OCEAN OUTCOMES
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Blue Seafood Guide Assessment Report

Round herring, Pacific and Tsushima Warm Current stocks

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June 2019

(Image from zukan-bouz.com)

Introduction to the BSG Assessment Methodology

The Blue Seafood Guide (BSG) methodology is primarily based on the Rapid Assessment tool co-developed by Ocean Outcomes (O2), World Wildlife Fund US, and the Sustainable Fisheries Partnership. The tool uses Marine Stewardship Council (MSC) performance indicators, with

incorporation of some concepts from the Monterey Bay Aquarium Seafood Watch (MBA SFW) Fisheries Standard. The methodology has also been adapted to account for general characteristics of the existing Japanese fisheries management system. Specifically, deficiencies in information (e.g. monitoring of other species caught in a fishery) and management components (e.g. harvest control rules) that are systemic will be mentioned in the assessment, but not necessarily considered in the BSG species selection process.

To be included in the BSG, the stock/species must not receive a red score for any of the indicators that are considered.

Executive summary

In Japan, round herring are managed as two stocks: Pacific Ocean and Tsushima Warm Current stocks. As of 2018, the FRA stock assessments determined that both stocks were at a medium level, with the Pacific stock showing a decreasing trend, and the Tsushima stock showing a stable trend during the most recent five years. In addition, an MSY-based stock assessment suggested that the Tsushima stock was slightly below MSY in 2015. Overall, the stock does not appear to be significantly depleted, nor is abundance at a high level. However, it should be noted that this is a lower trophic level (LTL) species, and management should consider its significance to the ecosystem when evaluating stock status and potential fishing impacts. Harvests are managed through total allowable catch (TAC).

One of the other species caught in round herring fisheries is Japanese anchovy, which is currently considered depleted and is therefore of some concern. The main fishing gear used, purse seine, is unlikely to contact or have significant negative impacts on bottom habitat. Trophic relationships involving round herring are broadly understood, although ecosystem impacts of associated fisheries do not appear to have been studied in detail. Fishing levels do not appear to be high enough to disrupt key ecosystem elements.

BSG qualification outcome

Round herring is does not qualify for inclusion in the BSG because the purse seine fisheries targeting round herring catch significant quantities of species of stock status concern, particularly Japanese anchovy. Management does not appear sufficient to minimize negative fishery impacts on these stocks of concern.

Scoring summary

Principle	Component	PI #	Performance Indicator	Scoring category
1	Outcome	1.1.1	Stock status outcome	

		1.1.2	Stock rebuilding outcome	Not considered
	Management	1.2.1	Harvest Strategy	
		1.2.2	Harvest control rules	Not considered
		1.2.3	Information and monitoring	
		1.2.4	Assessment of stock status	
2	Other species	2.2.3	Other species information	
		2.2.1	Other species outcome	
		2.2.2	Other species management	
	ETP species	2.3.3	ETP species information	
		2.3.1	ETP species outcome	
		2.3.2	ETP species management	
	Habitats	2.4.3	Habitats information	
		2.4.1	Habitats outcome	
		2.4.2	Habitats management	
	Ecosystem	2.5.3	Ecosystem information	
		2.5.1	Ecosystem outcome	
		2.5.2	Ecosystem management	
3	Governance & policy	3.1.1	Legal and customary framework	
		3.1.2	Consultation, roles and responsibilities	
		3.1.3	Long term objectives	
	Fishery specific management system	3.2.1	Fishery-specific objectives	
		3.2.2	Decision-making processes	
		3.2.3	Compliance and enforcement	

		3.2.4	Management performance evaluation	

Basic fishery information

Target species scientific name and common name	Round herring (*Etrumeus teres*), ウルメイワシ
Fishery location and season	The Pacific stock is caught in coastal areas in the Pacific Ocean south of Ibaraki prefecture (Fig. 1), with most catches being made off Miyazaki to Mie prefectures. The Tsushima stock is caught in coastal areas in the Japan Sea, from Aomori and southward (Fig. 1). Fisheries can operate year-round.
Gear type(s)	About 90% of Japan's total catch is from purse seines (*maki-ami*, 巻網), so we focus on that gear type here.
Catch quantity (weight)	Based on simulation models, the estimated landings of round herring from Japanese fisheries was 45,000 t for the Pacific stock and 41,000 t for the Tsushima stock, averaged from 2012 to 2016.
Management authorities	Fishery cooperative associations, prefectural governments, Fisheries Agency of Japan

