive ○ Positive ○ Negative ○ Strongly negative ◉ No effect ○ Unknown	There are few if any documented examples of escapes from aquaculture or deliberate stocking events affecting genetic resources of wild stocks although there are likely to have occured on some scale. Countermeasures put in place to prevent such impacts include policies relating to stock enhancement such that impacts on restocking on wild genetic resources is minimized. An example is a policy implemented by the Northern Territory government's policy in response to plans for ranching of sea cucumbers..
Capture fisheries	○ Strongly positive ○ Positive ◉ Negative ○ Strongly negative ○ No effect ○ Unknown	There are likely to be many examples of where capture fisheries have impacted on the genetic diversity of wild relatives of cultured species in Australia through creation of genetic bottlenecks resulting from overfishing and dramatic reductions is sizes of specific populations. The countermeasure to this is effective fisheries management. As indicated in the answer to Q15, of the 245 fished stock which have been classified, 184 (75%) are considered to be fished sustainable or are recovering whilst only 17 (7%) are considered overfished. Whilst Australia's track record in fisheries management still has room for improvement, significant advances have been made reducing the likelihood of overfishing impacting negatively on genetic diversity of affected populations. Look up published example.
Other ***Continue listing other driverst*** Add Row / Remove Row	○ Strongly positive ○ Positive ○ Negative ○ Strongly negative ○ No effect ○ Unknown	

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

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

The specific objectives are as follows:

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

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

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

Please mark appropriate box.

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

Please include any additional information

The current impact of aquaculture and culture based fisheries on aquatic genetic resources is believed to be relatively benign with a few exceptions. Whilst escapes do occur in aquaculture, including from marine cages, the impacts of these escapes (positive or negative) on in situ aquatic resources (the receiving populations, conspecific or otherwise) are relatively minor. Whilst policies and regulation are in place to limit the impacts of aquaculture in the environment, including on AqGR these generally do not require or promote the contribution of aquaculture to in situ conservation of resources.

There are relatively few examples of successful and on-going cases of culture based fisheries in Australia, certainly relative to that in some of our Asian neighbours. Lonregan et al (2013) reviewed the status of marine culture based fisheries which included small releases of Abalone, Barramundi, Sand Whiting and Mulloway and larger releases of Penaeid prawn species and the Black Bream. More recent activities include the stocking of Abalone on artificial reefs in Western Australia and the ranching of sea cucumber (Sandfish) in the Northern Territory. The purpose of these releases is primarily to augment commercial fisheries rather than having conservation objectives per se and thus the impacts on conservation of genetic resources are generally not closely monitored. More recently regional policy governing stock enhancement are based on the principle that culture based fisheries should not impact negatively on in situ genetic resources outlined in Taylor et al, 2004.

Inland culture based fisheries are more focused on conservation and stock recovery including recovery programs for Murray Cod, Trout Cod and Silver Perch. These plans take account, where possible, of in situ genetic structure that requires conserving and the programs are designed to conserve or augment these resources.

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

Please mark appropriate box.

- ◯ To a great extent
- ◯ To a limited extent
- ◯ Not at all
- ◯ Not applicable

Please include any additional information

Australia has a network of marine parks of marine protected areas (MPAs) known as the National Representative System of Marine Protected Areas (NRSMPA). These were legislated and declared in 2013 and include 2.3 million square kilometers of commonwealth waters. These are augmented by further MPAs designated by States and Territories which cover from 5-35% of state controlled waters. These MPAs are multi use areas and are zoned for different levels of activities with the overall objective of preserving marine habitats and biodiversity. Whilst the specific objectives of these reserves do not necessarily focus on genetic resources, the fact that they reduce pressure on the environments from a range of resource users, they do promote the sustainability and in some cases recovery of populations. These MPAs represent one of our most important facilities for in situ conservation of our AqGR.

Management of commercial and recreational fishing are also vitally important facilities for in-situ conservation of our AqGR. As stated in previous sections of the 245 fished stock which have been classified, 184 (75%) are considered to be fished sustainable or are recovering whilst only 17 (7%) are considered overfished. These management plans for our fisheries which are managed and both federal (for commonwealth fisheries) and state level play are key role in the in situ conservation of our AqGR. Further to this some specific species are protected and either cannot be caught or cannot be caught during specific times or at specific stages of their life cycle.

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

Please describe examples

A RECOVERY PLAN
One example of an on-going activity for in-situ conservation is that National Recovery Plan for the Murray Cod (Maccullochella peelii peelii). This plan is supported by the Federal government and all state governments with jurisdiction over the Murray Darling River basin (MDB) to which the fish is endemic. The Murray Cod was a very important species in this large river basin supporting both commercial and recreational fishing. The objectives of this plan include:
1. Determine the distribution, structure and dynamics of Murray Cod populations across the MDB.
2. Manage river flows to enhance recruitment to Murray Cod populations.
3. Undertake risk assessments of threats and evaluate benefits of recovery actions on Murray Cod populations for each Spatial Management Unit
4. Determine the habitat requirements of Murray Cod life stages and populations.
5. Manage the recreational fishery for Murray Cod in a sustainable manner while recognising the social, economic and recreational value of the fishery.
6. Encourage community ownership for Murray Cod conservation.
7. Manage Recovery Plan implementation.

This plan includes a review of knowledge of population genetics and current and future gene flow and identification of any particular genetic units that need preservation.

PROTECTED SPECIES:
An example of how endangered and threatened species are conserved includes species protection. As an example the state of South Australia lists 8 species of species groups of freshwater fish that are protected at all times and a further three species of freshwater crustacean. There are a further 6 species of marine crustaceans that are protected when carrying eggs seasonal protection for abalone, cephalopods and one fish species.

MARINE PARKS
Again using South Australia as an example, in 2012 the State government designated 19 new marine parks for South Australia. This resulted in 2.6 million square kilometres - 44% of the state's waters – to be managed as marine parks. Of this approximately 6% of these waters are fully protected in marine sanctuary zones. These marine parks are designated into four types of zones:

General managed use - no change to existing use, but managed as part of the park. All recreational activities, including fishing, are allowed.

Habitat protection - protects the sea floor. All recreational activities, including fishing, are allowed. Prawn trawling is prohibited from March 2013.

Sanctuary zones -areas of high conservation value set aside for conservation and low-impact recreation. No fishing is allowed in these zones from 1 October 2014, but diving, surfing, swimming etc are welcome.

Restricted access - areas that are off limits to the public (no entry).

Whilst these parks are too young to have yet demonstrated conservation of AqGR (and in any case specific genetic resources are not monitored unless part of a specific research project) it is likely that they will impact upon and contribute to conservation of Australia's AqGR.

