Blue Seafood Guide Assessment Report

Walleye pollock, Pacific stock

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(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.

Summary of results

In Japan, walleye pollock are managed as four stocks: Northern Japan Sea, Nemuro Strait, Southern Okhotsk Sea, and Pacific. Current stock abundances are substantially lower than they were before the 1990s, and a recovery plan has been implemented for the Pacific walleye pollock stock. As of 2017, the Pacific stock appears to be at a medium abundance level, while the remaining three stocks appear to be at low abundance levels. Walleye pollock stocks are managed by total allowable catch (TAC), which in recent years has been set at levels equivalent to the ABCs (allowable biological catches) estimated in the stock assessments.

The main fishing gears used, bottom trawl and gillnet, may have negative impacts on bottom habitat and ETP species. However, due to lack of information, performance indicators related to those areas are not being considered at the current time. Trophic relationships involving walleye pollock are fairly well 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.

Individual prefectures harvesting this species set limits on vessel numbers and total catches that relate to the TAC set at the national level.

BSG qualification outcome

Walleye pollock caught from the Pacific Ocean stock by bottom trawl and gillnet qualifies for inclusion in the BSG.

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	Not considered

		2.2.1	Other species outcome	Not considered
		2.2.2	Other species management	Not considered
	ETP species	2.3.3	ETP species information	Not considered
		2.3.1	ETP species outcome	Not considered
		2.3.2	ETP species management	Not considered
	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	Walleye pollock (*Theragra chalcogramma*), *madara* (スケトウダラ)
Fishery location and season	The main fishing grounds for walleye pollock are around Hokkaido. The Pacific stock is distributed along

	the Pacific coast from Ibaraki prefecture to north of Nemuro (Fig. 1). The main pollock fishing season runs from about September through March, but fishing can generally take place throughout the year.
Gear type(s)	The main gears are single vessel bottom trawl (沖合底びき網，1そうびき) and gillnet (刺網).
Catch quantity (weight)	Landings of the Pacific stock by Japanese fisheries averaged 151,734 t from 2012 to 2016, with a 2016 estimate of 101,992 t.
Management authority	Fisheries Agency of Japan

Description of the fishery

In Japan, walleye pollock are managed as four stocks: Northern Japan Sea, Nemuro Strait, Southern Okhotsk Sea, and Pacific Ocean. In this assessment we focus on the Pacific Ocean stock, which currently appears to be at a moderate abundance level. The remaining three stocks were determined to be at relatively low abundance levels. Stock status (low, medium, or high) is evaluated relative to reference points that are based on historical abundance estimates and are not linked to maximum sustainable yield (MSY). Specifically, the total range of past abundance estimates is divided into thirds, and the third that the most recent abundance estimate falls into determines the status. When available, the limit reference point B_{lim} (defined as a historically low estimate of spawning stock biomass) is also used to determine status. If the spawning stock biomass is below B_{lim}, stock status is rated as low.

Harvests of the Pacific stock take place in four sea areas, defined as the Northeast Pacific (東北太平洋), West of Erimo (襟裳以西), East Hokkaido (道東), and the Kuril Islands (北方四島). Pollock are caught in both coastal and offshore areas. South Korea has harvested from this stock previously, but no Korean catches have been reported since 2000.

Figure 1. Distribution of the Pacific Ocean stock of walleye pollock. The distribution is outlined in pink, and spawning areas are shown in orange. Image from http://abchan.fra.go.jp/digests2018/html/2018_12.html

Table 1. Japanese fisheries landings of walleye pollock, separated by sea area.* Data available at http://abchan.fra.go.jp/digests2017/index.html

Year	Northeast Pacific 東北太平洋	West of Erimo 襟裳以西	East Hokkaido 道東	Kuril Islands 北方四島	Japan total	Total
2007	11,716	81,395	58,009	2,430	153,549	20,194
2008	17,440	73,552	61,852	2,409	155,254	22,143

2009	15,847	85,251	69,574	1,828	172,499	22,556
2010	12,998	96,103	64,889	1,485	175,474	23,236
2011	16,781	79,577	74,303	1,579	172,239	28,259
2012	17,687	70,114	67,127	1,244	156,172	28,554
2013	16,400	72,467	65,437	1,519	155,823	29,460
2014	19,752	63,929	70,256	400	154,337	24,716
2015	11,428	49,908	58,667	0	120,003	21,160
2016	11,815	40,293	49,884	0	101,992	24,321

*Data for 2015 and 2016 are preliminary.