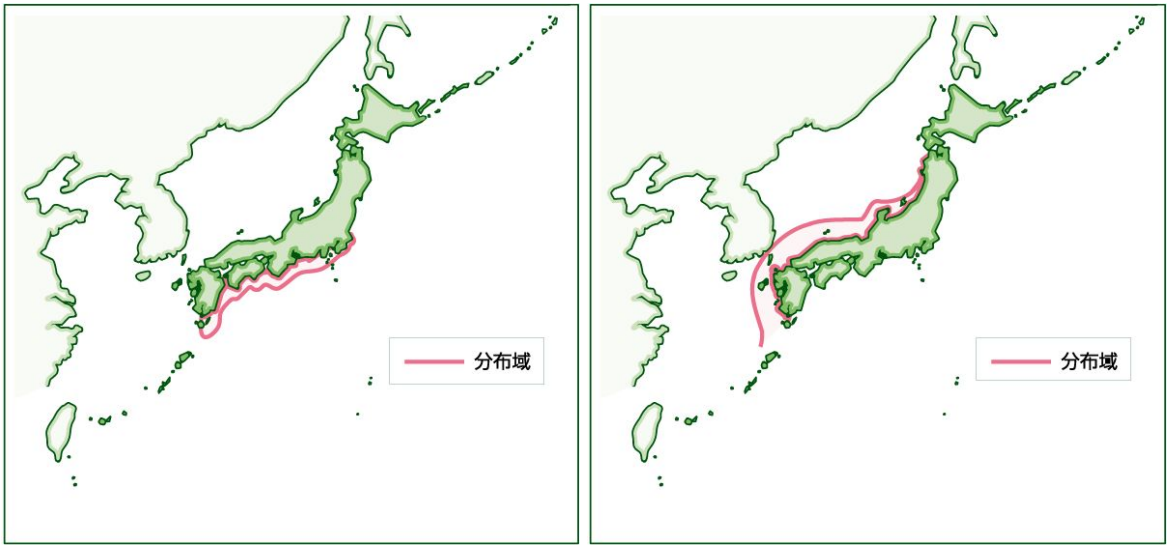

Figure 1. Distributions of the Pacific Ocean (left) and Tsushima Warm Current (right) stocks of round herring, shown in pink. Images from

http://abchan.fra.go.jp/digests2018/html/2018_21.html and
http://abchan.fra.go.jp/digests2018/html/2018_22.html

Description of the fishery

Two stocks of round herring are harvested by Japanese fisheries: the Pacific Ocean stock and the Tsushima Warm Current stock. Adult round herring are mostly harvested by purse seine. There is also a seasonal boat seine (船びき網) fishery for juveniles (market name: shirasu).

South Korean fisheries also harvest jack mackerel from these stocks, although Korean catches have not been regularly reported to MAFF since 2005.

Table 1. Estimated landings (in thousands of t) of the Pacific and Tsushima round herring stocks for Japan fisheries. Data available at http://abchan.fra.go.jp/digests2017/index.html

Year	Pacific	Tsushima	Total
2007	32	27	59
2008	28	15	43
2009	29	23	52
2010	18	29	47
2011	45	38	83
2012	43	36	79
2013	37	50	87
2014	48	25	73
2015	54	42	96
2016	42	51	93

Unit of Assessment(s)

The Unit of Assessment is Japanese jack mackerel from the Tsushima Warm Current stock caught by purse seine.

Status of target stock(s) - Principle 1

The Fisheries Research and Education Agency of Japan (FRA) evaluates stock status (low, medium, or high) relative to reference points for spawning stock biomass (SSB) that are not linked to MSY. Specifically, the total range of past SSB estimates is divided into thirds, and the third that the most recent estimate falls into determines the status. Status is also determined in part by the limit reference point B_{limit} (aka B_{lim}), which is defined as an SSB level below which favorable recruitment cannot be expected, based on historical recruitment data (Yoda et al. 2014). If the SSB is below B_{lim}, stock status is rated as low.
Fishing effort in Japan is largely regulated through input controls (Makino 2011). For round herring, effort is largely managed by regulating the number of vessels that can fish, and some prefectures or fishery cooperatives implement fishery openings and closures.

Stock status outcome (1.1.1)

Scoring category	Yellow

Rationale:
Biomass and spawning stock biomass (SSB) are estimated using cohort analysis. Data used in the stock assessment includes data from MAFF (Ministry of Agriculture, Forestry and Fisheries) fisheries and aquaculture reports, landings at major ports (including some size and age sampling data), and some trawl and spawning surveys (Nyuji et al. 2017, Suzuki et al. 2017). Some aspects of early life stage and spawning ecology are not well understood, although growth and spawning patterns have been studied (Nyuji et al. 2017).

To determine the status of the Pacific stock of round herring, FRA uses annual spawning production (in trillions of eggs, estimated from research survey data) as the abundance indicator. The production level is calculated for Sea Area III, which extends from Hyuganada to Shionomisaki. In 2017, the estimated spawning production was above the threshold between low and medium status (60 trillion eggs) but below the threshold between medium and high status (99 trillion eggs), resulting in a determination of medium status (Fig. 2). These thresholds were obtained by dividing total range of historical egg production estimates into thirds (Nyuji et al. 2017). There is no target reference point (TRP) for this stock. Stock assessment scientists also estimate biomass and SSB. Biomass estimates appear to stable overall with some fluctuations over time (Figs. 3 and 4). Scientists may consider combining egg count data with cohort analysis in future stock assessments (Nyuji et al. 2017).

