China Sustainable Seafood Assessment (CSSA)

Aquaculture

[Species]
[Farming Method]

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December 2023

Statement

In the assessment of all species, the China Sustainable Seafood Assessment (CSSA) team will strictly follow the assessment criteria and refer to the latest, impartial and objective scientific data. Common sources of reference for evaluation data include literature review, official materials, objective and unbiased media reports, data obtained from field research, and expert interviews. Inevitably, many fisheries face the problem of lacking robust data, and some data are not publicly available, which may affect the assessment results to some extent. The CSSA team is committed to carrying out the assessment and evaluation of the species objectively and impartially, basing on respecting objective facts, making maximum use of open data, and relying on rigorous scrutiny of experts. The results of the species assessment do not represent the opinion of any particular expert, scholar, etc.. The CSSA team has the right to the final interpretation of the assessment results.

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Introduction

China is the world's largest fishing country, and also has a large consumer market for aquatic products. The food choices we make determine the present and future of our marine and freshwater ecosystems. In order to cultivate a new generation of responsible seafood foodies, Qingdao Marine Conservation Society (QMCS) has launched the China Sustainable Seafood Assessment (CSSA) project to customize scientific and interesting sustainable seafood consumption guides for domestic consumers. We hope that by raising public awareness and promoting changes in consumer behavior, we can use the power of the market to force industrial transformation and make a lasting contribution to the continuous improvement of the health of China's marine and freshwater ecosystem.

Executive Summary

Briefly summarize the assessment results in 1-3 paragraphs.

Overview of the Assessed Species

Describe:

1. *biological features (e.g. scientific name, trade name, common name, etc.) and other characteristics (e.g. origin, life history, main aquaculture area, product and economic value) of the species;*
2. *main aquaculture areas, and operation methods;*
3. *trade related status (e.g. circulation volume/market, type of product, market trends, etc.);*
4. *safety risk (common food safety risk, purchasing guidelines, specification recommendations or alternative choices).*

FULL ASSESSMENT

Criterion 1: Aquaculture Method and Management Status

Aquaculture method and industry overview

Assessing the current status of the aquaculture industry of the species being evaluated, including the aquaculture method (from seedling to adult), characteristics, openness, common aquaculture areas, the inherent vulnerability of the aquaculture system (such as typhoons, floods, etc.), as well as the importance of the aquaculture industry, including production volume, type of final product, target market and common/reported prominent problems, and whether there is noteworthy change or innovation in the industry. The aim of the assessment is to get a comprehensive overview of the current development of the aquaculture industry and its advantages and disadvantages.

Government supervision

Assessing the scope and capacity of the relevant government authorities to enforce the law in respect of assessed aquaculture, and whether there are relevant national, provincial and local management measures to ensure aquaculture performances are well-organized. Management measures include laws and regulations regulating the production procedure (e.g. seed production, breeding, veterinary medicine and disease control, environmental impact assessment and management, code of practice for the safe production of aquaculture products, supply chain traceability, best practice, etc.) and the effectiveness of enforcement. Besides, to assess whether the relevant integrated management system is set for achieving Ecosystem Based Aquaculture (EBA). Meanwhile, assessing the existence and implementation effectiveness of a series of management measures related to biosafety in the aquaculture area, including escape and disease spread. This criterion evaluates the adequacy and implementation of relevant management measures within the aquaculture industry.

Note:
This criterion focuses on assessing the aquaculture management status, and the following criteria would give a detailed assessment of specific key elements.

Criterion 2: Habitat Impact

Habitat impacts

Assessing whether the habitat adjacent to the aquaculture production sites retains the original ecological service function (the type of habitat needs to be identified beforehand), whether there is severe negative impact on the surrounding habitat caused by the aquaculture farm, such as the loss or degradation of one or more key functions, the destruction of wildlife spawning and breeding grounds or other important habitat types. Other negative impacts include deposition around the pond, biodiversity decline, vegetation destruction and so on. Assessing the impact of aquaculture on the surrounding natural environment and the effectiveness of related habitat management law enforcement.