Unit of Assessment(s)

The Unit of Assessment is defined as walleye pollock from the Pacific Ocean stock caught by bottom trawl and gillnet.

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 that are determined by historical data and are not directly linked to maximum sustainable yield (MSY).

Fishing effort in Japan is largely regulated through input controls (Makino 2011). For walleye pollock, effort is managed through input controls (regulation of the number of vessels that can fish) and output controls (total allowable catch). There are also management measures relating to minimum size limits.

Stock status outcome (1.1.1)

Scoring category	Yellow

Rationale:
For the Pacific stock of walleye pollock, the stock status indicator is the estimated biomass of age-2 and older pollock. The total range of past biomass estimates is divided into three parts, and the part that the most recent abundance estimate falls into determines the status. The 2017 estimate of biomass was 898,000 t, which was between the thresholds for medium status (500,000 t) and high status (1 million t, Fig. 2).

There is also an estimated B_{limit} for spawning stock biomass (SSB) of 151,000 t (Funamoto et al. 2014). The 2017 SSB estimate was 310,000, which was well above the B_{limit} (Fig. 3). There is no target reference point.

According to a preliminary, MSY-based assessment conducted in March 2018 for the Council for Promotion of Regulatory Policy Reform, the Pacific Ocean walleye pollock stock was above a sustainable abundance level in 2015, with an SSB_{2015} / SSB_{MSY} ratio of 1.59.

Based on the stock assessment result and SSB_{2015} / SSB_{MSY} ratio, stock status is very likely above a limit reference point. Stock abundance appeared to be above MSY in 2015.

Overall, it appears that the Pacific Ocean stock of walleye pollock is well above a limit reference point and has been determined to be at 'medium' status.