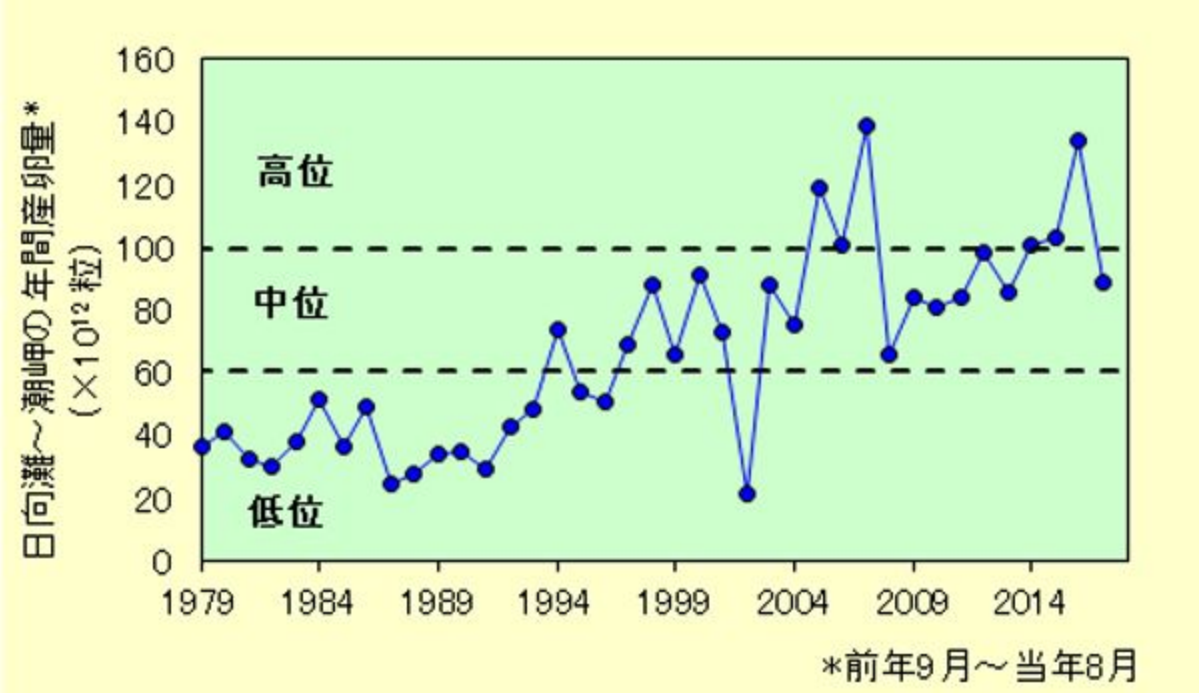

Figure 2. Estimated spawning production (in trillions of eggs; blue dots) over time for the Pacific Ocean stock of round herring. The dashed lines indicate the thresholds between medium and low status level, and between medium and high status level. Figure from: http://abchan.fra.go.jp/digests2018/html/2018_21.html

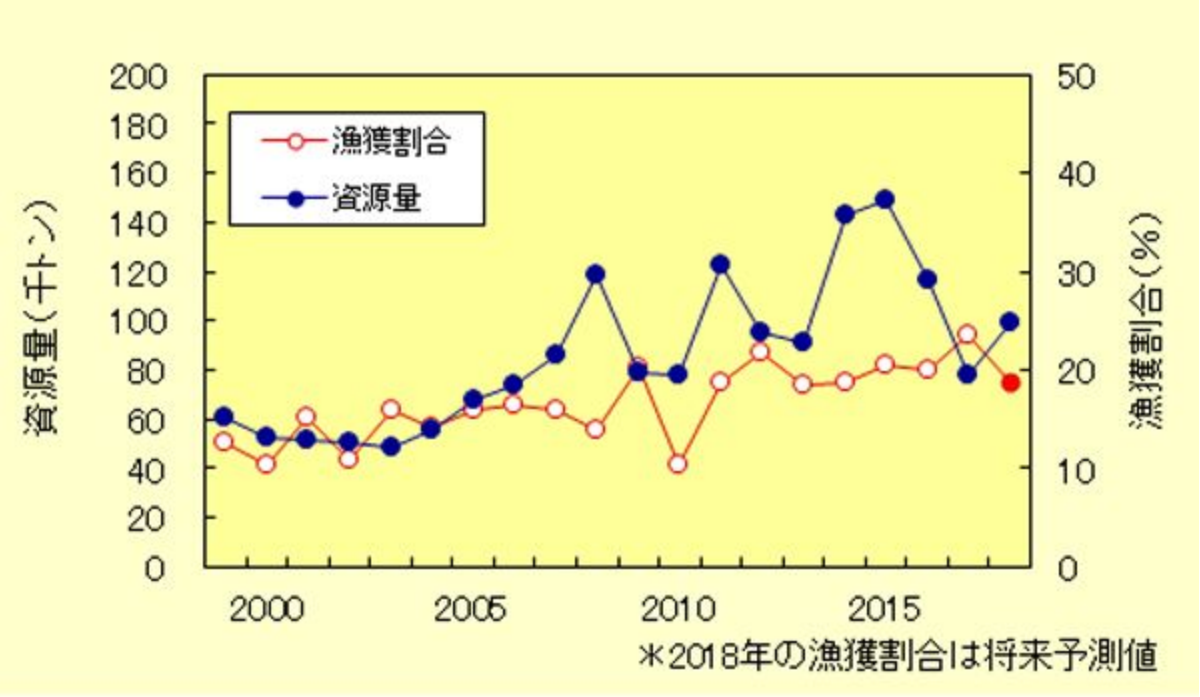

Figure 3. Estimated biomass (blue dots, in thousands of t) and relative catch proportion (white circles, in percent) over time for the Pacific stock of round herring. Figure from: http://abchan.fra.go.jp/digests2018/html/2018_21.html

