SPRFMO
South Pacific Regional Fisheries Management Organisation

9TH MEETING OF THE SPRFMO COMMISSION

Held remotely, 25 January – 3 February 2021

COMM 9 – Obs 04

FAO IUU estimation methodology series Concept Note and Collaboration Proposal

FAO Operations and Technology Branch (NFIO)

In 2015 the FAO convened a workshop to consider methodologies for estimating IUU fishing at the global level which resulted in a number of action items including the development of methodologies and indicators of IUU fishing and the development of a field guide for practitioners. The final component is to apply the methodologies to a range of global case studies.

In this regard, in November 2020, the FAO emailed the Secretariat concerning FAO's ongoing work on IUU methodology study/estimations and proposing a possible collaboration with SPRFMO for one of the case studies proposed (high seas jumbo flying squid- *Dosidicus gigas*) for an upcoming Volume 4 on IUU fishing in 2021. Following this, a video conference was held between the FAO (Glenn Quelch- MSC and Compliance – Fishing Operations and Technology Branch) and the Secretariat in early December where more of the background to the IUU methodology and the proposed assessment process (including a FAO developed field guide) was explained. The proposed jumbo flying squid (*Dosidicus gigas*) case study is one of 6 case studies involving multispecies, species groups, and single species across broad geographical areas and diverse fisheries.

While FAO is the overall lead on the case studies (Volume 4) it is suggested that SPRFMO undertake the estimation exercise for jumbo flying squid, with FAO NFIO acting in a support role, on hand for clarifications and guidance where required. A Concept Note and Collaboration Proposal has been prepared by the FAO for consideration by SPRFMO supplemented with additional information such as a Table outlining the various types of data that could be sourced and a sample template of data compilation.

Given that the information required to complete the case study is wide ranging, the engagement of key MCS personnel from interested Member States as well as the Scientific (and other) expertise would be required to aid the Secretariat in formulating a detailed response to complete the case study. This will require in-kind resources from SPRFMO, FAO and the Member States. While the exact effort required is yet to be determined, giving due consideration to the types of data, information and analysis required it is likely to require a considerable commitment from both the Secretariat and Members. Additionally, given that statistical rigour is required in exercises of this nature, the broader SPRFMO assessment team will need to include individuals with the appropriate expertise.

COMM9 is invited to:

- Consider carefully the proposal from FAO for the Secretariat and interested Members to participate in an IUU case study for jumbo flying squid; and
- Provide guidance to the Secretariat on the level of engagement SPRFMO should dedicate to this proposal.

Concept Note and Collaboration Proposal

Volumes 3 and 4

FAO IUU estimation methodology series

Background

In 2015 FAO convened a workshop to consider methodologies for estimating IUU fishing at the global level. The workshop suggested that FAO could: (i) coordinate a 'Study of IUU fishing studies' to review the different methodologies being used to estimate IUU fishing; (ii) lead a process to develop technical guidelines for future studies so they could be conducted in a way that would allow for estimates to be combined to contribute to a global estimate; and (iii) consider indicators of IUU fishing for inclusion in FAO's bi-annual SOFIA publication.

Since then, a Global Review of Studies (vol. 1) was completed in 2016 and Guiding principles and approaches on methodologies and indicators for the estimation of the magnitude and impact of IUU fishing (vol. 2) were put forward in 2018.

The work outlined below will be the basis for a third and fourth volume: these being a field guide for practitioners (volume 3) and a series of applied case studies (volume 4).

Finally, a possible fifth volume could use these case studies to examine and estimate a range of impacts.