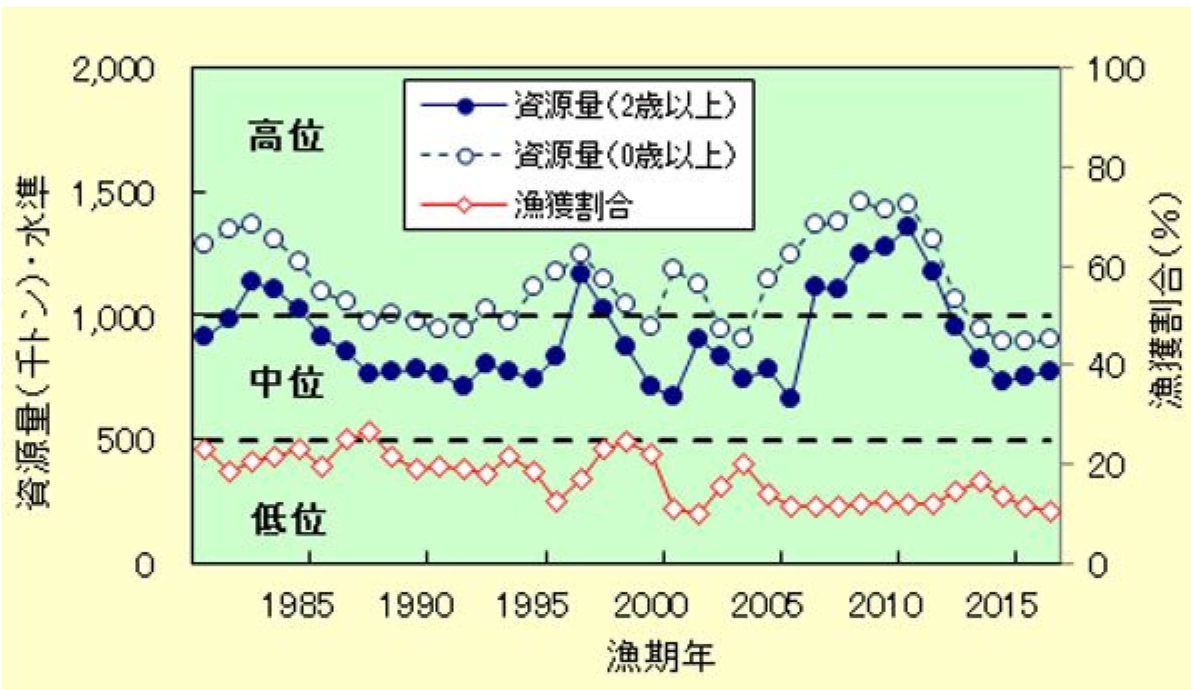

Figure 2. Estimated biomass (in thousands of t) of the Pacific Ocean stock of walleye pollock for fish age two and older (blue circles) and all fish age 0 and older (white circles outlined in blue), over time. The white diamonds outlined in red depict relative catch proportion (%) over time. The dashed lines separate the thresholds between high (高位), medium (中位), and low status (低位) level. Figure from http://abchan.fra.go.jp/digests2018/html/2018_12.html

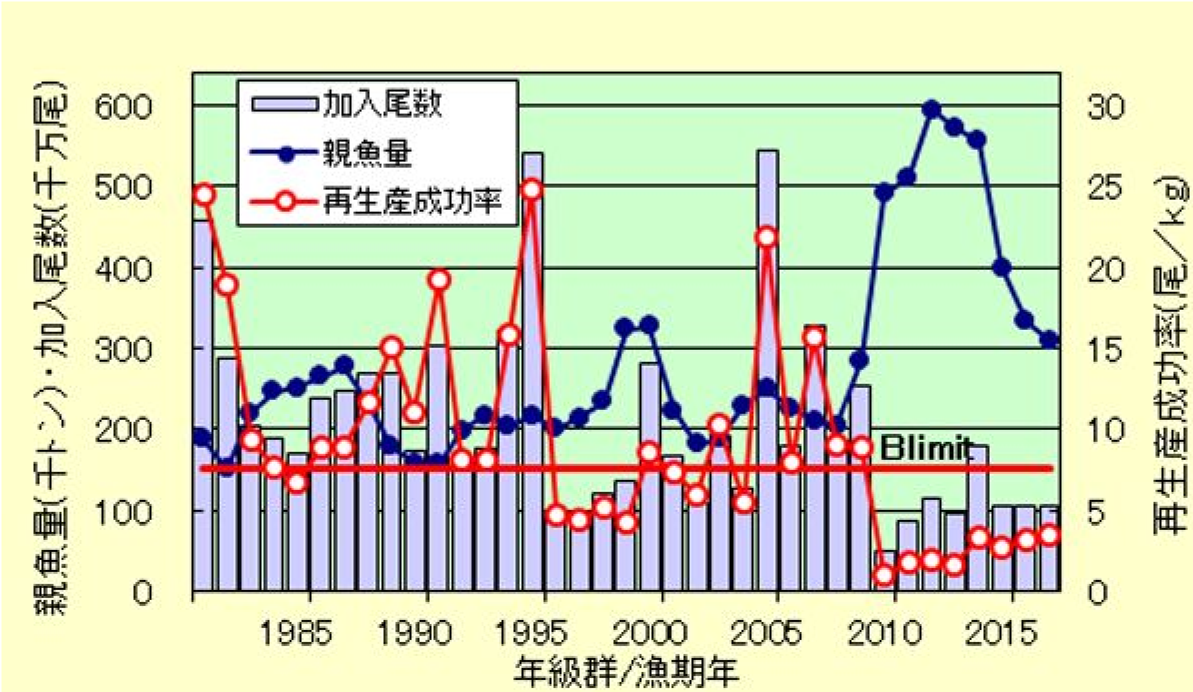

Figure 3. Estimated Pacific Ocean walleye pollock spawning stock biomass (blue circles, in thousands of t) and recruitment success rate (white circles, number of offspring per kg SSB) over time. The red horizontal line depicts the B_{limit} of 151,000 t, while the light blue bars show estimated numbers of recruits. Figure from http://abchan.fra.go.jp/digests2018/html/2018_12.html

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 the Pacific stock of walleye pollock, likely because a need has not been identified by the Japanese management system. Although not the focus of this assessment, we note that a recovery plan was developed the Japan Sea stock, which has shown clear signs of depletion.