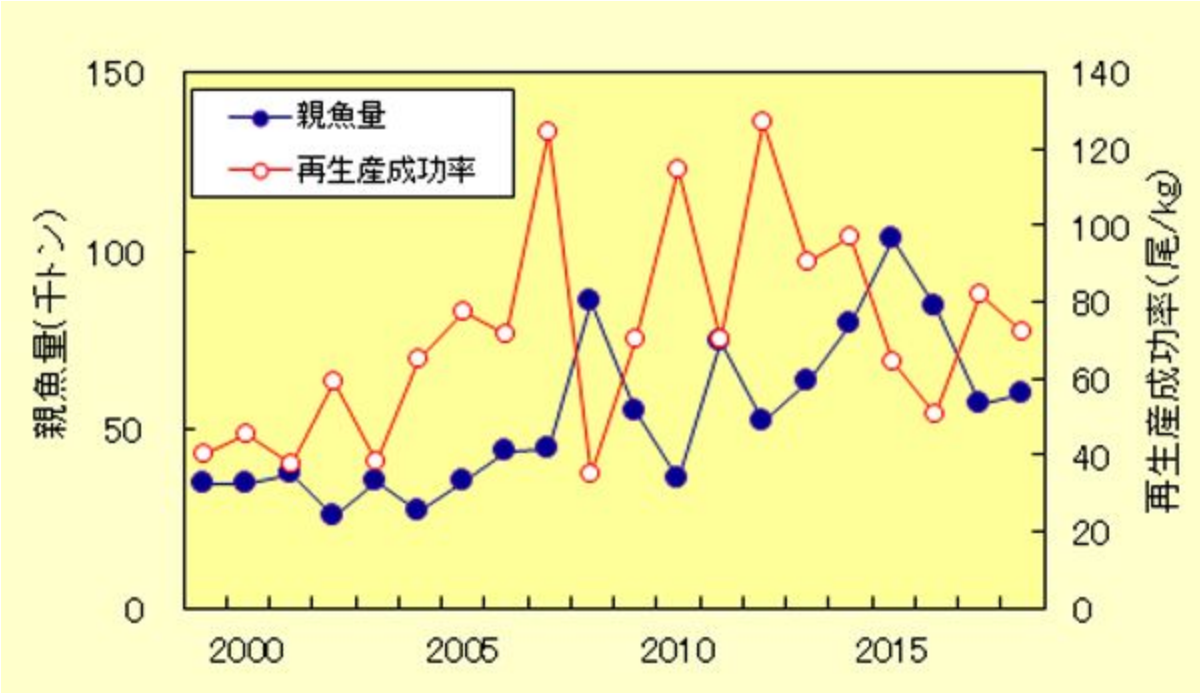

Figure 4. Estimated spawning stock biomass (blue dots, in thousands of t) and recruitment success rate (white circles, number of offspring per kg SSB) over time for the Pacific stock of round herring. Figure from: http://abchan.fra.go.jp/digests2018/html/2018_21.html

For the Tsushima Warm Current stock, SSB is used as the stock abundance indicator. The Tsushima round herring stock was determined to have high status in 2016 because the spawning stock biomass (SSB) estimate for that year (86,000 t) exceeded both the B_{limit} (27,000 t) and the threshold between medium and high status (85,000 t; Fig. 5). The B_{limit} was set as a potential stock recovery threshold based on spawner-recruit relationship information (Suzuki et al. 2017). The trend in estimated abundance for the past five years (2012 to 2016) was considered to be stable (Suzuki et al. 2017). As with the Pacific stock, there is no TRP. The status of the stock in 2017 was determined to be medium, based on the 2018 assessment (Fig. 5). Broadly speaking, stock abundance appears to be relatively stable with some fluctuations over time (Figs. 5 and 6).

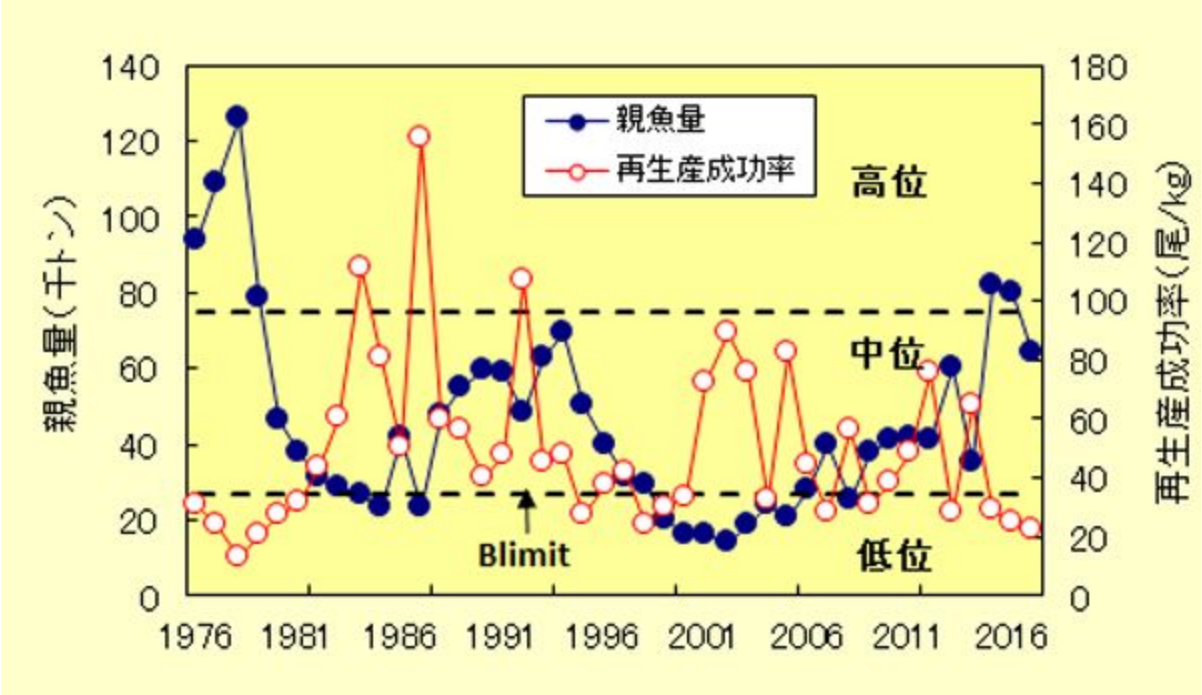

Figure 5. Estimated Tsushima round herring spawning stock biomass (blue circles, in thousands of t) and recruitment success rate (white circles, number of offspring per kg SSB) over time. The dashed lines indicate the thresholds between medium and low status level (Blimit) and between medium and high status level. Figure from: http://abchan.fra.go.jp/digests2018/html/2018_22.html