For effluent emissions, assessing the impact of effluent emission on the adjacent environment, including the type, frequency, and quantity of emissions. Assessing whether emissions lead to algal blooms, reduction in surrounding biota, and other phenomena indicating unreasonable carrying capacity of the surrounding ecosystem. Assessing the potential impact of aquaculture operation during certain periods (such as periodic pond cleaning and dredging, large-scale pond water exchange) on the surrounding habitat. Additionally, it is necessary to assess the plans and implementation of management regulations related to effluent emissions, assess whether emission policies are based on corresponding environmental carrying capacity and whether there are national or local regulations governing or restricting discharges from aquaculture facilities and the enforcement status.

Note:
The service function of habitat includes providing livelihood for the surrounding community or providing value that is difficult to replace. Important habitat types include coastal/intertidal zones, wetlands, estuaries, mangroves, coral reefs, seagrass beds, freshwater lakes, rivers and their branches, tropical broadleaf forests, etc..

Criterion 3: Chemical Use and Disease Control

Chemical use

The assessment includes two aspects:

1) *The existence of laws and regulations on chemicals used in aquaculture production. Assessing whether the responsible government has formulated regulations on aquaculture chemical use (e.g. permitted/prohibited chemicals, frequency of use, discharge requirements, ecological impact, etc.) and the implementation status . Assessing whether the relevant management effectively covers the common types of aquaculture chemicals used in the assessed aquaculture. Assessing whether the management effectively responds to concerns about food safety, such as potentially harmful chemical residues, and the risk of chemical residues of the aquaculture species.*
2) *The characteristics of the chemical used during aquaculture production. Assessing whether it involves long-term, diverse chemical usage, the length of half-life of chemicals used. Assessing whether it leads to resistance or death of farmed species and/or organisms living in the adjacent areas. Assessing the existence of significant losses due to improper chemical usage and whether the farm keeps chemical usage records. Assessing whether there is direct discharge of residual toxic or harmful chemicals, and undegraded harmful metabolites, and their impact on the surrounding environment (given that the impact of chemicals on the surrounding environment is related to the connectivity between the farm and the environment, the openness of the aquaculture mode should also be assessed). Assessing whether there are best practices to reduce unreasonable chemical usage and adverse effects on the surrounding environment.*

Note:
Common types of chemicals used in aquaculture include disease control antibiotics, water disinfectants, decontamination agents (it is prohibited to use environmentally harmful copper-based chemicals for cleaning gear, and it is recommended to use mechanical, copper-free non-toxic chemical cleaning agents or biological methods for cleaning aquaculture equipment), anti-parasitic drugs.

Disease control

Assessing whether management measures are in place to prevent the spread of related diseases in and around aquaculture areas, and the effectiveness of enforcement in limiting and stopping the spread of aquaculture diseases. Assessing the risk of disease transmission from the aquaculture mode, and whether the aquaculture industry has good practices or relevant cases of preventing the spread

of disease.

Responsible disease management includes timely treatment to prevent spreading, to prevent large-scale infection of wild populations living in surrounding habitats, or to cause the pathogens and parasites to escape into the natural environment. It should be noted that systematic and comprehensive data or research results may be used when they are available. If there is only scattered data such as a few case reports available, the limited data should be combined to carry out risk assessment on the water exchange frequency, related management measures, and surrounding biota composition of the aquaculture farm.

Criterion 4: Escape Risk and Response Method

Escape risk

Assessing the escape risk by understanding the occurrence (scale, frequency) and how farms treat the escape incidents. Assessing the potential threats of species escaping to the surrounding environment, whether the escaped species carries germs and whether they are selected and improved species/genetically modified species that lack genetic diversity. Assessing the threat of invasion, such as competing for food and territory, preying on native species, seizing habitats, and preventing the reproduction of native species. Assessing whether it is a highly competitive species with high survivability. Assessing the existence of regulations on escape management and escape risk mitigation, escape monitoring and recording, as well as the effectiveness of enforcement. Given the fact that the impact of escaped species on the surrounding environment and wildlife is unknown in many cases, the potential risk of escape can be assessed with limited data with the understanding of whether wild populations have been established and expanding, and their ecological niche.

