Methods and Guidance for the

Seafood Risk Assessment Tool

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1. Introduction

1.1 Scope

This document outlines the risk assessment method for Seafood Risk assessment (SRA) tool. The scope of the SRA risk assessment comprises a rapid assessment of the environmental risks for 1) wild capture species and 2) for farmed (aquaculture) species that are relevant to the Hong Kong seafood market.

Guidelines to help ensure that different assessors interpret the risk assessment criteria consistently are provided. A process is also described that details how the risk assessment results will be converted into a single score for wild caught and farmed species that aligns with the Hong Kong Sustainable Seafood Coalition (HKSSC) Voluntary Code of Conduct (VCC) on Responsible Fish and Seafood Sourcing.

1.2 Intention on how the risk assessments will be conducted

Each risk assessment profile will comprise the following information:

- Date of assessment, and name of the institution who undertook the assessment
- IUCN category[1] (wild capture or capture based aquaculture only)
- An overview of the biology and life-history of the species
- An overview of the capture or aquaculture production methods
- Seasonal availability
- Certifications (provide summary and links to certified producers if applicable)
- Details of relevant Fisheries / Aquaculture Improvement Projects
- Source country(s) risk assessment(s) as specified in Sections 2 and 3.

The aim is for risk assessments to take no longer than three days per profile. This will depend on the availability of information from and number of producer countries profiled. Ideally, each risk assessment will be carried out by fisheries and aquaculture experts who are familiar with the key risks associated for the species and country of production being assessed. Where this is not possible, a peer review process will ensure regional experts are consulted on the species profiles developed. Typically, completion of the risk assessments will require the undertaking of the following tasks:

- Desk-based review of key information sources to inform the completion of the risk assessment templates outlined in Section 2.
- If there are knowledge gaps, reaching out to in-country experts / fisheries managers to try and obtain further insights that will inform the risk assessment.
- A peer review process, if needed, whereby regional experts can provide feedback.

The draft risk assessments will then be sent to a technical team for review (see Section 4 for process) before being finalised and uploaded to the website.

[1] https://www.iucnredlist.org/

1.3 How outputs of the risk assessment should be interpreted

The outputs of the risk assessment provide a generalised indication of risk for the capture / production of a species in a particular catch area / country, based on desk-based research with some consultation with in-country fisheries management institutions, where needed.

The overall risk score shown on the website will be aligned with the risk criteria and scores outlined in the HKSSC Voluntary Code of Conduct (see Annexes 1 & 2). The intention is that the assessments will be used by HKSSC members and others in the seafood supply chain as a starting point for their due diligence. To help users further retrieve key information from their suppliers on sustainability, provenance, and legal aspects, key questions for a buyer to ask their supplier will be shown on each website profile.

2. Wild Capture Fisheries Risk Assessment Method

2.1 Background

The approach taken is a modified version of Productivity and Susceptibility Analysis (PSA). PSA has been used in a variety of contexts for bycatch and multispecies assessments, and is now widely used in various seafood assessment programmes. The utility of PSA is that it can be used in situations where there are limited data to provide an indication of risk. For the Hong Kong seafood market, the main benefit of using PSA is that the majority of the hundreds of fish and invertebrate species found on the wet markets are data-deficient, with limited data on the biology of the majority of species (very few will have stock assessments), the capture fisheries, and effectiveness of the fisheries management system.

The scoring matrix is found in the "*wild capture risk assessment method*". Risk assessments can be completed in MS Excel and based upon the following types of evidence, with sources fully referenced:

- Scientific peer-reviewed literature
- Fisheries management reports
- Online resources; e.g. FishBase, SeaLifeBase, IUCN redlist, FisheriesProgress.org
- Expert opinion (reference as pers. comms.)

The risk assessment covers three aspects:

1) The stock and management risk (section 2.2)
2) Gear risk – impacts of the gear on species and habitats (section 2.3)
3) A method for calculating the stock and gear risks into a single risk (section 2.4)

2.2 Scoring stock status

There are two pathways for the stock risk assessment to take:

- **Pathway A** – the Productivity and Susceptibility Analysis (PSA) for data-deficient fisheries. Applies to the majority of the fish species found on the Hong Kong market.
- **Pathway B** – for species where there is a stock assessment that measures stock biomass and fishing mortality in relation to biological limit and/ or target reference points (e.g. most tuna species).

Pathway A – Default – Productivity Susceptibility Analysis

Productivity attributes

Table 1 Productivity attributes scoring criteria.

		High risk	Medium risk	Low risk
Life-history parameters	Resilience	Low	Medium	High
	Average age at maturity	>4 years	2 – 4 years	<2 years
	Maximum size*	>100 cm	30-100 cm	< 30 cm
	Reproductive mode	Congregatory within fished/fishable areas and small number of large congregations relative to spawning area	Small groupings	No grouping
	Highly limited extent of geographic distribution or specialized habitat requirement **	A high risk category only for species with very limited distribution or very specific habitat requirement	NA	Widespread
Proxies for status	Catch Per Unit Effort (CPUE) (of species in question)	Declining	Stable	Increasing
	Catch composition (if no CPUE data)	Predominantly juveniles being taken (this is not because they are specifically being targeted – see susceptibility – but situation is due to reduced sizes in fishery)	Increasing number of smaller fish caught but less than 50% of catch is juveniles	Stable, no discernible trend

* Max size will be typically known for most species and has some relationship with max age (roughly) which can be a component of vulnerability

** can use IUCN limits – they have actual ranges for species with limited distributions

Five species life-history parameters and two proxies for the status of the species in the fishery underpin the productivity risk. FishBase[2] (or SealifeBase[3] for invertebrates) and the IUCN red list are useful repositories of information for assessors to score against the life-history parameters in Table 1. Note that for invertebrate species the maximum size criteria will not be applicable. Information for the life-history parameters are fixed for each species irrespective of the country sourced from.