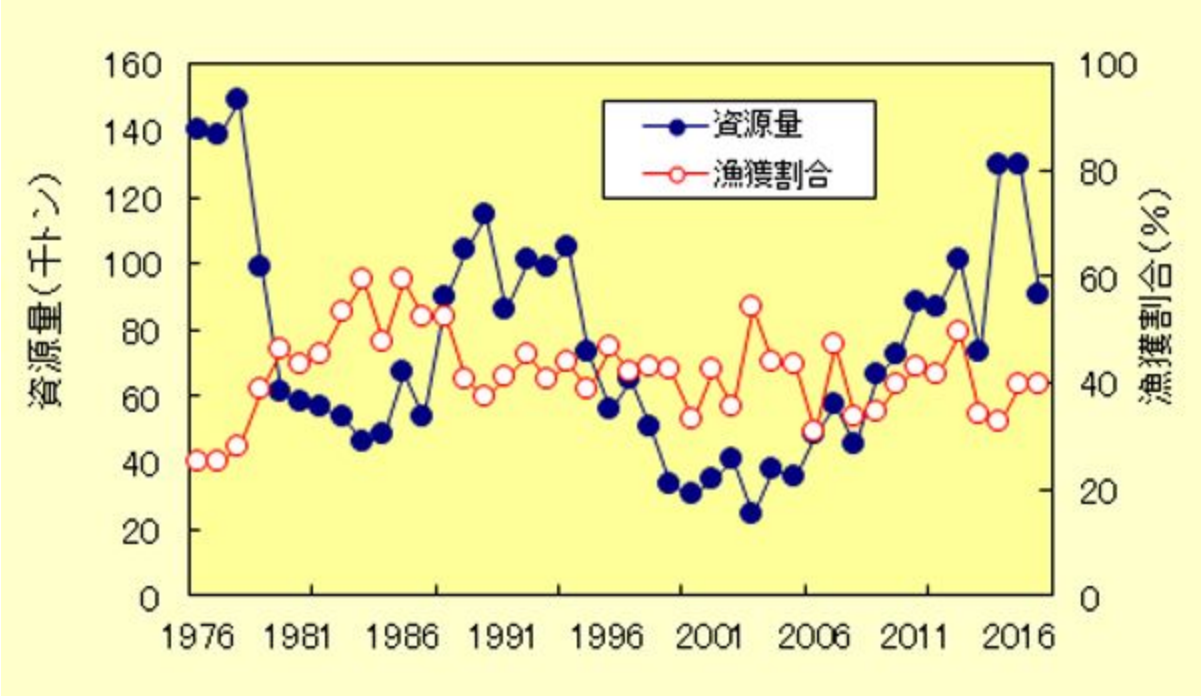

Figure 6. Estimated Tsushima round herring biomass (blue circles, in thousands of t) and relative catch proportion (white circles, in percent) over time. Figure from: http://abchan.fra.go.jp/digests2018/html/2018_22.html

According to a preliminary, MSY-based assessment conducted in March 2016 for the Council for Promotion of Regulatory Policy Reform, the Tsushima stock of round herring was slightly below a sustainable abundance level in 2015, with an SSB_{2015} / SSB_{MSY} ratio of 0.76.

Based on all of the information above, stock status is likely above a limit reference point and may not be far off from MSY for the Tsushima stock. Clupeid species including round herring typically have cyclical abundance cycles that correspond with large scale climate regimes such as the Pacific Decadal Oscillation (PDO; Takasuka et al. 2008), and the biomass estimates in the stock assessments appear consistent with this type of pattern.

However, it is important to mention that round herring are low trophic level carnivores, and they may need to be scored as a lower trophic level (LTL) species under the MSC standard. In this case it is not clear whether either the LRP (B_{limit}) or TRP (SSB_{MSY}) take the potential LTL status of round herring into account. Thus we scored this indicator as yellow.

Stock rebuilding outcome (1.1.2)

Scoring category	Not considered

Rationale:
This indicator was not considered because in Japan, stock rebuilding plans are rare and generally implemented only on a voluntary basis. They are not automatically developed in response to changes in stock status. No rebuilding plan or measures have been developed for either stock of round herring, likely because a need has not been identified by the Japanese management system.

Harvest strategy (1.2.1)

Scoring category	Yellow

Rationale:
As is typical with Japanese fisheries, harvest control rules (HCRs) are lacking. Information collected to support the harvest strategy includes stock productivity, fishing vessel statistics, stock abundance, landings at major ports, catch reports from specific fisheries, monthly surveys of fish sizes at markets, spawning surveys, and research conducted by the Japan Fisheries Agency and national research institutes (Suzuki et al. 2017).

The FRA stock assessments include estimates of acceptable biological catch (ABC), based on cohort analysis model outputs and consideration of socio-economic conditions. Thus all harvest strategy components required by the MSC standard, excluding HCRs, are present. The ABCs are not currently used to set any sort of catch limit or total allowable catch (TAC), although this species is being considered as a candidate for management by TAC. There is also an area closed to purse seine fishing in Tosa Bay off Kochi prefecture (FRA 2018). The area closure and potential for TAC management may make it possible to maintain stock biomass around a target reference point (TRP), although the current lack of output controls is a concern.