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

Objectives of *in situ* conservation	Rank 1=Very Important 10=No importance
Preservation of aquatic genetic diversity	3
Maintain good strains for aquaculture production	7
Meet consumer and market demands	4
To help adapt to impacts of climate change	3
Future breed improvement in aquaculture	7
Please continue listing any other objectives as needed	
Maintain and recover resources for commercial and recreational fishing	2
Add Row / Remove Row	

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

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

Please mark appropriate box

- ○ Yes
- ○ Not yet, but planned to be included
- ◉ No
- ○ Unknown

If yes, please give examples

Whilst in situ conservation of aquatic genetic resources is not usually explicitly listed as an objective of management policy it is often implicit in the policy.

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

Please mark appropriate box

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

Please include any additional details

There is relatively little collection of wild seed or broodstock for aquaculture with the principal exception of Southern Bluefin Tuna aquaculture which remains entirely dependent on the catch quota determined as part of an intergovernmental agreements under the Indian Ocean Tuna Commission. The Australian industry association (Australian Southern Bluefin Tuna Industry Association - ASBTIA) is a keen supporter for conservation of tuna stocks (with the objective of maintaining and improving the catch quota) and supports R&D to understand and assess the viability of the stock.

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

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

Please mark appropriate box

- ○ Yes
- ◉ Not yet, but under development
- ○ No
- ○ Unknown

If yes, please give examples

Again, whilst in situ conservation of aquatic genetic resources is not usually explicitly listed as an objective of fisheries management policy it is often implicit in the policy. There are some examples such as in high value Abalone and Rock Lobster fisheries, where there is some understanding of the genetic structure of wild populations and this information is taken into account, together with many other factors, in the fishing rules setting process.

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

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

Add Row

Aquatic protected area	Effectiveness of conserving Aquatic Genetic Resources	Comments ***provide any additional information***	
National Representative System of Marine Protected Areas (NRSMPA).	○ Very effective ○ Somewhat effective ○ Not effective ◉ Unknown	These were legislated and declared in 2013 and include 2.3 million square kilometers of commonwealth waters. The Marine Parks Act which designates these MPAs does not explicitly listed as an objective of the parks but implicit in the policy. Given that the marine parks do not specifically focus on AqGR the impact of the parks on AqGR are not routinely monitored. In any case the formation of these parks is still relatively recent and thus it is premature to assess their effectiveness in the in situ conservation of AqGR	X
State Marine Protected Areas	○ Very effective ○ Somewhat effective ○ Not effective ◉ Unknown	Australia has 8 states and territories, 7 of which have designated their own state MPAs which do integrate to some extent with the NRSMPA mentioned above. Each state has different strategies with regard to MPAs with the areas covered ranging approximately from 5-35% of state waters but with different areas and zones within areas having different levels of protection. Again, whilst the objectives of these marine parks do not specifically focus on AqGR the impact of the parks on AqGR are not routinely monitored. In any case the formation of these parks are still relatively recent (although somewhat longer than the NRSMPA) and thus it is premature to assess their effectiveness in the in situ conservation of AqGR	X

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

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

The specific objectives are:

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

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

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

Add Row

Species (*include information on subspecies or strain in comments if available*)	Type of use ***Please mark all that apply***	Is the species (or subspecies) threatened or endangered for example in the IUCN Red List, CITES Appendices or national lists? ***Please mark appropriate box***	Comments ***Please list any additional information***	
Australian National Algae Culture Collection (ANACC)	☐ Direct human consumption ☒ Live feed organism ☐ Other	○ Yes ◉ No ○ Unknown	This collection includes over 900 strains of approximately 300 species of marine microalgae. This includes species for direct use in aquaculture (listed in Table 1.1) but also includes representatives of most marine microalgae classes and several freshwater genera, including Cyanobacteria. 100% of these strains have been electronically databased and a high proportion of these have been made available through a publically accessible web database. ANACC is now grouped in CSIRO's National Research Collections Australia (NRCA) which comprises 6 biological collections and the Atlas of Living Australia (ALA). A core research strategy of NRCA is to document and digitise Australia's natural biodiversity including AqGR.	X

Species (*include information on subspecies or strain in comments if available*)	Type of use ***Please mark all that apply***	Is the species (or subspecies) threatened or endangered for example in the IUCN Red List, CITES Appendices or national lists? ***Please mark appropriate box***	Comments ***Please list any additional information***	
Others: Commercial hatcheries, aquaculture farms and research institutions	☒ Direct human consumption ☒ Live feed organism ☒ Other	○ Yes ◉ No ○ Unknown	There are no known collections held by these stakeholders that are for the specific purpose of ex situ conservation of AqGR but collectively these serve some pupose in holding genetic resources. For example a survey was carried out, through the Australian Barramundi Farmers Association, of the genetic resources held in the form of broodstock in commercial hatcheries. This report and the database associated with it provides a valuable resource for the development of a breeding program for the species.	X

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

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

Add Row

Species (include information on subspecies or strain if available in comments)	Users and managers ***List all that apply***	Type of *ex-situ* conservation collection *in vitro* ***mark all that apply***	Facilities where collection is located ***mark all that apply***	Comments ***list all breeds, subspecies of the species and any additional information***	
Salmo salar	Private sector salmon farming.	☒ In vitro collection of gametes ☐ In vitro collextion of embryos ☐ In vitro collection of tissues ☐ Spores ☐ Other	☒ Aquaculture facilities ☐ Research facilities ☐ Universities ☐ Zoos and aquaria ☒ Other	This cryopreserved sperm gene bank retains samples of sperm taken from successive generations of selected salmon from the salmon breeding program	X
There are no other collections of which the authors are aware		☐ In vitro collection of gametes ☐ In vitro collextion of embryos ☐ In vitro collection of tissues ☐ Spores ☐ Other	☐ Aquaculture facilities ☐ Research facilities ☐ Universities ☐ Zoos and aquaria ☐ Other	There are several state herbariums which maintain collections of preserved macroalgae. These collections are mainly for taxonomy purposes and do not have AqGR conservation objectives. Nevertheless there are probably a small number of macroalgal species from which viable spores might be collected	X

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

Objectives of *ex situ* conservation	Rank 1=Very Important 10=No importance
Preservation of aquatic genetic diversity	5
Maintain good strains for aquaculture production	3
Meet consumer and market demands	8
To help adapt to impacts of climate change	5
Future breed improvement in aquaculture	3
Other ***Continue adding row as necessary***	
Add Row / Remove Row	

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

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

The specific objectives are:

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

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

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

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

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

Stakeholders	Role of stakeholder in regards og AqGR ***mark all that apply***	Genetic resource of main interest ***mark all that apply***	Comments ***Please provide any information or explanation of stakeholders' role***
Fish Farmers	☐ Conservation ☒ Production ☐ Feed manufactoring ☒ Breeding ☒ Research ☒ Marketing ☐ Processing ☐ Advocacy ☐ Outreach/Extension ☐ Other (**specify**)	☐ DNA ☒ Stock, breed or variety ☒ Species ☐ Other	The principal interest among fish farmers is in the genetic management and improvement of stocks to enhance performance and productivity.
Fishers	☒ Conservation ☒ Production ☐ Feed manufactoring ☐ Breeding ☒ Research ☐ Marketing ☐ Processing ☒ Advocacy ☐ Outreach/Extension ☐ Other (**specify**)	☐ DNA ☒ Stock, breed or variety ☐ Species ☐ Other	The principal interest among fishers is it sustainable management of stocks representing key fisheries to improve maximum sustainable yield and/or maximum economic yield.