[2] https://www.fishbase.se/search.php
[3] https://www.sealifebase.ca/

If additional information is available on Catch Per Unit Effort (CPUE)[4] or catch composition from a recent (up to 5 years old) scientific or fisheries management publication pertaining to the fishery under assessment, this proxy for abundance will also be assessed. Note that if information for a proxy exists this will have a stronger bearing on the final risk rating than life-history parameters (see Section 2.4 for an explanation).

Susceptibility attributes

Table 2 Susceptibility attributes scoring criteria.

		High risk	Medium risk	Low risk
Availability	Distribution	Species found only in the location being fished	Species has limited range and found only within the region	Species found in different regions/ globally distributed
Availability	Encounterability	Habitat preference of species makes it highly likely to encounter fishing gear **OR** fishermen able to access species in full extent of area being fished, leaving few possible refuges for population	Habitat preference and/ or occurrence in enforced Marine Protected Areas (MPAs) mean species is not accessible to fishing in some areas	Enforced MPAs protect the species in >30% of the area being fished
Availability	Accessibility (or predictability)	Aggregation-spawning or association with specific habitats make species very easy to access predictably (in time and/or space)	Some predictability but not highly specific in time and/or place in a way that concentrates fishing activity. **OR** Spawning year round, and fishing activity concentrated only at certain times.	Species spread out and available but not highly accessible or predictable in a way that could make overfishing easier
Targeting	Species selectivity	Species highly targeted, and very susceptible to being caught by gear **OR** species not targeted but taken unavoidably as bycatch in major fisheries	Species susceptible to being caught by gear	Species not targeted AND not very susceptible to being caught by gear
Targeting	Size selectivity	Species are specifically and extensively targeted as juveniles (could be plate sized or for grow-out to market size).	Some fishes targeted specifically in their juvenile size range and/or in their nursery habitats, and some taken as adults	Sizes taken are typically within the adult size range
Proxies	Economic value	Highly valuable (in top 15% of most valuable species). Species will be removed if encountered (whether targeted or only encountered opportunistically)	Moderately valuable	Low market value (in bottom 15% of species by value)
Proxies	Management measures and effectiveness	No management or no effectiveness of management	Some management, reasonably effective	Good and effective (i.e. enforced) management

Seven criteria were identified that underpin the susceptibility risk of the types of seafood being typically sourced by Hong Kong buyers.

- **Availability** – the three risk criteria for this theme capture the geographic range of the species in relation to the fishery being profiled (*Distribution*), the extent to which the species is likely to encounter fishing gear (*Encounterability*), and the predictability of the species for being

[4] CPUE is an indirect measure of the abundance of a target species. Changes in the catch per unit effort are inferred to signify changes to the target species' true abundance.

targeted, for example, through aggregation spawning events[5] in known localities (*Accessibility*).
- **Targeting** – the two risk criteria for this theme capture the extent to which the species is targeted / or susceptible to capture in the fishing gear (*Species selectivity*), and whether the species is extensively targeted as juveniles, i.e. before they are sexually mature (*Size selectivity*).

Appropriate sources of evidence used to score the above criteria could include peer-reviewed scientific literature, fisheries management reports, and testimony by a credible in-country expert (pers. comms.).

Two additional criteria have been added to capture further information that underpins the susceptibility risk:

- **Economic value** – the assumption (supported by scientific literature for many wildlife species) that highly valuable species are more likely to be overexploited (because of high profit margins). Market intelligence (particularly prices in the retail sector) will be used as evidence in scoring this criterion.
- **Management measures and effectiveness** – species that have management measures in place to reduce the risk of overexploitation will have a reduced susceptibility risk. Evidence to score against this criterion could include information from in-country fisheries management institutions including testimony by experts, provided a reasoned argument can be made for scoring. Note that many countries may have management measures in place, but these may not be specific to the species in question, and enforcement may not be effective. Hence, to score a low risk under this criterion sufficient evidence must be provided to demonstrate that management measures are suitable to preventing overexploitation of the species in question and enforcement (or compliance) is effective. Ideally evidence of this would come from peer-reviewed material of the effectiveness of the country's fisheries management system.

Pathway B – For species with a stock assessment

For species with a stock assessment that is sufficient to allow scoring against the criteria in Table 3 (next page), Pathway B should be used rather than the PSA (Pathway A). This will allow risks to be determined that consider the extent to which the stock biomass has been overfished and whether fishing mortality remains too high. For the South East Asia region, only a minority of species (mainly tuna and other pelagic species) will have stock assessments in place to allow scoring against Table 3.

Management effectiveness will also be assessed using the criteria outlined in Table 4 (next page). Also see the full description in the previous section for scoring this criterion.

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[5] Spawning aggregations is defined as a group of fish of the same species that are gathered together for the purpose of **spawning**—releasing sperm or eggs for the purpose of reproduction.

Table 3 Criteria for scoring species with a stock assessment.

	High risk	Medium risk	Low risk
Stock biomass	Below the limit reference point	Below the target reference point, though within safe biological limits	Fluctuating around or above the target reference point
Fishing mortality	Too high and will likely lead to recruitment overfishing (if this is not already happening)	Risk of overfishing	At a level consistent with the optimal exploitation of the stock **OR** stock underexploited

Table 4 Criteria for assessing management measures and effectiveness (see previous page for description).

	High risk	Medium risk	Low risk
Management measures and effectiveness	No management or no effectiveness of management	Some management, reasonably effective	Good and effective (i.e. enforced) management

2.3 Scoring main fishing gears

In the majority of cases, buyers of seafood in Hong Kong probably won't be able to differentiate between the gear (or fishing method) used in the capture of the species. As such, a generalisation has been made on the main capture methods used in the origin country that the species has come from, with the final risk scores erring on the potential of the gear to have the most damaging gear effects. Fisheries where prohibited methods (e.g. cyanide, indiscriminate bottom trawling) are known to be widely used will be scored a high risk by default.

The scoring criteria (Table 5) cover two risks:

- **Gear selectivity** – unselective gears / capture methods that lead to the mortality of unwanted or Endangered, Prohibited, and Threatened (ETP) species or high levels of bycatch[6] will lead to this criterion be scored a higher risk.
- **Impact on marine habitats** – indiscriminate use of gear that causes damage of sea floor habitats will be scored a higher risk.