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 structure, stock productivity, fleet composition, stock abundance, landings at major ports, field data from specific fisheries, and research conducted by the Japan Fisheries Agency and national research institutes (Hamatsu et al. 2017). FRA scientists assess the stock every year and estimate an acceptable biological catch (ABC), which is used to set a total allowable catch (TAC) for the stock. Since 2015, the TAC has been set at the ABC.[1] There are also management measures relating to a minimum size limit (body length 30 cm or total length 34 cm), where fishers must change fishing locations if more than 20% of the catch consists of pollock under this limit (Hamatsu et al. 2017). The goal of such measures is to protect immature fish. Thus all harvest strategy components required by the MSC standard, excluding HCRs, are present.

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 walleye pollock stocks. There is no evidence that exploitation is significantly reduced in response to stock depletion, although a recovery plan was developed and implemented for the Japan Sea stock. The Pacific stock does not have a recovery plan or effective HCR, and thus this indicator scores red.

Information and monitoring (1.2.3)

Scoring category	Yellow

Rationale:
Landings have been monitored for each of the four sea areas from which the Pacific stock is harvested, and these landings are separated into those from coastal and offshore fisheries (see data sheet posted at http://abchan.fra.go.jp/digests2017/index.html). Information at this level of detail has been collected since at least 1981. Information on fleet composition and catches by different gear types is also collected, and is likely sufficient to support a harvest strategy.

Assessment of stock status (1.2.4)

Scoring category	Yellow

Rationale:

[1] http://www.jfa.maff.go.jp/j/suisin/s_tac/kanren/attach/pdf/index-56.pdf

Scientists at the Japan Fisheries Research and Education Agency (FRA) assess walleye pollock stocks annually, although total biomass and spawning stock biomass are estimated only for the Pacific and Japan Sea stocks. For the Pacific stock, stock status is evaluated against reference points for estimated biomass (Hamatsu et al. 2017). 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 assessment appears appropriate to the species and could be used to develop an HCR.

Ecosystem impacts - Principle 2

Walleye pollock is primarily caught by single vessel bottom trawl (沖合底びき網, １そうびき) and gillnet (刺網). In terms of Japan's total harvest, bottom trawls catch about 68% of the harvest and gillnets about 25% (http://www.maff.go.jp/j/tokei/kouhyou/kaimen_gyosei/index.html). Single vessel bottom trawl vessels often also catch Pacific cod (*Gadus macrocephalus*), flounders (e.g. *Paralichthys olivaceus*), Okhotsk atka mackerel (*Pleurogrammus azonus*) and squids (e.g. *Todarodes pacificus*) in addition to walleye pollock. Gillnet vessels catch Pacific cod, Okhotsk atka mackerel, and righteye flounders (family Pleuronectidae).

Despite the availability of information on overall catches by fishing gear, there is no catch composition data for fishing vessels that are specifically targeting walleye pollock. Japanese fishers are not required to keep records on discards or bycatch, though they sometimes record catches of commercially important species. Since bait is not typically used with bottom trawls or gillnets, and bait species likely do not need to be considered.

Other species information (2.2.3)

Scoring category	Not considered

Rationale:
Due to the lack of bycatch monitoring, including fishery-specific data on other species caught and retained, insufficient information is collected to inform bycatch management and determine the fishery's risk to these other species.

Other species outcome (2.2.1)

Scoring category	Not considered

Rationale:
This indicator is not considered due to lack of information.

Other species management (2.2.2)

Scoring category	Not considered

Rationale:
This indicator is not considered due to lack of information.

ETP species information (2.3.3)

Scoring category	Not considered

Rationale:
This indicator is not considered due to lack of information. 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. Qualitative information about ETP species mortality resulting from the assessed fishery is not available.

ETP species outcome (2.3.1)

Scoring category	Not considered

Rationale:
This indicator is not considered due to lack of information. However, we used the SFW Unknown Bycatch Matrix information to preliminarily consider likely impacts on turtles, seabirds, and sharks from bottom trawl and bottom gillnets 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 are expected to be moderate to high concern for both gear types, while impacts on marine mammals, seabirds, and sharks are expected to be high (Table 2). However, if monitoring information or evidence can show that impacts on these potential ETP species are minimal, the score can be adjusted accordingly.

Table 2. Impacts of bottom trawls, bottom gillnets, and bottom longlines based on the Monterey Bay Aquarium SFW Unknown Bycatch Matrices.