Stakeholders	Role of stakeholder in regards og AqGR ***mark all that apply***	Genetic resource of main interest ***mark all that apply***	Comments ***Please provide any information or explanation of stakeholders' role***
Fish hatchery people	☐ Conservation ☐ Production ☐ Feed manufactoring ☒ Breeding ☒ Research ☒ Marketing ☐ Processing ☐ Advocacy ☐ Outreach/Extension ☐ Other (**specify**)	☐ DNA ☒ Stock, breed or variety ☒ Species ☐ Other	The principal interest of fish hatchery stakeholders is in the supply of the highest quality seed for aquaculture and being able to market their product as differentiated from competing hatcheries.
People involved in marketing	☒ Conservation ☐ Production ☐ Feed manufactoring ☐ Breeding ☐ Research ☒ Marketing ☒ Processing ☐ Advocacy ☐ Outreach/Extension ☐ Other (**specify**)	☐ DNA ☒ Stock, breed or variety ☐ Species ☐ Other	Marketers have little interest in AqGR per se except where it relates to quality or differentiation of product from that of competitors and/or presents a sustainability benefit that can be effectively communicated to consumers.
Government resource managers	☒ Conservation ☒ Production ☐ Feed manufactoring ☐ Breeding ☒ Research ☐ Marketing ☐ Processing ☐ Advocacy ☐ Outreach/Extension ☐ Other (**specify**)	☐ DNA ☒ Stock, breed or variety ☒ Species ☐ Other	The principal interest of resource managers (including fishery resources) is in the conservation of biodiversity and contribution towards sustainable fishery resources and meeting the sometimes conflicting demands of resource users.

Stakeholders	Role of stakeholder in regards og AqGR ***mark all that apply***	Genetic resource of main interest ***mark all that apply***	Comments ***Please provide any information or explanation of stakeholders' role***
Fishing or aquaculture associations	☐ Conservation ☒ Production ☐ Feed manufactoring ☒ Breeding ☒ Research ☐ Marketing ☐ Processing ☒ Advocacy ☐ Outreach/Extension ☐ Other (**specify**)	☐ DNA ☒ Stock, breed or variety ☒ Species ☐ Other	Priorities of the associations reflect those of their stakeholder members with the addition of an advocacy role.
Aquatic protected area managers	☒ Conservation ☐ Production ☐ Feed manufactoring ☐ Breeding ☒ Research ☐ Marketing ☐ Processing ☒ Advocacy ☒ Outreach/Extension ☐ Other (**specify**)	☐ DNA ☐ Stock, breed or variety ☒ Species ☐ Other	The principal interest of MPA managers is in the conservation of biodiversity and contribution towards sustainable fishery resources and meeting the sometimes conflicting demands of resources users.
Policy Makers	☒ Conservation ☒ Production ☐ Feed manufactoring ☐ Breeding ☐ Research ☐ Marketing ☐ Processing ☐ Advocacy ☐ Outreach/Extension ☐ Other (**specify**)	☐ DNA ☐ Stock, breed or variety ☐ Species ☐ Other	The principal interest of policy makers lies on conservation of AqGR with production being a secondary benefit. They also need to ensure that the needs of all key stakeholders are met.

Stakeholders	Role of stakeholder in regards og AqGR ***mark all that apply***	Genetic resource of main interest ***mark all that apply***	Comments ***Please provide any information or explanation of stakeholders' role***
Non-Governmental Organizations	☒ Conservation ☐ Production ☐ Feed manufactoring ☐ Breeding ☐ Research ☐ Marketing ☐ Processing ☒ Advocacy ☐ Outreach/Extension ☐ Other (**specify**)	☐ DNA ☒ Stock, breed or variety ☒ Species ☐ Other	There is a strong representation of environmental NGOs in Australia. Whilst they are rarely focused on specific genetic resources they have a strong interest in conservation and the minimal and/or sustainable exploitation of aquatic resources include AqGR.
Intergovernmental Organizations	☒ Conservation ☒ Production ☐ Feed manufactoring ☐ Breeding ☐ Research ☐ Marketing ☐ Processing ☐ Advocacy ☐ Outreach/Extension ☐ Other (**specify**)	☐ DNA ☒ Stock, breed or variety ☒ Species ☐ Other	The principal interest of Intergovernmental organisations such as the Indian Ocean Tuna Commission lies in the sustainable management of transboundary resources.
Donors	☒ Conservation ☐ Production ☐ Feed manufactoring ☒ Breeding ☒ Research ☐ Marketing ☐ Processing ☒ Advocacy ☐ Outreach/Extension ☐ Other (**specify**)	☒ DNA ☒ Stock, breed or variety ☒ Species ☐ Other	The principal interest of donors lies in conservation and R&D including breeding and development/application of emerging molecular technologies in particular.

Stakeholders	Role of stakeholder in regards og AqGR ***mark all that apply***	Genetic resource of main interest ***mark all that apply***	Comments ***Please provide any information or explanation of stakeholders' role***
Consumers	☒ Conservation ☐ Production ☐ Feed manufactoring ☐ Breeding ☐ Research ☐ Marketing ☐ Processing ☐ Advocacy ☐ Outreach/Extension ☐ Other (**specify**)	☐ DNA ☐ Stock, breed or variety ☒ Species ☐ Other	Consumers primarly interest in AqGR would be in the sustainable management/exploitation of the resource.

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

Whilst aquatic resource management, aquaculture and fishing tends to be a male dominated sector there are no clear delineations of gender roles in Australian aqGR although women are more equally represented among some stakeholders (marketing, R&D, processing) than in others (aquaculture and fishing).

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

Australia has a National Aquaculture Development Strategy for Indigenous Communities in Australia (2001) reflecting the strong interest expressed by many indigenous communities in Aquaculture. Aquaculture is often considered to be in harmony with the lifestyles and skills of the original Australians and well suited to the remote areas they often inhabit. Aboriginals and Torres Strait Islanders have a strong tradition or living in harmony with the natural environments. As such then they could play important roles in the conservation of AqGR although they are unlikely to specifically target genetic resources per se. As an example aboriginal communities have been involved with the management and harvest of ranched sea cucumbers in the Northern Territory which is a project that has a key objective to preserve the genetic diversity of wild stocks. There is also strong indigenous involvement in the farming of crocodiles.