[6] Bycatch is defined here as fisheries-related mortality or injury of species other than the retained catch. Examples of bycatch include discards, the incidental mortality of megafauna (e.g. marine mammals, seabirds, turtles), pre-catch mortality and ghost fishing.

Table 5 Criteria for determining gear(s) impact risk.

	High risk	Medium risk	Low risk
Gear selectivity and bycatch	Gear not selective and captures most species in its path, including ETP* species which cannot be readily avoided	Gear used to target particular species, though there is a risk of bycatch and mortality of ETP species. Levels of bycatch could be controlled by restrictions on time or place fished	Gear highly targeted, ETP species if caught have high survivability when released
Impact on marine habitats	Indiscriminate use of gear, likely impacting on vulnerable marine habitats	Potential risk of gear interaction with vulnerable marine habitats	Gear unlikely to cause damage to vulnerable habitats, either because fishing is unlikely to occur in these areas, or the type of fishing gear will not interact with vulnerable marine habitats

* Endangered, Threatened, and Protected species

2.4 Converting risk assessment results into single SRA score for wild capture profiles

To facilitate decision-making during seafood procurement, the outputs of each wild-capture risk assessment will be combined into a single score that aligns with the HKSSC Voluntary Code of Conduct (VCC) on Responsible Fish and Seafood Sourcing (see Annex 1), the wording of the VCC as follows:

- **High Risk** – No data available **OR** A data deficient and unknown stock status and/or high risk of decline to poor status without appropriate management/ineffective management and/or high environmental impact. If the fishery has high risk rating AND the species is listed as vulnerable, endangered or critically endangered or considered threatened in the national (source country) legislation, member should stop sourcing until an effective improvement plan (including monitoring) has been established and the risk rating has been reduced to medium. Any CITES II listed fish should be sourced legally with relevant permits.
- **Medium Risk** – Stable, not optimal but not poor status **AND** Actions identified to reduce environmental impact and/or improve management or stock status. May be data poor with stable catches and adequate and effective management.
- **Low Risk** – Certified to a third-party environmental sustainability standard **OR** Stable and productive low environmental impact fishery with precautionary management, proven effectiveness, ongoing stock status information / monitoring and confidence that the status will be maintained or further improved (maximum sustainable yield). If the stock is data poor then measures are in place to improve data collection.

In calculating averages, score the following:

- High risk = 3
- Medium risk = 2
- Low risk = 1

The final SRA risk rating will result from the method outlined in Table 6 (see Annex 3 for a worked example). The final risk rating will be allocated on the basis of where the final score fits in relation to the following ranges:

- **High risk** = 2.5 - 3
- **Medium risk** = 1.6 – 2.4
- **Low risk** = 1 – 1.5

Table 6 Method for calculating the final SRA risk score that will be shown on the website.

			Guidance
Stock status risk	**Pathway A**	Productivity risk combined score	If CPUE data or catch composition data available use the risk score derived from this for the final productivity score. In the absence of this data take an average of the five life-history parameters.
		Susceptibility risk combined score	Take average risk score across the seven parameters.
		PSA risk combined	**= Average of Productivity + Susceptibility risk** (P+S) / 2
	Pathway B	Stock risk	= Average of Stock Biomass + Fishing Mortality risk (B+F) / 2
		Management effectiveness	Scored according to criteria on page 6
		Stock risk combined	**= Average of Stock risk + Management effectiveness** (S+M) / 2
	Gear impact	**Gear risks combined**	**= Average of Bycatch risk + Habitat impact risk** (B+H) / 2
	TOTAL	**SRA Risk Score**	**= Average of Stock status risk + Gear risk** (S + G) / 2

Please view Annex 4 on a comparison between how scores for this risk assessment compare with those of WWF assessments (using their 2014 Seafood Guide).

3. Aquaculture Risk Assessment Method

3.1 Background

A key requirement of the HKSSC VCC is that the farm is audited to a good aquaculture standard[7] or code of practice (Annex 2). Given that not all seafood suppliers will be sourcing directly from a farm, and perhaps only know the country of origin of the aquaculture species they are sourcing, the initial risk assessment profiles have been created at a country level. This will mean that some of the risks have been generalised according to what is typically known about the effectiveness of aquaculture governance in place in a country and impacts of the main types of production.

[7] See the GSSI for credible aquaculture standards https://www.ourgssi.org/gssi-recognized-certifcation/

However, it should be noted that the risks outlined in Table 7 (page 11) will vary significantly between different farms and regions. In order to signpost the user to best practices, each aquaculture profile will signpost the user to relevant third-party certification schemes such as the Aquaculture Stewardship Council (ASC)[8] or Best Aquaculture Practices (BAP)[9]. In the absence of third-party certification, it is envisaged that the risk criteria in Table 7 could initially inform the basis for internal audit questions to be asked of suppliers.

3.2 Scoring aquaculture risks

Criteria have been developed to score risk as 'high', 'medium' or 'low' against the following seven factors:

- **Farm siting**: have the farms been responsibly sited with respect to impact on the local ecosystem, and in compliance with local planning laws?
- **Nutrient pollution**: is the farm stocked at the appropriate level, and does it take into account nutrient loading from neighbouring farms?
- **Feed**: does feed come from a responsible source, such as a third-party certified fishery?
- **Disease, medicine, and chemicals**: are treatments in accordance within prescribed limits, is there evidence of the use of banned substances? Are disease outbreaks reported?
- **Introductions / Genetics**: is there potential for accidental introductions of non-native species (e.g. hybrid grouper) into marine ecosystems?
- **Wild Seed:** does the gathering of larvae/ juveniles take into account the impact on wild populations?
- **Fish Welfare:** is a veterinary health plan in place to address all aspects of fish welfare and food safety? Are measures also in place to prevent and control disease and/or parasites, such as vaccinations (where appropriate)?