Note:
Native species
Refers to species that originally inhabit the geographical range of the area in which they are cultivated. The escape of native species may involve the transmission of parasitic pathogens into the wild population, or the introduction of their artificial selected genes into the wild population, thereby reducing genetic diversity and even reducing disease resistance and fertility (genetic selected character as aquaculture species) of the population as a whole.
Alien species
Refers to species that are not originally present on aquaculture sites and have been introduced accidentally or deliberately through human actions. Some alien species are aggressive, for example, quick adaption to the wild environment and establishing a population, prey on a large number of native species leading to native biodiversity loss, lack of natural enemies to restrain the population's growth. The above may result in potential bioeconomic damage.

Criterion 5: Feed Requirements

Wild caught fishery resources ratio and sustainability in aquaculture feed

Assessing whether a large amount of fishmeal and fish oil is used as feed material. After obtaining information about the source and proportion of fishmeal and fish oil in the feed, the weight of raw feed fish consumed can be calculated according to a specific conversion coefficient. For instance, the figure for fishmeal is 22.2%, that is, 100 kg of raw fish is consumed to produce 22.2 kg of fishmeal. The figure for fish oil is 5%. In addition, the economic Feed Conversion Ratio (FCR) of the production [economic FCR or eFCR = total feed amount used/total production volume] and the Fish Feed Equivalency Ratio (FFER) were calculated (a FFER result less than 1 indicates the utilization rate of feed is high and more sustainable). Meanwhile, assessing the source of feed fish used for processing fishmeal and fish oil, identifying the possibility of the raw material coming from IUU fishery and the species composition. Note that when the fishmeal and fish oil used in feed are scraps from the processing industry, there is no concern about the sustainable use of feed fish.

Correlation formula
*FFER (fishmeal) = (fishmeal ratio * FCR/eFCR) / 22.5*
*FFER (fish oil) = (fish oil ratio * FCR/eFCR) / 5.0*

Criterion 6: Source of Stock

Source of seedlings

Assessing the source of germplasm (eggs, seedlings, etc.) used for production, and whether the germplasm used in aquaculture is artificial germplasm provided by hatcheries, or harvested from the wild. Assessing whether there are problems such as germline degradation and seedling weakening in artificial germplasm. When using wild seeds, assessing whether the collection of germplasm resources is responsible and does not harm the survival and reproduction of the wild population, and whether the wild population is in ETP status.

Criterion 7: Wildlife Interaction

Wildlife (especially threatened species) interaction

Assessing whether the aquaculture industry has attracted significant numbers of wildlife from surrounding areas, especially if the wildlife is an endangered, protected species, and whether the wildlife interaction event is properly handled. Assessing the mortality rate of predators or wildlife (intentional or accidental injury as a result of entering the production sites), and whether lethal methods are used to remove predators, whether there are measures to manage contact between wildlife and the farm, whether the interactions are monitored and documented, as well as the effectiveness of enforcement. For farms where there is no or limited probability of exposure to wild

predators and no ETP species involved, this assessment may be defined as the absence of such a risk depending on the actual situation.

Note:
When assessing whether wild animals and predators fall into ETP or wild population decline (threatened) categories, information can be obtained by referring to farm records or consulting professionals/stakeholders, public data, etc., but it is undeniable that it is possible to find it difficult to obtain relevant information or there is geographical differentiation. In this case, empirical inference and average calculation are used as assessment methods.

Acknowledgement

The CSSA team sincerely thanks XXX/XXX organization for providing scientific and professional feedback for this report.

Reference