Australia's indigenous people still hold some Native title on lands recognised in Australian law that some Indigenous people continue to hold rights to their land and waters including coastal waters which hold some important AqGR. Native title may include the right to possess and occupy an area to the exclusion of all others, or it may be a set of non-exclusive rights. In tidal and sea areas, only non-exclusive native title can be recognised.

There are a number of Indigenous Protected Areas (IPAs) in Australia including in some marine coastal areas. These are voluntarily dedicated by Indigenous groups on Indigenous owned or managed land or sea country. They are recognised by the Australian Government as an important part of the National Reserve System, protecting the nation's biodiversity (including AqGRs) for the benefit of all Australians. There are currently over 70 dedicated IPAs across 65 million hectares accounting for more than 40% of the National Reserve System's total area.

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

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

The specific objectives are as follows:

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

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

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

Add Row

National legislation, policy and/or mechanism	Date established	Scope ***Select all that apply***	Comments ***Please provide any additional information for example whether it has been effective or not; and main sources of information***	

National legislation, policy and/or mechanism	Date established	Scope ***Select all that apply***	Comments ***Please provide any additional information for example whether it has been effective or not; and main sources of information***	
Environment Protection and Biodiversity Conservation Act 1999	Jan 1, 1999	☐ Genes or molecules only ☐ Aquaculture ☐ Capture fisheries ☒ Conservation ☐ Intellectual property protection ☐ Importation ☐ Trade and commerce ☐ Access and benefit sharing ☐ Other	The EPBC Act contains an extensive regime for the conservation of biodiversity including provisions dealing with: - listing of nationally threatened species and ecological communities, migratory species and marine species - preparing conservation advice and/or national recovery plans and wildlife conservation plans for listed species and additional protection for listed species in Commonwealth areas - identifying key threatening processes and the preparing threat abatement plans for such processes (if required) - invasive species - access to biological resources in Commonwealth areas - import and export of plants and animals (wildlife) and products derived from wildlife - protection and management of World Heritage properties, National and Commonwealth Heritage places, Ramsar wetlands and Commonwealth reserves - establishment of the Australian Whale Sanctuary in Australia's exclusive economic zone The act lists several hundred protected marine species that are protected including 57 families under 24 orders. The Act also provides for the proclamation and management of Commonwealth reserves including marine reserves (marine parks, marine reserves and nature reserves).	X

National legislation, policy and/or mechanism	Date established	Scope ***Select all that apply***	Comments ***Please provide any additional information for example whether it has been effective or not; and main sources of information***	
National Aquaculture Strategy	under development	☐ Genes or molecules only ☐ Aquaculture ☐ Capture fisheries ☐ Conservation ☐ Intellectual property protection ☐ Importation ☐ Trade and commerce ☐ Access and benefit sharing ☐ Other	This national strategy for aquaculture is currently under development. Individual states have specific local policy and legislation ranging from Acts.	X
National Aquaculture Policy Statement	Jan 1, 2003	☐ Genes or molecules only ☒ Aquaculture ☐ Capture fisheries ☐ Conservation ☒ Intellectual property protection ☐ Importation ☒ Trade and commerce ☒ Access and benefit sharing ☐ Other		X
Best practice framework of regulatory arrangements for aquaculture in Australia	feb, 2005	☐ Genes or molecules only ☐ Aquaculture ☐ Capture fisheries ☐ Conservation ☐ Intellectual property protection ☐ Importation ☐ Trade and commerce ☐ Access and benefit sharing ☐ Other	This framework includes a component for risk assessment and management strategies commensurate to the level of risk which will include management of AqGR	X

National legislation, policy and/or mechanism	Date established	Scope ***Select all that apply***	Comments ***Please provide any additional information for example whether it has been effective or not; and main sources of information***	
Fisheries Management Act 1991 (FMA)	Jan 1, 1991	☐ Genes or molecules only ☐ Aquaculture ☒ Capture fisheries ☐ Conservation ☐ Intellectual property protection ☐ Importation ☐ Trade and commerce ☐ Access and benefit sharing ☐ Other	The Commonwealth and the States have shared responsibility for the management of Australia's fisheries resources since Federation in 1901. The Commonwealth has a head of power over 'fisheries in Australian waters beyond territorial limits' , which on current High Court authority is the marine area beyond three nautical miles of the coastal low-water mark (out to 200 nautical miles). The states and territories control waters within territorial limits. The Offshore Constitutional Settlement (OCS - 1979) is the political agreement as a result of which the Commonwealth and the States enacted complementary legislation to assign single jurisdiction for managing each Australian fishery.	X
Fisheries Administration Act	Jan 1, 1991	☐ Genes or molecules only ☐ Aquaculture ☒ Capture fisheries ☒ Conservation ☐ Intellectual property protection ☐ Importation ☐ Trade and commerce ☒ Access and benefit sharing ☐ Other	The act establishes the Australian Fisheries Management Authority which has oversight over fisheries management nationally. The AFMA is required to take a more strategic approach to the setting of total allowable catch and/or effort levels in Commonwealth fisheries, consistent with a world's best practice Commonwealth Harvest Strategy Policy (HSP) that has the objectives of managing fish stocks sustainably and profitably, putting an end to overfishing, and ensuring that currently overfished stocks are rebuilt within reasonable timeframes	X
Fisheries Management Act	Jan 1, 1991	☐ Genes or molecules only ☐ Aquaculture ☒ Capture fisheries ☒ Conservation ☒ Intellectual property protection ☐ Importation ☐ Trade and commerce ☒ Access and benefit sharing ☐ Other	sets out the legislative parts of the fisheries management framework, including the regulation of fisheries, preparation of fisheries management plans, allocation and management of statutory fishing rights and other concessions, determination of allowable catch, fish receival, compliance and foreign fishing controls, cooperation with the States and the Northern Territory, and satisfying international obligations	X