Harvest control rules (1.2.2)

Scoring category	Not considered

Rationale:
Since harvest control rules are not currently used in Japanese fisheries management, this indicator is not considered. There are no official harvest control rules (HCRs) for round herring stocks. It is uncertain whether exploitation will be reduced significantly in response to stock depletion.

Information and monitoring (1.2.3)

Scoring category	Green

Rationale:
A substantial amount of information is monitored for round herring fisheries. Information on biological characteristics, fishery removals, and fleet composition is collected, and egg production is monitored for the Pacific stock (Nyuji et al. 2017, Suzuki et al. 2017). This information is likely sufficient to support a harvest strategy.

Assessment of stock status (1.2.4)

Scoring category	Green

Rationale:
Scientists at the Japan Fisheries Research and Education Agency (FRA) assess round herring stocks annually. These assessments estimate biomass and determine stock status relative to reference points based on historical biomass estimates, or spawning surveys (Nyuji et al. 2017, Suzuki et al. 2017). Stock assessment scientists use a widely accepted cohort analysis technique (Pope 1972) that uses catch at age data to estimate biomass in terms of numbers of fish at age. The assessments are reviewed internally and also externally by experts and officials (JFA and FRA 2015). The stock assessment determines an ABC_{target} that is set at 80% of the ABC_{limit} to account for uncertainty in estimation of ABC, but ABC is a recommendation rather

than a binding catch limit. The assessments appears appropriate to the species and could be used to develop HCRs.

Ecosystem impacts - Principle 2

Round herring are primarily caught in multispecific purse seines fisheries. Catch composition is highly dependent on fishing location and practices, but it's generally known that purse seines also catch Japanese pilchard (*Sardinops melanostictus*), Japanese anchovy (*Engraulis japonicus*), chub and blue mackerel (*Scomber japonicus and S. australasicus*), Japanese jack mackerel (*Trachurus japonicus*), and Japanese amberjack (*Seriola quinqueradiata*). Estimated catch compositions for the Pacific stock are described in Table 2 below; catch compositions for fisheries targeting the Tsushima stock have not yet been reported by FRA scientists. Species are classified as either main (comprising at least 5% of the catch by weight) or minor (< 5% of the catch by weight).

Table 2. Other species caught and their classification for purse seine fisheries targeting the Pacific Ocean stock of round herring. Data from FRA 2017.

Species common and scientific names	Proportion of catch (%)	Classification
Chub and blue mackerel (*Scomber japonicus and S. australasicus*)	29.2	Main
Japanese pilchard (*Sardinops melanostictus*)	17.9	Main
Japanese anchovy (*Engraulis japonicus*)	17.4	Main
Japanese jack mackerel (*Trachurus japonicus*)	3.7	Minor
Amberjack species, including Japanese amberjack (*Seriola quinqueradiata*)	4.7	Minor

Japanese fishers typically record catches of commercially important species but are not required to keep records on discards or bycatch, so there is no information available on discarded species. Bait is not used in purse seine fisheries and does not need to be considered here.

Other species information (2.2.3)

Scoring category	Yellow

Rationale:

Main and minor other species have been identified for purse seine fisheries targeting round herring, and they include Japanese pilchard, Japanese anchovy, and chub and blue mackerel, Japanese amberjack, and Japanese jack mackerel (Table 2). Information appears sufficient to inform management and determine the fishery's risk to these other species, at least for the Pacific stock. However, catches of bycatch and discard species are not monitored.

Other species outcome (2.2.1)

Scoring category	Red

Rationale:
Three main species have been identified (Table 2), and of these, one is currently identified as having poor stock status (Japanese anchovy, Pacific Ocean stock). Purse seine fisheries may be overfishing the Japanese anchovy stock (FRA 2017). Fishing mortality on the other two main species does not appear to be at an unacceptable level, but the concern about the Japanese anchovy stock results in a red score for this indicator.

Other species management (2.2.2)

Scoring category	Red

Rationale:
There are management measures in place for the main species caught by the UoA. However, it is not clear whether they are expected to maintain or to not hinder rebuilding of these species, particularly Japanese anchovy.

ETP species information (2.3.3)

Scoring category	Yellow

Rationale:
There is no standardized monitoring of bycatch species in Japanese fisheries (Fukutake et al. 2014), and fishers do not usually record data on encounters with ETP species. Information about ETP species mortality resulting from the assessed fishery is therefore not available. However, FRA has identified ETP species that are at risk from incidental mortality in purse seine fisheries targeting the Pacific stock (see FRA 2017), and there was sufficient qualitative information to conduct productivity susceptibility analyses (PSAs) for these species.

ETP species outcome (2.3.1)

Scoring category	Yellow

Rationale:
The FRA conducted productivity susceptibility analyses (PSAs) on the ETP species that may interact with the fishery, which include a variety of seabirds and sea turtles (Table 3).

Table 3. PSA results for ETP species that may interact with purse seine fisheries targeting round herring. Color corresponds to risk level to the species from the fishery, which can be low (green), medium (yellow), or high (red). Data from FRA 2017.