The evidence used to score these risks could come from peer-reviewed scientific literature, FAO[10] reports, management schemes, and third-party certification reports. Where appropriate, expert opinion could also be used.

For some farmed species, there was insufficient publicly available information to undertake an informed risk assessment at a country level. In these situations a general narrative has been put together for the country based on limited information, though the aquaculture risk criteria have not been assessed. Going forward, it is envisaged that these information gaps will be addressed through speaking with in-country experts, who have knowledge of the main farming methods and a detailed understanding of the regulatory requirements governing the production of the species in question.

[8] https://www.asc-aqua.org/
[9] https://www.bapcertification.org/
[10] Food and Agriculture Organisation of the United Nations http://www.fao.org/aquaculture/en/

Table 7 Aquaculture risk assessment criteria. Note that two factors; disease, medicine and chemicals and wild seed have critical criteria defined. Farms undertaking these practices should not be sourced from.

	CRITICAL	High risk	Medium risk	Low risk
Farm siting		Planning laws don't exist **OR** Planning laws exist on paper but not implemented	Planning laws in place, though don't completely mitigate all risks concerned with farm siting **OR** Planning laws exist but not fully enforced/ only partially effective	Farm certified against a credible third-party standard that addresses farm siting risks. **AND/ OR** Effective planning laws in place that ensure farms have been situated in a way that minimises impact on the local environment, also considering siting in relation to other farms. **OR** Regulations do not exist for pond siting; however, farm locations are historic and there is minimal new development.
Nutrient pollution		The farm does not measure inputs of feed and there are no water quality records.	There is some monitoring of water quality and feed use, though not to any prescribed standard. Monitoring records are incomplete. **OR** The cumulative impacts of nutrient pollution from neighbouring farms in the area are not taken into account during site planning.	Farm certified against a credible third-party standard that addresses nutrient pollution/ water quality issues **OR** Operations don't cause nutrients to be released into the environment (e.g. shellfish farms, or recirculating aquaculture systems)
Feed source		The source of feed is undocumented or shown to come from an unsustainable fishery.	The farm can evidence that >50% of the feed comes from a responsible source i.e. one that is either certified or in a FIP. **OR** The farm is using some fishmeal in feed, though the quantity and source is unknown.	Farm certified against a credible third-party standard that ensures that feed is from a responsible source that is sustainable. **OR** The farm does not use feed in its operations (e.g. shellfish farms). **OR**

				The species grown does not require fishmeal in its feed and / or the majority of feed ingredients are sourced sustainably (i.e. fishmeal that is certified to MSC or MarinTrust (formally IFFO RS) approved).
Disease, medicine and chemicals	The farm is using banned substances.	The farm does not record medicines and chemicals being used.	The farm can evidence that medicines and chemicals are legal, though records incomplete. **OR** Disease known to be a common problem in the species.	Farm certified against a credible third-party standard that ensures that any medicinal and chemical treatments are suitable and controlled. **OR** The farm does not use medicinal and chemical inputs in its operations.
Introductions / Genetics		There is a high risk of escapes from the farm and these are likely to establish themselves and compete with native species/ populations.	There is a risk of escapes from the farm, though the best available evidence suggests that it is unlikely that the cultured species will establish in the wild.	Farm certified against a credible third-party standard that ensures enclosures are adequately maintained and escapes minimised. **OR** The farm operation does not pose a risk to native species/ populations, as the species is already native to the country AND farmed species genetics unlikely to establish in the wild
Wild seed	The wild species seed is cited by the IUCN as vulnerable, endangered or critically endangered or is considered threatened in the national (source	The operation relies on 100% wild seed collection and is likely having an impact on wild population(s) of the species.	The operation relies on wild seed collection, and the **status of wild population(s) is unknown**. **OR** A small percentage (<10%) of the wild seed collection may be having an impact on the wild population. **OR** The operation relies on 100% wild seed collection, and may be **having an impact on the wild population**. However, **seed collection is properly managed.**	Farm certified against a credible third-party standard that ensures seed comes from certified hatcheries and impacts on wild populations are minimal. **OR** The operation does not rely on the collection of wild seed. I.e. the seed comes from second generation broodstock in closed loop hatchery production. **OR** The operation may rely on **some** wild seed collection, though all wild population(s) of the **species is healthy (i.e. not overexploited)**.

	country) legislation AND an assessment of the wild seed fisheries indicates high risk.			
Fish Welfare		Serious issues with husbandry that compromise the welfare of the fish during captivity or slaughter.	Aspects of animal husbandry not properly controlled (e.g. stocking densities not recorded/ managed). There is no veterinary care plan. Inadequate source of feed to provide essential nutrition. **OR** Slaughter not carried out to international best practice guidelines.	Farm certified against a credible third-party standard that ensures a high standard of welfare, including humane slaughter. **OR** The operation demonstrates good animal husbandry appropriate to the cultivated species. I.e. there is a veterinary care plan in place.

3.3 Converting risk assessment results into single SRA score for aquaculture profiles

To facilitate decision-making during procurement, the outputs of each aquaculture risk assessment will be combined into a single score that aligns with the HKSSC Voluntary Code of Conduct (VCC) (see Annex 2).

The VCC for farmed species takes a slightly different approach to wild-catch species, such that members sourcing decisions will be based on the outcomes of a farm audit against a good aquaculture standard or code of practice. If the audit is non-compliant, the farm will have to undertake corrective actions for buyers/suppliers e.g. HKSSC members to continue sourcing from it.

For the purpose of the website profile summaries, the single SRA risk score will reflect the highest scored risk factor in the assessment. For example, see worked example for Kuruma prawn in Table 8.

Table 8 Worked example for Kuruma prawn.

	Number of risks in each category			
Country	**High**	**Medium**	**Low**	**Final SRA score**
China	2	3	2	High risk
Japan	-	4	3	Medium risk
France	-	3	4	Medium risk

This would mean that a profile that had one factor that was scored high risk and all other factors scored a low risk, would overall be scored a high risk. This is defensible, as it will be important to clearly communicate the highest risk factor(s) to seafood buyers so that they can make these the focus of any audit of their suppliers.