National legislation, policy and/or mechanism	Date established	Scope ***Select all that apply***	Comments ***Please provide any additional information for example whether it has been effective or not; and main sources of information***	
Customs Act	Jan 1, 2001	☐ Genes or molecules only ☐ Aquaculture ☐ Capture fisheries ☐ Conservation ☐ Intellectual property protection ☒ Importation ☒ Trade and commerce ☐ Access and benefit sharing ☐ Other	This act controls the import of AqGR	X
Quarantine Act	Jan 1, 2001	☐ Genes or molecules only ☐ Aquaculture ☐ Capture fisheries ☐ Conservation ☐ Intellectual property protection ☒ Importation ☒ Trade and commerce ☐ Access and benefit sharing ☐ Other	Whilst the main focus of this Act relates to biosecurity, it does impact upon and limit the importation of AqGR.	X
New Directions for Commonwealth Fisheries Management in the 1990s.	Jan 1, 1989	☐ Genes or molecules only ☐ Aquaculture ☒ Capture fisheries ☒ Conservation ☐ Intellectual property protection ☐ Importation ☒ Trade and commerce ☒ Access and benefit sharing ☐ Other	Modern fisheries management policy for Commonwealth fisheries derives substantially from this Policy statement.	X
National Recreational Fishing Policy (1994).	Jan 1, 1994	☐ Genes or molecules only ☐ Aquaculture ☒ Capture fisheries ☐ Conservation ☒ Intellectual property protection ☐ Importation ☐ Trade and commerce ☒ Access and benefit sharing ☐ Other	The policy under which recreational fishing management stuctures are formed.	X

National legislation, policy and/or mechanism	Date established	Scope ***Select all that apply***	Comments ***Please provide any additional information for example whether it has been effective or not; and main sources of information***	
Recreational fishing in Australia – 2011 and beyond: a national industry development strategy (2011)	Jan 1, 2011	☐ Genes or molecules only ☐ Aquaculture ☒ Capture fisheries ☐ Conservation ☒ Intellectual property protection ☐ Importation ☐ Trade and commerce ☒ Access and benefit sharing ☐ Other	This strategy which builds on the implementation of the above policy, promoting regulation of recreational fisheries. Regulations and policies are usually set at State and Territory level.	X
State Marine Park Acts	various	☐ Genes or molecules only ☒ Aquaculture ☒ Capture fisheries ☒ Conservation ☐ Intellectual property protection ☐ Importation ☐ Trade and commerce ☒ Access and benefit sharing ☐ Other	The states and the Northern Territory have their own Marine Park acts which designate or provide for the designation of Marine Protected areas within state territorial limits	X
Policies on stock enhancement	various	☐ Genes or molecules only ☒ Aquaculture ☒ Capture fisheries ☒ Conservation ☐ Intellectual property protection ☐ Importation ☐ Trade and commerce ☒ Access and benefit sharing ☐ Other	Some states and territories have specific policies on stock enhancement (e.g. Northern Territory and Western Australia). These policies make specific reference to impact of activities on genetic resources and seek to limit negative impact on these resources.	X
State and territory legislation on Aquaculture	various	☐ Genes or molecules only ☒ Aquaculture ☐ Capture fisheries ☒ Conservation ☒ Intellectual property protection ☐ Importation ☐ Trade and commerce ☒ Access and benefit sharing ☐ Other	The development of legislation and policy varies from state to state with the more developed states (with correspondingly the largest aquaculture sectors) having Acts including the Marine Farming Planning Act 1995 in Tasmania and the Aquaculture Act in South Australia (2001).	X

National legislation, policy and/or mechanism	Date established	Scope ***Select all that apply***	Comments ***Please provide any additional information for example whether it has been effective or not; and main sources of information***	
The inter-governmental Gene Technology Agreement	11 september 2001	☐ Genes or molecules only ☐ Aquaculture ☐ Capture fisheries ☐ Conservation ☐ Intellectual property protection ☐ Importation ☐ Trade and commerce ☐ Access and benefit sharing ☐ Other	This agreement lead to the National Regulatory Scheme for Genetically Modified Organisms which limits the applications of GMOs. This agreement spawned the National Regulatory Scheme for Genetically Modified Organisms which is administered by the Office of the Gene Technology Regulator.	X
Australia's Biodiversity Conservation Strategy 2010-30	october 2010	☐ Genes or molecules only ☐ Aquaculture ☐ Capture fisheries ☒ Conservation ☐ Intellectual property protection ☐ Importation ☐ Trade and commerce ☐ Access and benefit sharing ☐ Other	This national strategy, endorsed by all Australian governments, represents Australia's National Biodiversity Strategy and Action Plan (https://www.cbd.int/nbsap/) under the Convention of Biological Diversity (https://www.cbd.int/). The Strategy provides a framework for guiding action to conserve biodiversity, including aquatic biodiversity. The first five years of the 2010 Strategy was recently reviewed and all governments have agreed to update the Strategy to meet new and emerging challenges.	X

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

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

A fundemental challenge is that the majority of legislation listed in the response to Q32 does not specifically refer to aquatic genetic resources, focusing on biodiversity at the habitat and species diversity level. Conservation of aquatic resources per se is implied in legislation and its implementation but is rarely explicit, even in legislation and conservation and marine protected areas. As a result there is little if any monitoring of AqGR below the species level other than specific R&D project.

A second gap is federal and state policy on Aquaculture developement which is still under development at the Federal level and has not been developed to the extent of the Fisheries Acts. This contributes to something of a policy vacuum and presents challenges when attempting to regulate specific issues such as AqGR

A second

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

Type of genetic resource (can be species name, DNA, gametes or other descriptor)	Comments ***Please, provide verifiable main sources of information, effectiveness of the restriction, description of type of restriction and for whom does the restriction apply***
DNA	There is no a specific genetic resources protected by law other than GMOs which contain transgenes. Commercial and research use of GMOs regulated at both the federal and state level.
Stock, breed or variety	Unlike for plants there is no legal mechanism (such as plant breeders rights) to protect access to breeds or varieties. Wild stock are protected under fisheries management regulations where they relate to specific fisheries.
Species	The following farmed aquatic species and their wild relatives are protected due to conservation status within the EPBC: Prototoctes maraena (Australian Grayling), Maccullochella peelii (Murray Cod), Maccullochella macquariensis (Trout Cod), Bidyanus bidyanus (Silver Perch), Thunnus maccoyii (Southern Bluefin Tuna), Epinephelus daemelii (Black Rockcod). Several of these species have recovery plans in place to rebuild vulnerable and endangered stocks. These exotic invasive feral pest species are projected by law and it is illegal to be caught in possession of live specimens: Common Carp (Cyprinus carpio); Mozzambique tilapia (Oreochromis mossambicus), Zille's cichlid (Tilapia zillii); Spotted tilapia (Tilapia mariae)
Other **Continue adding row as necessary** Add Row | Remove Row	