Common name	Species name	PSA score and risk level
Loggerhead sea turtle, アカウミガメ	*Caretta caretta*	3.06
Pelagic cormorant, ヒメウ	*Phalacrocorax pelagicus*	2.51
Swinhoe's storm petrel, ヒメクロウミツバメ	*Oceanodroma monorhis*	2.43
Little tern, コアジサシ	*Sternula albifrons*	2.28
Japanese murrelet, カンムリウミスズメ	*Synthliboramphus wumizusume*	2.43
Laysan albatross, コアホウドリ	*Phoebastria immutabilis*	2.76
Audubon's shearwater, セグロミズナギドリ	*Puffinus lherminieri*	2.51
Short-tailed albatross, アホウドリ	*Phoebastria albatrus*	2.76
Greater crested tern, オオアジサシ	*Thalasseus bergii*	2.54

We also used the SFW Unknown Bycatch Matrices (UBM) to attempt to corroborate the PSA results. Using the UBM, we evaluated likely impacts on turtles, seabirds, and sharks from purse seines in the North Pacific or Northwest Pacific Ocean. Level of concern regarding fishing mortality is marked by the following colors: high concern = red, medium concern = yellow, and low concern = green. Highest impacts receive a score of 1, and lowest impacts receive a score of 5. For benthic invertebrates, finfish, forage fish, and corals, impacts were not determined by region, and SFW did not assign concern categories.

Based on the information in the matrices, impacts on sea turtles, marine mammals, seabirds, and sharks are expected to be low concern (Table 4). If monitoring information or evidence can show that impacts on these potential ETP species are minimal, the score can be better confirmed.

Table 4. Impacts of purse seines in the North or Northwest Pacific Ocean based on the Monterey Bay Aquarium SFW Unknown Bycatch Matrices.

Bycatch susceptibility category	Region	Score and level of concern
Sea turtle	North Pacific	4
Marine mammal	Northwest Pacific	3.5
Seabird	Northwest Pacific	4
Shark	Northwest Pacific	3.5
Benthic invertebrates	N/a	5
Finfish	N/a	4
Forage fish	N/a	3
Corals and other biogenic habitats	N/a	5

Based on information from the PSAs and the UBM, fishery impacts on ETP species are generally expected to be low, though there are a few species potentially at medium risk. Thus the species outcome indicator receives a preliminary yellow score.

ETP species management (2.3.2)

Scoring category	Yellow

Rationale:
Japan has a Red Data Book identifying ETP species found within the country. In terms of national legislation, there is a Law for the Conservation of Endangered Species of Wild Fauna and Flora (Law No. 75) that aims to conserve endangered species and contribute to conservation of the natural environment (Ministry of the Environment 2016a). There is also a Wildlife Protection and Hunting Law (Law No. 32) that protects birds and mammals by establishing wildlife protection areas (Ministry of the Environment 2016b). In addition, Japan accepted the application of CITES and has been implementing its requirements since 1980.

We found no documented information on management measures for minimizing negative impacts for this specific fishery. However, in practice Japanese fishers generally try to minimize incidental entanglement of seabirds and sea turtles, and often attempt to release them. Between the ETP species protection laws and common practices, measures are likely in place and expected to work.

Habitats information (2.4.3)

Scoring category	Yellow

Rationale:
Round herring is a pelagic species, and the primary gear type used to target the mackerel (purse seines) is unlikely to contact the sea bottom and directly impact marine habitat (FAO 2001). Thus the types and distribution of commonly encountered habitats and the nature of gear impacts upon those habitats is broadly understood. However, data are not adequate for verifying efficacy of habitat management measures and determining fishery risks to habitat.

Habitats outcome (2.4.1)

Scoring category	Green

Rationale:
Based on the nature of purse seines and their operation in upper water layers to catch round herring, these fisheries are highly unlikely to reduce structure and function of the commonly encountered habitats to a point where there would be serious or irreversible harm. They are also highly unlikely to impact VME habitats.

Habitats management (2.4.2)

Scoring category	Yellow

Rationale:
The gear type and operations of purse seine fisheries for herring constitute an operational strategy for managing impacts on encountered habitats. Fishing takes place in deep water with gear that is used at the ocean surface and does not contact the sea bottom. Knowledge about this gear type provides an objective basis for confidence that the fisheries do not harm encountered habitats (FAO 2001). However, the effectiveness of the strategy has not been tested, and there is no quantitative evidence that the operational strategy is being implemented successfully.

Ecosystem information (2.5.3)

Scoring category	Yellow

Rationale:

Trophic relationships involving round herring are broadly understood. Herring consume zooplankton and are preyed upon by larger pelagic fishes (Nyuji et al. 2017). However, ecosystem impacts of mackerel fisheries do not appear to have been studied in detail. MSC considers herrings (Family *Clupeidae*, which includes round herring) lower trophic level (LTL) species by default.

Ecosystem outcome (2.5.1)

Scoring category	Yellow

Rationale:
Round herring are an LTL species, and fisheries harvest large quantities of this fish. However, they are a productive species with a short generation time, and estimated abundances have appeared stable in recent years (Figs. 3, 4, 5, and 6). Thus fisheries appear unlikely to disrupt key ecosystem elements to a point where there would be serious or irreversible harm.

Ecosystem management (2.5.2)

Scoring category	Yellow

Rationale:
The Japanese fisheries management system focuses primarily on target species and currently lacks an ecosystem-based approach, although some policy documents, such as the Fisheries Policy of 2001, state that ecosystems should be conserved (Makino 2011). Jack mackerel harvests are not managed to minimize negative ecosystem impacts, but stock assessments do include estimates of ABC that could potentially be used to manage impacts.