Please view Annex 4 on a comparison between how scores for this risk assessment compare with those of WWF assessments (using their 2014 Seafood Guide).

4. Profile quality assurance

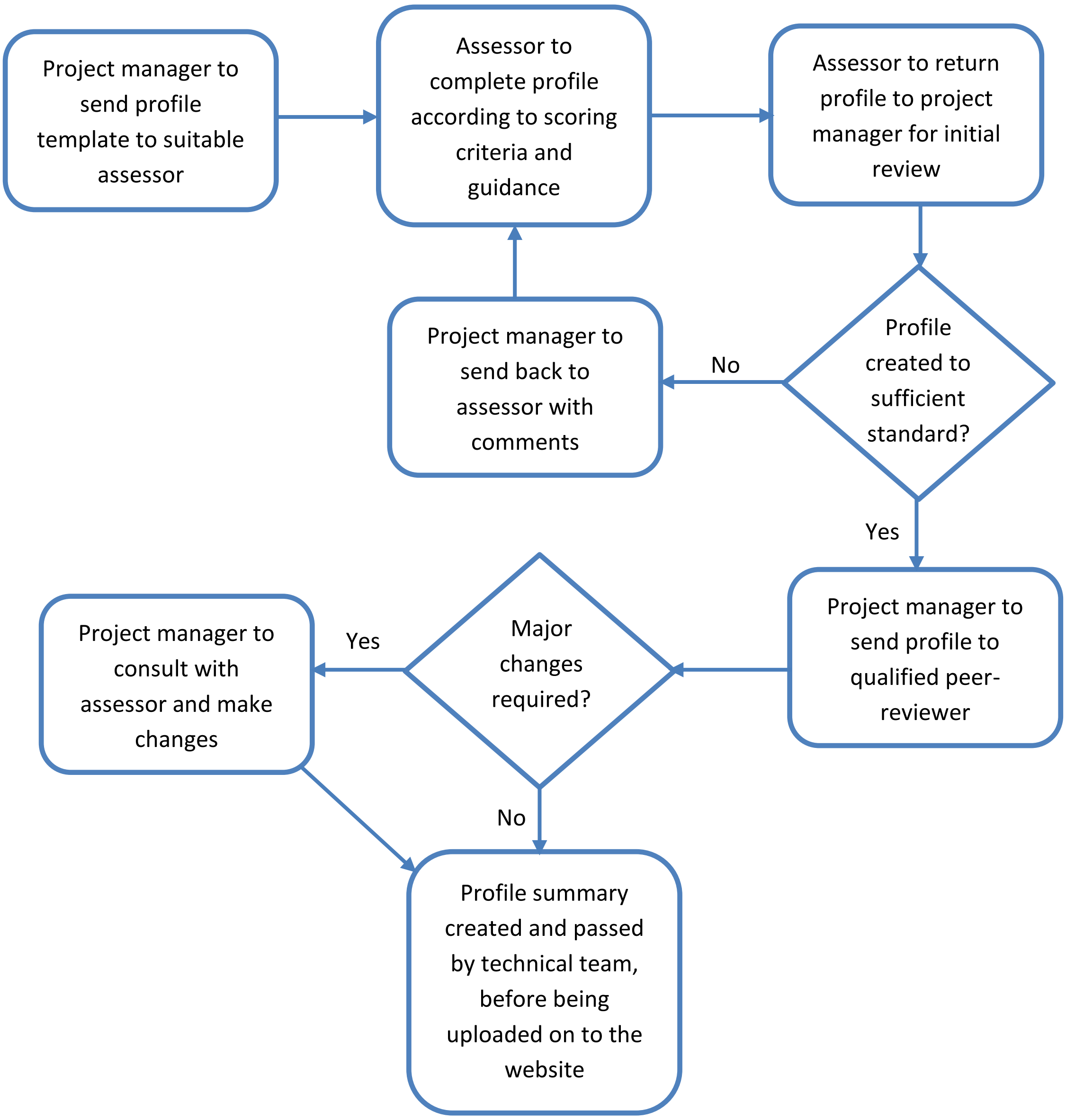
To ensure that risk assessments are accurate and based on the best available evidence, and the final SRA rating and summary is a fair reflection of the key risks, the following process (see Figure 1 for detailed process flow) will be adhered to:

1) Risk assessments will be conducted by expert assessors, ideally who have specific knowledge of the species and country fisheries / aquaculture management.
2) The risk assessments will be submitted to the project manager for initial review.
3) Each risk assessment will, where needed, also be peer-reviewed by an expert familiar with the production and biology of the species, and sent back to the assessor to finalise.

4) Summaries of the information contained in each risk assessment will be created for the website (see Annex 5 for example), this will necessitate the assessor converting the outputs from each risk assessment into a single score that aligns with the VCC (see Sections 2.4 and 3.3).
5) These summaries and full assessment documents will be reviewed by the technical team before being uploaded to the website.