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

Add Row

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

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

Obstacles to accessing aquatic genetic resources	Please describe type of genetic resource ***mark all that apply***	Comments ***please include additional information as needed***
Intellectual property protection	☐ DNA ☐ Stock, breed or variety ☐ Species ☐ Other	n/a due to national law restrictions
National laws of your country	☐ DNA ☐ Stock, breed or variety ☒ Species ☐ Other	There is a restrictive list of aquatic species that are permitted to be introduced into Australia which are almost exclusively ornamental fish. Ornamental fish have not been included as AqGR in this report due to the difficulty of data collection. It is very difficult to add new species to the list of permissible species and no species can be imported if it is not included on this list.
National laws of donor country	☐ DNA ☐ Stock, breed or variety ☐ Species ☐ Other	n/a due to national law restrictions
Internationl laws or protocols	☐ DNA ☐ Stock, breed or variety ☐ Species ☐ Other	n/a due to national law restrictions
Too expensive	☐ DNA ☐ Stock, breed or variety ☐ Species ☐ Other	n/a due to national law restrictions
Material transfer agreements required	☐ DNA ☐ Stock, breed or variety ☐ Species ☐ Other	n/a due to national law restrictions
Knowledge gaps	☐ DNA ☐ Stock, breed or variety ☐ Species ☐ Other	n/a due to national law restrictions

Obstacles to accessing aquatic genetic resources	Please describe type of genetic resource ***mark all that apply***	Comments ***please include additional information as needed***
Public perception	☐ DNA ☐ Stock, breed or variety ☐ Species ☐ Other	n/a due to national law restrictions
Other **Continue adding row as necessary** Add Row / Remove Row	☐ DNA ☐ Stock, breed or variety ☐ Species ☐ Other	

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

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

The specific objectives are:

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

Research

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

Please mark appropriate box

◯ Yes

◯ No

◯ Unknown

Please provide details

Genetic data are available for 35 of the 53 cultured species (66%) listed in Table 1.1 reflecting the considerable research effort on the genetics of Australia's cultured species. Research projects are too numerous to list here.

In recent times a major industry and government investment was made into the Australian Seafood Cooperative Research Centre (2007-2015). One of three research themes in the (AU$35m) Production Innovation research program of this CRC (known as Breeding for Profit) focused on cooperative approaches to genetic management and improvement of our major aquaculture species.

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

Add Row

Main institutions, organizations, corporations and other entities	Area of research ***Mark all that apply***	Comments ***Please provide any additional information***	
Commonwealth Scientific and Industrial Research Organisation (CSIRO)	☒ Genetic resource management ☒ Basic knowledge on aquatic genetic resources ☒ Characterization and monitoring of aquatic genetic resources ☒ Genetic improvement ☒ Economic valuation of aquatic genetic resources ☒ Conservation of aquatic genetic resources ☒ Communication on aquatic genetic resources ☒ Access and distribution of aquatic genetic resources ☐ Other		X
Australian Institute of Marine Sciences (AIMS)	☒ Genetic resource management ☒ Basic knowledge on aquatic genetic resources ☒ Characterization and monitoring of aquatic genetic resources ☐ Genetic improvement ☐ Economic valuation of aquatic genetic resources ☐ Conservation of aquatic genetic resources ☐ Communication on aquatic genetic resources ☒ Access and distribution of aquatic genetic resources ☐ Other		X

Main institutions, organizations, corporations and other entities	Area of research ***Mark all that apply***	Comments ***Please provide any additional information***	
South Australian Research Development Institute	☒ Genetic resource management ☐ Basic knowledge on aquatic genetic resources ☒ Characterization and monitoring of aquatic genetic resources ☒ Genetic improvement ☒ Economic valuation of aquatic genetic resources ☒ Conservation of aquatic genetic resources ☒ Communication on aquatic genetic resources ☒ Access and distribution of aquatic genetic resources ☐ Other		X
Dept. of Primary Industries , Victoria	☒ Genetic resource management ☐ Basic knowledge on aquatic genetic resources ☒ Characterization and monitoring of aquatic genetic resources ☒ Genetic improvement ☐ Economic valuation of aquatic genetic resources ☒ Conservation of aquatic genetic resources ☐ Communication on aquatic genetic resources ☐ Access and distribution of aquatic genetic resources ☐ Other		X
Department of Industry Skills and Regional Development, NSW	☒ Genetic resource management ☐ Basic knowledge on aquatic genetic resources ☒ Characterization and monitoring of aquatic genetic resources ☒ Genetic improvement ☒ Economic valuation of aquatic genetic resources ☒ Conservation of aquatic genetic resources ☒ Communication on aquatic genetic resources		X

Main institutions, organizations, corporations and other entities	Area of research ***Mark all that apply***	Comments ***Please provide any additional information***	
	☐ Access and distribution of aquatic genetic resources ☐ Other		
Flinders University	☒ Genetic resource management ☒ Basic knowledge on aquatic genetic resources ☒ Characterization and monitoring of aquatic genetic resources ☒ Genetic improvement ☐ Economic valuation of aquatic genetic resources ☒ Conservation of aquatic genetic resources ☒ Communication on aquatic genetic resources ☒ Access and distribution of aquatic genetic resources ☐ Other		X
Deakin University	☒ Genetic resource management ☒ Basic knowledge on aquatic genetic resources ☐ Characterization and monitoring of aquatic genetic resources ☐ Genetic improvement ☐ Economic valuation of aquatic genetic resources ☒ Conservation of aquatic genetic resources ☐ Communication on aquatic genetic resources ☐ Access and distribution of aquatic genetic resources ☐ Other		X

Main institutions, organizations, corporations and other entities	Area of research ***Mark all that apply***	Comments ***Please provide any additional information***	
Macquarie University	☐ Genetic resource management ☒ Basic knowledge on aquatic genetic resources ☒ Characterization and monitoring of aquatic genetic resources ☐ Genetic improvement ☐ Economic valuation of aquatic genetic resources ☐ Conservation of aquatic genetic resources ☐ Communication on aquatic genetic resources ☐ Access and distribution of aquatic genetic resources ☐ Other		X
James Cook University	☒ Genetic resource management ☒ Basic knowledge on aquatic genetic resources ☒ Characterization and monitoring of aquatic genetic resources ☒ Genetic improvement ☒ Economic valuation of aquatic genetic resources ☒ Conservation of aquatic genetic resources ☒ Communication on aquatic genetic resources ☒ Access and distribution of aquatic genetic resources ☐ Other		X
University of Sunshine Coast	☒ Genetic resource management ☒ Basic knowledge on aquatic genetic resources ☒ Characterization and monitoring of aquatic genetic resources ☒ Genetic improvement ☐ Economic valuation of aquatic genetic resources ☒ Conservation of aquatic genetic resources ☐ Communication on aquatic genetic resources		X

Main institutions, organizations, corporations and other entities	Area of research ***Mark all that apply***	Comments ***Please provide any additional information***	
	☐ Access and distribution of aquatic genetic resources ☐ Other		

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

Please rank the following in regard to capacity strengthening.