Bycatch susceptibility category	Region	Bottom trawl	Bottom gillnet

		Score	Score
Sea turtle	North Pacific	3	2
Marine mammal	Northwest Pacific	1	1
Seabird	Northwest Pacific	2	1
Shark	Northwest Pacific	1	2
Benthic invertebrates	N/a	2	3
Finfish	N/a	2.5	2
Forage fish	N/a	2	2
Corals and other biogenic habitats	N/a	1	2

ETP species management (2.3.2)

Scoring category	Not considered

Rationale:
Since no information is available on the specific ETP species that may be affected, we could not score this indicator.

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).

Habitats information (2.4.3)

Scoring category	Yellow

Rationale:
Walleye pollock are often found at depths of 30 to 400 m,[2] and are fished on or close to the sea bottom. Bottom gillnets are likely set over sandy or muddy substrates, while trawls are dragged close to or along such substrates. According to guidance in the SFW fisheries standard, bottom

[2] http://www.fao.org/fishery/species/3017/en

gillnets generally have low habitat impacts when used over resilient mud/sand habitat, while bottom trawls used over such habitats have moderate impacts. FAO gear descriptions note that bottom trawls usually interact with bottom sediments, potentially resulting in removal or damage of benthic organisms and objects (FAO 2001). The Japan Coast Guard hosts a map website (CeisNet: http://www1.kaiho.mlit.go.jp/JODC/ceisnet/index.html) that includes maps of benthic habitats and sensitive areas such as coral reefs.

In summary, 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 risks to habitat from this specific fishery.

Habitats outcome (2.4.1)

Scoring category	Yellow

Rationale:
Based on information in the SFW Fisheries Standard, impacts on mud/sand habitat are likely to be low from bottom gillnets and moderate from bottom trawls. Muddy and sandy habitats are somewhat resilient, so walleye pollock fisheries seem highly unlikely to reduce structure and function of the commonly encountered habitats to a point where there would be serious or irreversible harm. However, there is no clear evidence to show that this is the case.

Habitats management (2.4.2)

Scoring category	Yellow

Rationale:
Bottom trawls cannot be operated within coastal areas according to the Basic Fishery Law (Article 52, Paragraph 1)[3]. There are fewer explicit restrictions on operations of bottom gillnets, though their habitat impacts are expected to be relatively low. However, the effectiveness of habitat measures has not been tested, and there is no quantitative evidence that they are being implemented successfully.

Ecosystem information (2.5.3)

Scoring category	Yellow

Rationale:

[3] http://jamarc.fra.affrc.go.jp/enganbiz/bizbox/sokobikiami/okisokotoha/okisoko.htm

Trophic relationships involving walleye pollock are broadly understood, but ecosystem impacts of pollock fisheries do not appear to have been studied in detail. There does not appear to be sufficient monitoring in place to detect increases in ecosystem risk level. As juveniles walleye pollock prey on copepods, then transition to consuming fishes, benthic crustaceans and cephalopods as adults (Maeda et al. 1983, Yamamura et al. 2002). Walleye pollock are a prey item for large fishes such as Pacific cod and halibut (Yamamura et al. 2004).

Ecosystem outcome (2.5.1)

Scoring category	Yellow

Rationale:
Fisheries harvest large quantities of walleye pollock, and some stocks are currently in a depleted state, although the Pacific stock does not appear to be one of them. 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). Walleye pollock 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

Rationale:
Management objectives relate more to the gear types used than to the target species. The largest fisheries harvesting the Pacific stock of walleye pollock are bottom trawl and gillnet fisheries. Offshore bottom trawl fisheries are managed as minister's permission fisheries (大臣許可漁業), while gillnet fisheries are managed as prefectural governor's permission fisheries (知事許可漁業).[4,5] Hence prefectural governments play a role in setting management objectives and issuing vessel permits. For example, the 2018 Hokkaido Prefecture Resource Management Guidelines (http://www.pref.hokkaido.lg.jp/sr/ggk/sigen/300905do-shishin.pdf) state a management objective of maintaining stocks at stable levels, and mention that non-fishing days are in place for gillnet fisheries.

However, objectives consistent with the precautionary approach are not apparent. Explicit bjectives relating to management of ecosystem impacts are also lacking.

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

4 http://www.pref.niigata.lg.jp/HTML_Article/646/950/no.6_kaigisiryou_siryou6~8,0.pdf
5 http://www.nemuro.pref.hokkaido.lg.jp/ss/sis/gyogyoukyoka.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 is regulated through permits and limited entry to the fishery, and harvests are managed by TAC. 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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