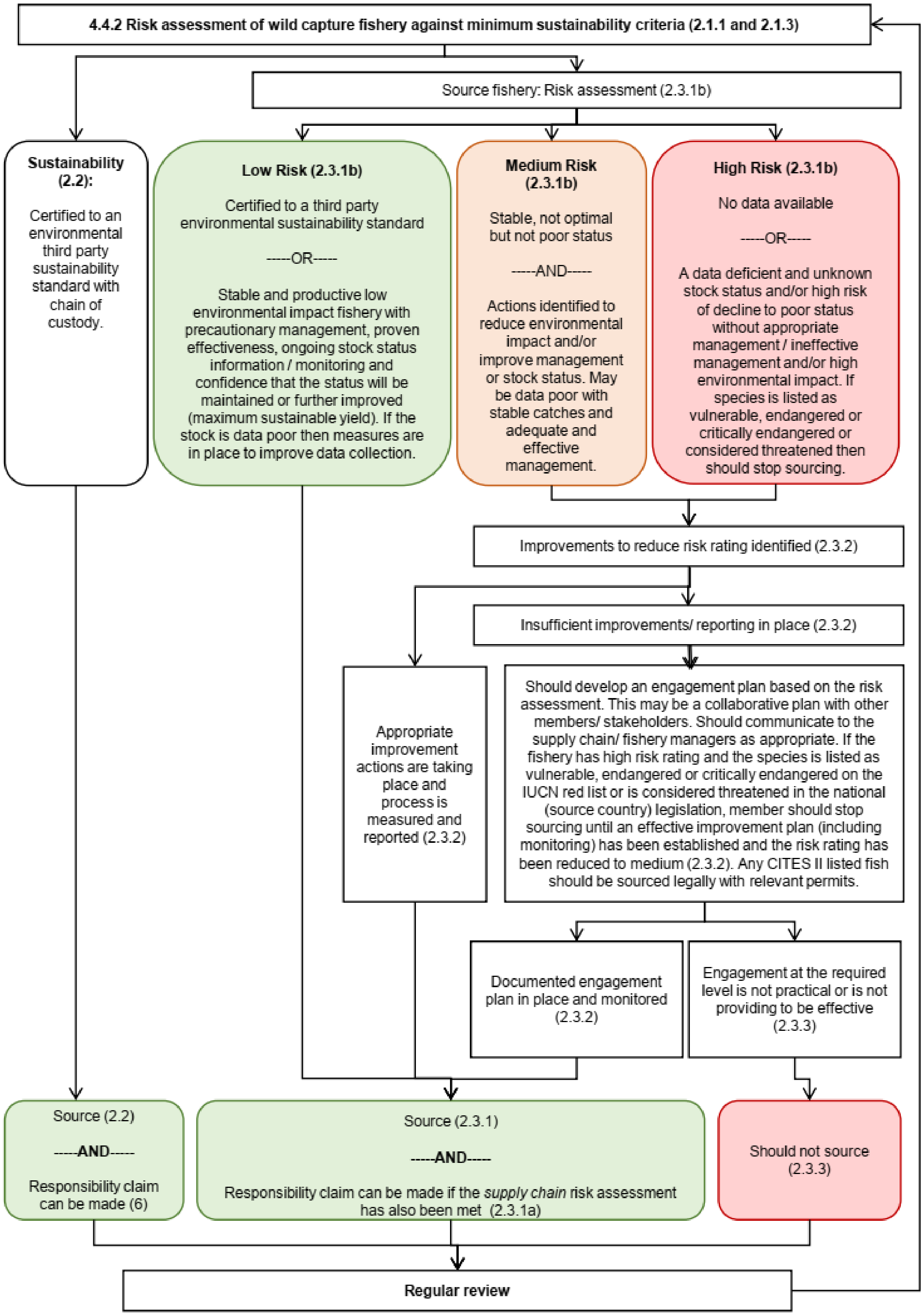
Note that the evidence used as the basis for the risk assessments will likely improve over time, therefore each profile will be reviewed periodically (depending on the frequency that information is likely to change).