Capacities	Rank 1=Very Important 10=No importance
Improve basic knowledge on aquatic genetic resources	8
Improve capacities for characterization and monitoring of aquatic genetic resources	6
Improve capacities for genetic improvement	5
Improve capacities for genetic resource management	5
Improve capacities for economic valuation of aquatic genetic resources	2
Improve capacities for conservation of aquatic genetic resources	5
Improve communication on aquatic genetic resources	3
Improve access to and distribution of aquatic genetic resources	2
Add other rows as appropriate and rank Add Row Remove Row	

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

Education, training and extension

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

Add Row

Institution	Thematic Area	Type of courses **mark all that apply**	Comments	
Flinders University	Genetic resource management	☒ Undergraduate ☒ Post-graduate ☒ Training ☒ Extension		
	Characterization and monitoring of aquatic genetic resources	☒ Undergraduate ☒ Post-graduate ☒ Training ☐ Extension		
	Genetic improvement	☒ Undergraduate ☒ Post-graduate ☒ Training ☒ Extension		X
	Economic valuation of aquatic genetic resources	☐ Undergraduate ☐ Post-graduate ☐ Training ☐ Extension		
	Conservation of aquatic genetic resources	☒ Undergraduate ☒ Post-graduate ☐ Training ☒ Extension		

James Cook University	Genetic resource management	☒ Undergraduate ☒ Post-graduate ☒ Training ☒ Extension		
	Characterization and monitoring of aquatic genetic resources	☒ Undergraduate ☒ Post-graduate ☒ Training ☒ Extension		
	Genetic improvement	☒ Undergraduate ☒ Post-graduate ☒ Training ☒ Extension		X
	Economic valuation of aquatic genetic resources	☐ Undergraduate ☐ Post-graduate ☐ Training ☐ Extension		
	Conservation of aquatic genetic resources	☒ Undergraduate ☒ Post-graduate ☒ Training ☒ Extension		
University of Sunshine Coast	Genetic resource management	☐ Undergraduate ☐ Post-graduate ☐ Training ☐ Extension		
	Characterization and monitoring of aquatic genetic resources	☒ Undergraduate ☒ Post-graduate ☐ Training ☐ Extension		
	Genetic improvement	☒ Undergraduate ☒ Post-graduate ☐ Training ☐ Extension		X
	Economic valuation of aquatic genetic resources	☐ Undergraduate ☐ Post-graduate ☐ Training ☐ Extension		
	Conservation of aquatic genetic resources	☐ Undergraduate ☐ Post-graduate ☐ Training ☐ Extension		

Coordination and networking

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

If no mechanism exists check here: ☐

Add Row

Name of mechanism	Description of how mechanism operates	
National Marine Science Plan (NMSP)	The Plan outlines the science needed to provide the knowledge, technology and innovation cornerstones that will grow a sustainable blue economy. Our oceans have a very large number of stakeholders, particularly if we include all those Australians who expect their coasts and oceans to be healthy and productive. The NMSP is a call to action, to the nation's marine scientists, but also to all those who will benefit from a strong marine science sector that is dedicated to working with governments, industries and communities in the mission of ensuring that we get the most out of our marine estate while protecting the things we all care about. The NMSP identifies seven critical challenges facing Australia and provides recommendations about how, in a coordinated way, marine science can support Australia in meeting those challenges. These challenges are: - marine sovereignty, security and safety - energy security - food security - biodiversity, conservation and ecosystem health - urban coastal environments - climate variability and change - resource allocation Aquatic genetic resources would be a very minor component of this plan that would cut across several of these challenges.	X

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

Please rank the following in regards to capacity strengthening.

Capacities	Rank 1=Very Important 10=No importance
Increase awareness in institutions	3
Increase technical capacities of institutions	5
Increase information sharing between institutions	2
Add other rows as appropriate and rank Add Row Remove Row	

Please specify in box below

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

Add Row

Network	Objectives of the network ***Please mark all that apply*** to your country	Comments	
The Seafood Cooperative Research Centre (2007-2015)	☐ Improve basic knowledge on aquatic genetic resources ☒ Improve capacities for characterization and monitoring of aquatic genetic resources ☒ Improve capacities for genetic improvement ☒ Improve capacities for economic valuation of aquatic genetic resources ☐ Improve capacities for conservation of aquatic genetic resources ☐ Improve communication on aquatic genetic resources ☐ Improve access to and distribution of aquatic genetic resources	This CRC (a federal government R&D initiative to address key industry needs) had a significant component of its production innovation component focused on a coordinated approach to genetic management and improvement of cultured species. Once the CRC was completed there was no continuation of the network. Under competitive R&D funding systems it is challenging to build cooperative R&D	X
National Aquaculture Centres of Asia (NACA)	☒ Improve basic knowledge on aquatic genetic resources ☐ Improve capacities for characterization and monitoring of aquatic genetic resources ☒ Improve capacities for genetic improvement ☐ Improve capacities for economic valuation of aquatic genetic resources ☐ Improve capacities for conservation of aquatic genetic resources ☒ Improve communication on aquatic genetic resources ☒ Improve access to and distribution of aquatic genetic resources		X

Network	Objectives of the network ***Please mark all that apply*** to your country	Comments	
FAO	☒ Improve basic knowledge on aquatic genetic resources ☒ Improve capacities for characterization and monitoring of aquatic genetic resources ☒ Improve capacities for genetic improvement ☐ Improve capacities for economic valuation of aquatic genetic resources ☐ Improve capacities for conservation of aquatic genetic resources ☒ Improve communication on aquatic genetic resources ☒ Improve access to and distribution of aquatic genetic resources	AFMA is implementing the FAO Code of Practice for Responsible Fisheries in Australia. Australia takes the Code seriously and its principles are built into national policies and legislation, with management targets set to meet or better the Code's performance outcomes. (http://www.frdc.com.au/knowledge/publications/fish/Pages/23-4_articles/30_Global-approach.aspx#sthash.BEIzkhyu.dpuf). Adherence to the code of practice has contributed to putting us in the position where we have some of the best-managed and best-understood fisheries in the world. (See more at: http://www.frdc.com.au/knowledge/publications/fish/Pages/23-4_articles/30_Global-approach.aspx#sthash.BEIzkhyu.dpuf_ Australia's participation in the preparation for the State of the World Report on Aquatic Genetic Resources has, however, been rather tardy.	X
IUCN/CITES/	☐ Improve basic knowledge on aquatic genetic resources ☐ Improve capacities for characterization and monitoring of aquatic genetic resources ☐ Improve capacities for genetic improvement ☐ Improve capacities for economic valuation of aquatic genetic resources ☒ Improve capacities for conservation of aquatic genetic resources ☒ Improve communication on aquatic genetic resources ☐ Improve access to and distribution of aquatic genetic resources		X

Information systems

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

Add Row

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

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

Please describe what capacities need to be strengthened

A consultation of experts is required to identify key needs and gaps. This report is a good start in identifying Australia's strengths and weaknesses in relation to understanding and managing its aquatic genetic resources. Incorporation of AqGR into relevant policies and legislation (Aquaculture strategies/Acts, Fisheries Management, Marine Protected Areas etc.) would raise the profile and importance of AqGR. Also coordination of activities, monitoring and communication across these different areas that impact upon and benefit from effective management of resources would facilitiate identification of R&D and management priorities and direct resources effectively.