The 2011 Japan Ministry of the Environment document titled ‘Marine life diversity conservation strategy’ (海洋生物多様性保全戦略) suggests a general movement toward policies that protect marine diversity and promote the sustainable use of marine resources (Fukutake et al. 2014). Relevant management measures include implementation of Marine Protected Areas (see Makino 2013). Conservation policy strategies are established by the Marine Diversity Conservation Specialist Investigative Commission (海洋生物多様性保全戦略専門家検討会), which holds meetings and receives public comments.

Management - Principle 3

Japan’s fisheries are managed on multiple levels. The national management body is the Fisheries Agency of Japan (JFA) within the Ministry of Agriculture, Forestry, and Fisheries (MAFF). Prefectural governments administer fishing rights and licenses within their jurisdictions (Makino 2011). At a smaller scale, fisheries are managed by fishery cooperative associations, whose membership consists of fishermen and small fishing companies. These cooperatives

tend to be defined by region, target species, and/or gear type. Management is coordinated among all these levels, generally with the JFA and prefectural governments issuing regulations and the fishery cooperatives implementing those regulations (McIlwain 2013). In Japan there is an emphasis on resource users actively contributing to management of their own fisheries, and fishery cooperatives have considerable influence in determining operational rules (e.g. gear restrictions) and setting fishery openings and closures (Uchida and Watanabe 2008, Makino 2011).

Legal and/or customary framework (3.1.1)

Scoring category	Green

Rationale:
Fisheries governance in Japan is supported by an effective national legal system with binding procedures governing cooperation with other parties, and the system is capable of delivering management outcomes consistent with 1) management of the stock to a sustainable level and 2) minimising impacts on other species, habitats, and wider ecosystem components. The legal system aims to guarantee justice and transparency in administrative management, and there is a clear decision-making process for determining fishery measures and dealing with disputes as they arise (Fukutake et al. 2014). The system has a mechanism to observe the legal rights of people dependent on fishing for food or livelihood.

The Fisheries Law of 1949 outlines a framework for managing fisheries via fishery rights and licenses that are controlled by the government (Makino 2011).

Consultation, roles, and responsibilities (3.1.2)

Scoring category	Green

Rationale:
Functions, roles, and responsibilities are clearly defined and understood in the national management framework. The Japanese Fisheries Policy Council has a key role in seeking and accepting relevant information from stakeholders, which may then be incorporated into management measures. The JFA regularly offers opportunities for stakeholders, including fishing industry members, to participate in public consultation processes (Fukutake et al. 2014).

Additionally, the JFA supports economic incentives for sustainable fishing by providing some degree of compensation for income loss resulting from management measures (Makino 2011).

Long term objectives (3.1.3)

Scoring category	Green

Rationale:
The Fisheries Basic Act (2001) describes the overarching framework for fisheries management in Japan. Chapter 1, Article 2 states a requirement to manage fisheries resources to ensure their sustainable use as a component of marine ecosystems, following the recommendations of UN Convention on the Law of the Sea (UNCLOS). The Law of Conservation and Management of Marine Living Resources states the need to protect surrounding ecosystems and habitats. Thus long term objectives consistent with the precautionary approach and appropriate management of target stocks and ecosystem impacts are explicit within management policy.

Fishery-specific objectives (3.2.1)

Scoring category	Yellow

Management objectives relate more to the gear types used than to the target species. The largest fisheries for round herring are medium to small sized purse seine fisheries operating from Mie to Miyazaki prefectures. Medium-sized purse seine fisheries are legal prefectural governor's permission fisheries (法定知事許可漁業), while small purse seine fisheries are prefectural governor's permission fisheries (知事許可漁業; see https://sh-u-n.fra.go.jp/search/?task=detail&fc=77&rc=441). Hence prefectural governments determine management objectives and the numbers of vessel permits issued. For example, the Mie Prefecture Resource Management Guidelines (三重県資源管理指針)[1] state an objective to maintain and stabilize catches for medium and small purse seine fisheries. The document notes that voluntary management measures, such as non-fishing days, are in place to help achieve that objective.

There are currently no output controls for these purse seine fisheries, although Tosa Bay has a sea area where fisheries using nets, including purse seines, are not allowed to operate. Round herring is being considered as a candidate for management by TAC.

Decision-making processes (3.2.2)

Scoring category	Yellow

Rationale:
Status of the fishery and fish stocks are reviewed at least once per year. These reflect the existence of decision-making processes that result in measures for achieving fishery-specific objectives, and suggest that the processes respond to monitoring and evaluation results. Some information on the fishery's performance is available in materials posted on the FRA and MAFF websites. There is no indication that management authorities or fishers repeatedly violate

[1] http://www.jfa.maff.go.jp/form/pdf/18mie.pdf

regulations necessary for sustainability of the fishery. However, it is not apparent that decision-making processes employ a precautionary approach.

Compliance and enforcement (3.2.3)

Scoring category	Yellow

Rationale:
Fishing effort appears to be primarily regulated through permits and limited entry to the fishery. The JFA and Japan Coast Guard engage in some enforcement activities such as checking fishing logbooks and permits, and clear provisions exist for penalizing individuals or parties who violate fishery regulations (Clarke 2007). Thus MCS mechanisms exist and are implemented. These mechanisms are expected to be reasonably effective, and there are no reports of systematic non-compliance. More information on application of sanctions and evidence of compliance would be needed to score this indicator green.

Monitoring and management performance evaluation (3.2.4)

Scoring category	Yellow

Rationale:
Key components of the fishery-specific management system include monitoring and evaluation of stock status, management of ecosystem impacts (e.g. catches of other species and habitat issues), and performance of the compliance and enforcement system. Stock assessments are regularly evaluated and subject to internal review, but it is not clear whether the other components are regularly evaluated and adapted.

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