Figure 1 Process flow for profile quality assurance

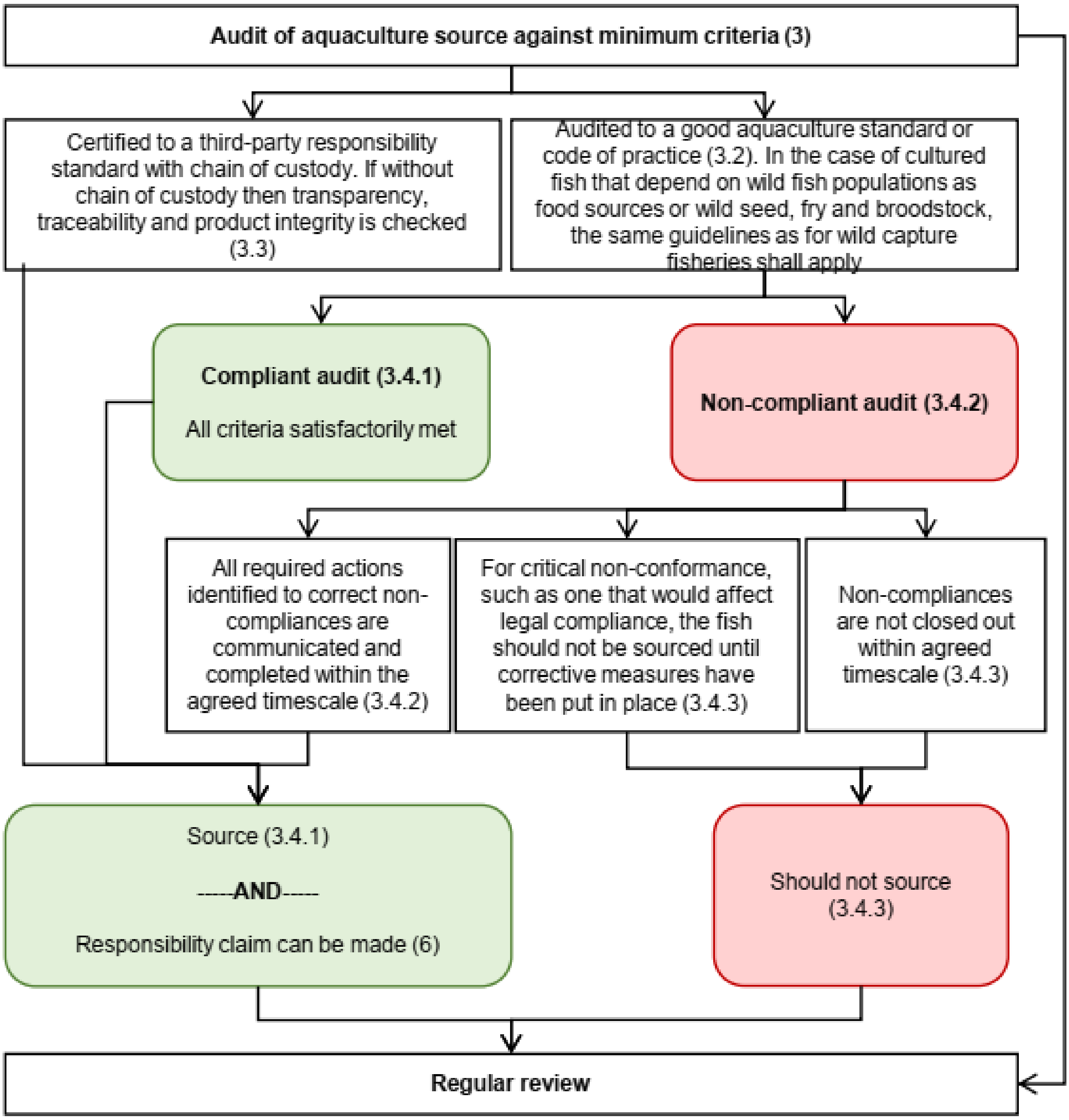


Annexes

Annex 1 - Decision tree for sourcing wild capture fish (Figure 2, page 8 of the VCC)



Annex 2 - Decision tree for aquaculture sourcing (Figure 3, page 9 of the VCC)



Annex 3 – Worked scoring example for wild-catch species

Leopard Coral Trout risk score calculations:

Australia

Pathway B stock risk score = (1 + 1) / 2 = 1
Management effective = 1
Combined = (1 + 1) / 2 =1
Gear impact risk score = (1 + 1) / 2 = 1

SRA risk score = (1+1) / 2 = 1 therefore **low risk**

Indonesia

Pathway A productivity proxy score = 3
Susceptibility score = 19 / 7 = 2.7
PSA risk = (3 + 2.7) / 2 = 2.85

Gear impact risk score = (3 + 3) / 2 = 3

SRA risk score = (2.85 + 3) / 2 = 2.93 therefore **high risk**

Philippines

Pathway A productivity proxy score = 3
Susceptibility score = 16 / 7 = 2.3
PSA risk = (3 + 2.7) / 2 = 2.65

Gear impact risk score = (3 + 3) / 2 = 3

SRA risk score = (2.65 + 3) / 2 = 2.83 therefore **high risk**

Annex 4 – Comparison of SRA risk assessment outputs against the WWF Seafood Guide (2014)

Wild capture profiles

Species	**SRA proposed score** (and comments)	**WWF score**
Leopard Coral Trout		
- Australia	**Low risk** – stock assessment data suggests that management is effective	Hook and line - recommended
- Philippines	**High risk** – catches declining, management effectiveness not assessed, can be caught with cyanide	Hook and line - avoid
- Indonesia	**High risk** – very limited management, high percentage of juveniles in declining catches	Hook and line - avoid
Squid (*Uroteuthis edulis*)		
- Vietnam	**High risk** – most recent catch trends suggest numbers are declining, no species-specific management in place	Bottom trawling - avoid
Squid (*Uroteuthis duvauceli*)		
- Sri Lanka	**High risk** – data deficient, some management measures in place, though effectiveness unknown	Bottom trawling - avoid
Yellowfin tuna		
- Western & Central Pacific	**Medium risk** – stock not overfished and no overfishing, concerns on effectiveness of management measures, including low observer coverage on longline fishery, and high incidence of capture of juveniles on FAD purse seine fisheries	Indonesia & Philippines – hand lining, purse seine - think twice Pelagic longlining - avoid
Bluefin tuna		
- NE Atlantic	**Medium risk** – some uncertainty over stock status, though strict controls in place have ended over-fishing	NE Atlantic - avoid
Spiny lobster (*Panulirus ornatus*)		
- Australia	**Low risk** – fishery generally well-managed, hand picking has minimal impact on the environment	Queensland – hand picking - recommended
- Philippines	**Medium risk** – little information on capture fisheries, fry typically caught and grown out in pens	**Not assessed**

Aquaculture profiles

Species	**SRA proposed score** (and comments)	**WWF score**
Giant grouper		
- Hong Kong ATA	**Low risk –** ATA indoor production only as risks carefully managed	Indoor tanks AFFS certified - recommended
- China	**High risk** – concerns of sustainability of feed inputs, and effluent pollution from farms	**Not assessed**
- Taiwan	*As above*	**Not assessed**
- Indonesia	*As above*	**Not assessed**
Grey mullet		
- Hong Kong	**Medium risk** – reliant on wild seed collection, most of which comes from Mainland China. Some wild seed is imported from Taiwan (this is relatively less common due to the high asking prices) where the wild stock is overexploited.	Outdoor ponds AFFS certified – think twice
- Taiwan	**High risk** – wild population at risk from overexploitation, limited regulatory oversight of farm siting	**Not assessed**
Mangrove (red) snapper		
- Malaysia	**High risk –** trash fish is still a common source of feed, limited regulatory oversight of farm siting	**Not assessed**
- Hong Kong	Insufficient data to assess risk	Outdoor ponds AFFS certified – think twice
- Philippines	Insufficient data to assess risk	**Not assessed**
- Singapore	Insufficient data to assess risk	**Not assessed**

Annex 5 – Example of profile summary for website upload

Spiny Lobster (*Panulirus spp*)

Date of Assessments

July 2020

Assessment Organisation

RS Standards

Peer reviewer

Dr Clive Jones, Associate Professor,
James Cook University

Alternative names

Panulirus ornatus

Common Name(s): • English: Ornate spiny lobster, tropical rock lobster, ornate rock lobster, ornate tropical rock lobster • French: Langouste ornée • Spanish: Langosta ornamentada

Filipino: Banagan • Cantonese (龍蝦、花龍、彩龍、錦繡龍蝦) • Thai: Kung mangkon

Panulirus homarus

Common Name(s): • English: Scalloped spiny lobster • French: Langouste festonée • Spanish: Langosta festoneada