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

Again consultation is required but capacity building could include national databases on R&D (past and present including a review of impacts of past research), genetic and genomic data, common and open database systems etc.

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

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

The specific objectives are:

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

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

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

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

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

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

Add Row

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

International, Regional, bilateral or Sub-Regional agreement	Year your country ratified or subscribed to the agreement	Impact on aquatic genetic resources	Impact on stakeholders	Comments	
United Nations Convention on the Law of the Sea (UNCLOS - 1982)	22 March 2002	○ Strongly positive ◉ Positive ○ Negative ○ Strongly negative ○ No effect	○ Strongly positive ◉ Positive ○ Negative ○ Strongly negative ○ No effect	Key articles of the UNCLOS relating to AqGR and their conservation include: 61 - Conservation of the living resources. 62 - Utilization of the living resources 118 - Cooperation of States in the conservation and management of living resources and 119 – Conservation of the living resources on the high seas (in relation to the high seas).	X
The Western and Central Pacific Fisheries Commission set up under the Convention on the Conservation of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPF Convention);	2003	○ Strongly positive ○ Positive ○ Negative ○ Strongly negative ◉ No effect	○ Strongly positive ○ Positive ○ Negative ○ Strongly negative ◉ No effect		X
The Commission for the Conservation of Southern Bluefin Tuna set up under the Convention for the Conservation of Southern Bluefin Tuna;	May 1993	○ Strongly positive ◉ Positive ○ Negative ○ Strongly negative ○ No effect	○ Strongly positive ◉ Positive ○ Negative ○ Strongly negative ○ No effect	awaiting further detail	X
The Indian Ocean Tuna Commission set up under the Agreement for the Establishment of the Indian Ocean Tuna Commission;	1996	○ Strongly positive ◉ Positive ○ Negative ○ Strongly negative ○ No effect	○ Strongly positive ◉ Positive ○ Negative ○ Strongly negative ○ No effect	awaiting further detail	X

International, Regional, bilateral or Sub-Regional agreement	Year your country ratified or subscribed to the agreement	Impact on aquatic genetic resources	Impact on stakeholders	Comments	
The Commission for the Conservation of Antarctic Marine Living Resources set up under the Convention on the Conservation of Antarctic Marine Living Resource	1980	◯ Strongly positive ◯ Positive ◯ Negative ◯ Strongly negative ◉ No effect	◯ Strongly positive ◯ Positive ◯ Negative ◯ Strongly negative ◉ No effect		X
The South Pacific Regional Fisheries Management Organisation set up under the Convention on the Conservation and Management of High Seas Fishery resource in the South Pacific Ocean;	2009	◯ Strongly positive ◯ Positive ◯ Negative ◯ Strongly negative ◉ No effect	◯ Strongly positive ◯ Positive ◯ Negative ◯ Strongly negative ◉ No effect		X
The Nagoya Protocol	not ratified	◯ Strongly positive ◯ Positive ◯ Negative ◯ Strongly negative ◉ No effect	◯ Strongly positive ◯ Positive ◯ Negative ◯ Strongly negative ◉ No effect	The agreement was signed in 2012 but yet to be ratified.	X
Pacific Islands Forum Fisheries Agency (FFA). Australia also participates in the APEC Oceans and Fisheries Working Group, the OECD Committee for Fisheries, and the Network of Aquaculture Centres in Asia.	1979	◯ Strongly positive ◯ Positive ◯ Negative ◯ Strongly negative ◉ No effect	◯ Strongly positive ◯ Positive ◯ Negative ◯ Strongly negative ◉ No effect		X

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

Collaboration is needed in order to ...	Rank 1=Very Important 10=No importance	To what extent are the needs being met	Comments ***For example any critical gaps***
Improve information technology and database management	2	○ To a great extent ◉ To some extent ○ None ○ Unknown	
Improve basic knowledge on aquatic genetic resources	4	○ To a great extent ◉ To some extent ○ None ○ Unknown	
Improve capacities for characterization and monitoring of aquatic genetic resources	6	◉ To a great extent ○ To some extent ○ None ○ Unknown	
Improve capacities for genetic improvement	7	◉ To a great extent ○ To some extent ○ None ○ Unknown	
Improve capacities for economic valuation of aquatic genetic resources	3	○ To a great extent ◉ To some extent ○ None ○ Unknown	
Improve capacities for conservation of aquatic genetic resources	2	○ To a great extent ◉ To some extent ○ None ○ Unknown	
Improve communication on aquatic genetic resources	2	○ To a great extent ○ To some extent ◉ None ○ Unknown	

Collaboration is needed in order to ...	Rank 1=Very Important 10=No importance	To what extent are the needs being met	Comments ***For example any critical gaps***
To improve access to and distribution of aquatic genetic resources	6	○ To a great extent ◉ To some extent ○ None ○ Unknown	Australia's capacity to import aquatic genetic resource is limited due to the small list of species permitted for import. Three may be some interest in exporting unique or improved resources.
Other **Continue adding row as necessary** Add Row Remove Row		○ To a great extent ○ To some extent ○ None ○ Unknown	

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

The regional collaborations that have focused on specific species such as Southern Bluefin Tuna. These have quantifiable impacts on resources and their commercial exploitation. By example, cooperation has enabled the turn around of our SBT quota which was declining but has increased in recent years due to perceived recovery of stock associated with improved management and improved data. It is more difficult to determine the impacts of the broader cooperations.

There are some bilateral institutional collaborations that can facilitate AqGR managment and improvement, for example cooperation between Australian and NZ oyster industry bodies concerning the genetic impact of disease.

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

- ◯ Yes
- ◯ No

If yes, please give details

There is a need to increase Australia's participation in international forums related to Aquatic Genetic resources. We have limited capacity to benefit from the importation of genetic resources due to our restrictions in introductions but we can benefit from improvement management of transboundary AqGR such as SBT and also potential develop mutually beneficial commercial partnership in relation to species that are improved in Australia (e.g. Pacific Oysters).

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

Australia's role is quite minimal due to restrictions on imports and exports of genetic resources. Australia plays and important role in the management of transboundard resources such as SBT, but such examples are limited.

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