Filipino: Banagan • Cantonese (青龍、波紋龍蝦) • Thai: Kung mangkon

IUCN Category

Least Concern

Overview

- *Panulirus ornatus* and *Panulirus homarus* are the only two spiny lobster species being developed for aquaculture, and the FAO production statistics do not differentiate between the two. Generally speaking, *P. ornatus* is the main cultivated species in Vietnam, with a developing aquaculture industry for *P. homarus* in Indonesia.
- **Production of *P. ornatus* accounts for ~80% of farmed spiny lobster**, and in 2016 was estimated to be about 1600 tonnes, worth more than US$120 million

- *P. ornatus* and *P. homarus* are tropical spiny lobster species native to the Indo-Pacific region that have become popular aquaculture species in recent decades. A surge in demand for these crustaceans came in the 1980s from China as the middle class began expanding, and led to the farming system that now exists in several Southeast Asian countries.
- The wild fishery for large *P. ornatus* began to experience declines in the 1990s due to overfishing, so fishermen turned to catching smaller lobsters and fattening them up in pens, a process known as ranching.
- *P. ornatus* is currently farm-raised in Vietnam, Indonesia, Philippines, and Malaysia.
- Farming of *P. homarus* is currently being expanded in Indonesia with support from Australian aquaculture research.
- Aquaculture of the species is **entirely dependent upon wild caught juveniles** as hatchery technology has not reached commercialization scale due to the lobster's lengthy larvae stage.
- Spiny lobsters are primarily caught in the puerulus stage (plural pueruli), a postlarva stage during which they do not feed and actively swim toward the coast to settle. Puerulus resemble the adult lobster form but is not yet a juvenile until after the first molt.
- As the industry continues to expand, there are concerns regarding sustainability of seed supply, feed source, disease and pollution. At present there is no hatchery supply for *P. ornatus* or *P. homarus*. Whilst the majority of producers are using trash fish as feed, formulated pellet feeds are becoming increasingly available.
- New policy developments in Indonesia with support from Australia will focus on the commercialisation of manufactured feeds and a requirement that they be used rather than trash fish.

Main production methods

Net pens / cages	Spiny lobster aquaculture takes place in net pens and cages in coastal waters. Floating cages consist of netting that is suspended from the surface and moored to the bottom, meanwhile pens are made up of netting that reaches the seafloor, enclosing the bottom of the pen. Both pens and cages are typically homemade with local materials, such as bamboo and rope, and square in design. Multiple square cages or pens with different sized lobster may be tied together, enabling ease of access for the farmer. The nursery stage also occurs in floating net cages or pens on the seafloor.

Certifications

None

Aquaculture Improvement Projects

None identified

Supplier questions

Can your supplier provide the following information?

- The *latin* species name
- Evidence of the country of origin, name and location of the farm
- Evidence that the farm is compliant with national regulations
- Evidence that production is controlled in a way that minimises impact on the wider marine environment (i.e. there is local planning, water quality testing etc.)
- Evidence of where the seed originates
- Evidence that the seed used on the farm has come from sustainable sources
- Evidence of where the feed originates
- Evidence that the feed used on the farm has come from sustainable sources
- Evidence that the farm does not use any banned medicines / chemicals
- Evidence that there is a plan / procedure in place to manage animal husbandry

If all of this evidence can be obtained, the farm from which the spiny lobster is sourced could be considered to be a low risk.

Country specific risk assessments

VIETNAM

Risk summary

- Spiny Lobster production in Vietnam can be considered to be a **high risk**.
- The main spiny lobster species farmed in Vietnam is *Panulirus ornatus*.
- Whilst planning laws exist, they are not effective at mitigating all environmental impacts. Feed typically comes from "trash fish" and conversion very inefficient, typically requiring 25-50kg of input for every 1kg lobster produced.
- Disease is also a major problem in the lobster aquaculture industry of Vietnam, due to high density, pollution created by feed, and poor nutrition from feed.
- Vietnam boasts the most productive tropical lobster aquaculture industry in the world. When the wild capture fishery began declining, with decreasing catch and size, Vietnamese fishers began holding on to the smaller lobsters until they reached a larger size and were ready for market.
- Lobster farming methods have not changed much since development in the 1990s. Grow out facilities include cages originally built in shallow water with netting and wooden stakes secured into the seafloor; most are now a floating design moored to the bottom, made with re-used plastic drums and timber, exhibiting square cross section cages that together create a framework of numerous cages.

INDONESIA

Risk summary

- Spiny Lobster production in Indonesia can be considered to be a **medium risk**.
- The main spiny lobster species farmed in Indonesia is *Panulirus homarus*.
- Planning laws are only partially effective, and there is less regulation in Indonesia than in other countries, although this is now changing.
- There is a high reliance on wild-caught fish for feed, with very inefficient conversion rates. However, new policy in Indonesia with support by Australia will focus on the commercialisation of manufactured feeds and a requirement that they be used rather than trash fish.
- Disease is less of a problem than in other regions due to the smaller number of producers.
- Lobster aquaculture began in Indonesia in the early 2000s. The industry is still in a developmental stage, but production has steadily increased over the past several years, as has its geographic footprint.

PHILIPPINES

Risk summary

- There is **insufficient information** to assess the risk of spiny lobster production in the Philippines.
- A small amount of lobster farming takes place in the Philippines where it is largely undertaken on a subsistence scale.
- A substantial wild seed resource has been confirmed along the east coast of the Philippines in 2018 through a USDA funded project. The resource has not been quantified, but is sufficient to support a large-scale lobster farming industry.
- The Philippines government recently announced a National Lobster Development Plan to provide a framework and resources to support development of a sustainable industry. The Philippines can be considered to be one to two years behind Indonesia, with similar potential.

MALAYSIA

Risk summary

- There is **insufficient information** to assess the risk of spiny lobster production in the Malaysia.
- Lobster aquaculture has not developed in Malaysia as it has in the other countries noted, and investment has stalled.
- The Integrated Lobster Aquaculture Park developed for *P. ornatus* in 2014 was intended to act as a hatchery as well as a grow out facility, taking the lobster from larvae to market size. However, as of 2015 there was no production from the facility following the exit of the main investor.