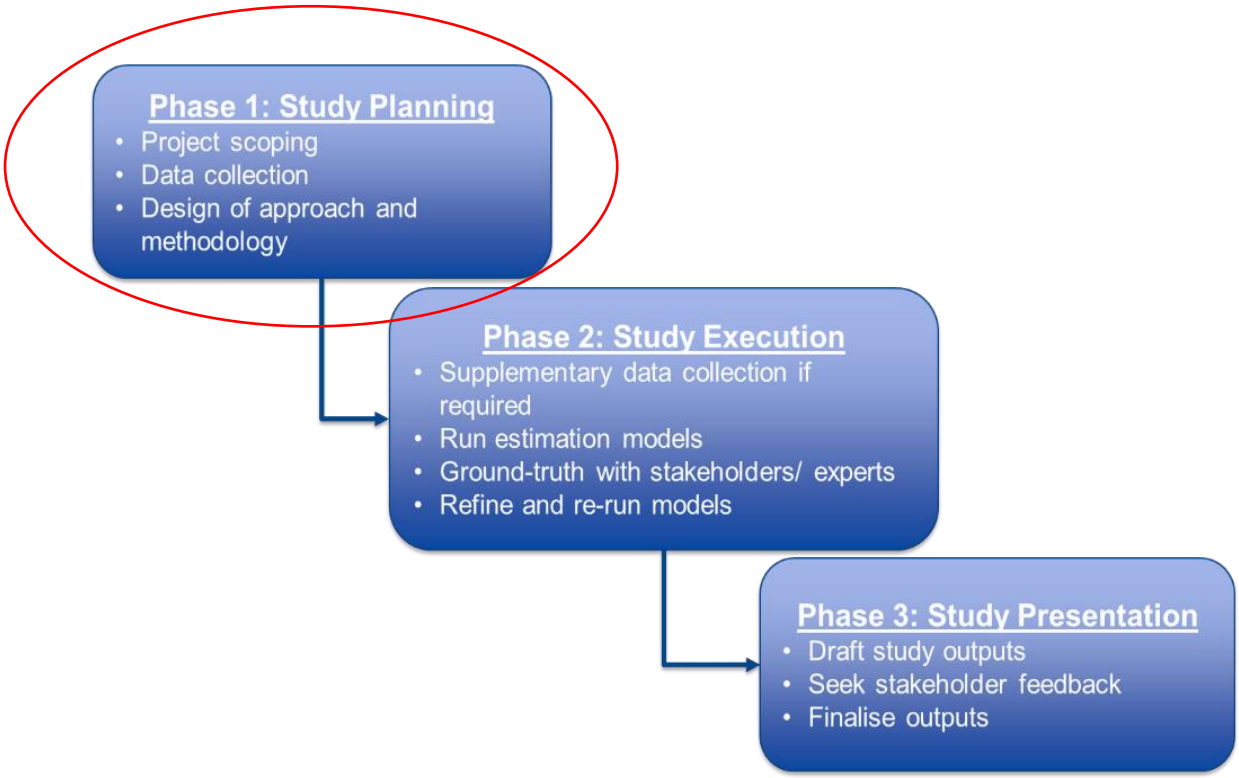
Volume 3

The third volume entitled: *Technical Guidelines on methodologies and indicators for the estimation of the magnitude and impact of IUU fishing* (short title: Field Guide) essentially lays out a standardised process for setting up any kind of IUU estimation or assessment study, including a consideration of indicators of prevalence of IUU fishing along with those of trends of magnitude. The Field Guide foresees a three-phase process in setting up an IUU estimation study:

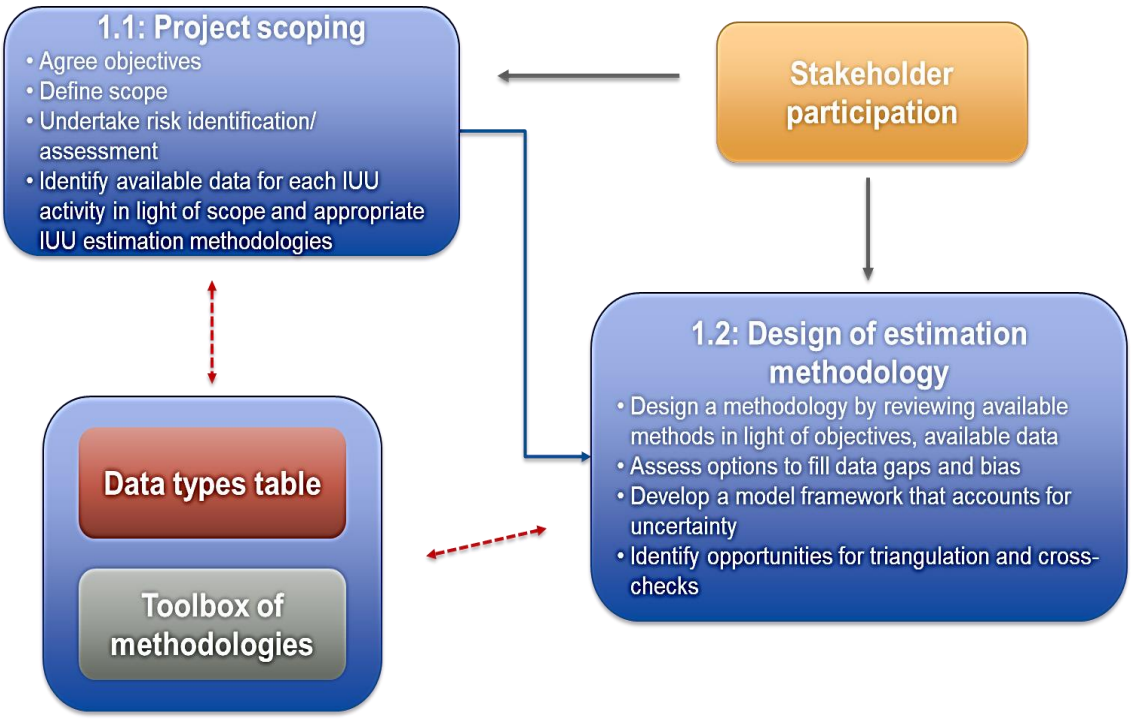
1. Study planning

2. Study execution

3. Study presentation.



The study planning phase focuses on defining the scope and objectives of the exercise, identifies available data and other information and identifies appropriate estimation methodologies. This phase is essential in 'setting the study up' properly. The following graphic indicates the essential elements of this phase of the exercise.



Volume 4

The six case studies foreseen for volume 4 will work through phases 2 and 3 of the above process in order arrive at and present IUU estimations based on the specific objectives and scope of each particular case study. The case studies involve multispecies, species groups and single species across broad geographical areas and diverse fisheries. Whilst the exercise is being coordinated by FAO, there is close collaboration with RFMOs, regional fisheries bodies / agencies and one individual coastal State on the setting up and execution of these case studies.

Collaboration proposal

1. The FAO *Fishing Operations and Technology Branch* (NFIO) has entered into some preliminary informal discussions with the SPRFMO Secretariat on a possible collaboration in this exercise in terms of using a SPRFMO fishery as a case study. The general idea is that this fishery would be used to showcase how a study or assessment of the levels of IUU fishing (components to be identified during the scoping and objective defining stages). As planning of the exercise by the FAO Operations and Technology Branch (NFIO) has now advanced sufficiently and following the guidance of the SPRFMO Executive Secretary, it is timely that a formal collaboration request is proposed to the SPRFMO Commission via the Compliance and Technical Committee (CTC).

2. FAO would like to formally propose collaboration with SPRFMO on this exercise, focusing on the fishery for Humboldt squid (*Dosidicus gigas*; Steenstrup, 1857).

3. In general terms, we would propose that FAO work with SPRFMO through the first part of this exercise (Phase 1) in setting everything up for the study (steps 1.1, 1.2, 2.1 and 2.2 (summarised below). This would need to be completed as early as possible in 2021 (estimated to be completed over a two month period after project approval).

Step	Task	Description
1.1	Objectives	Decide which components of IUU will be the subject of the study or assessment.
	Scope	Humboldt squid. Fisheries to be decided.
	Indicators of occurrence	What indicators are there to suggest that the components selected as the objective of the study / assessment are present?
	Data	What data and information are available to support the study / assessment? (See table of data types Annex 1)
1.2	Methodology design	Use the decision support tool (See Annex 2)
	Data gaps	Consider what is missing and how to compensate?
	Model framework for uncertainty	Use decision support tool to identify most appropriate methods from studies thought appropriate to the planned exercise.
	Cross-checking	What potential is there for triangulation and cross-checking of different data and info?
2.1	Supplementary data	What other sources of data and information can help to fill gaps or supplement key data?
2.2	Select best model	In consideration of the foregoing and use of the decision support tool.

4. The objectives and scope of the exercise are of course for SPRFMO to take a decision on, although the FAO NFIO team are happy to provide guidance and advice where required.

5. Thereafter, it is suggested that SPRFMO undertakes the estimation exercise described in phases 2 and 3 during a suitable timeframe, with FAO NFIO acting in a support role, on hand for clarifications and guidance where required. (The IUU estimation study - Template for test scenario description is provided as Annex 3 for reference).

6. Given that statistical rigour is required in exercises of this nature, it is recommended that the SPRFMO assessment team includes this kind of profile.

7. The final outputs of the study would be published in volume 4.

Table of Data Types

Type of data	Availability by scope element[1] (refer to section 1.1.2)	Data content and potential use	Considerations
Information on the licenced fleet capable of quantifying the likely impact of 'unseen' activity by the licenced and unlicenced fleet; and identifying licenced fleet non-compliance			
Licensing/vessel registry information		Numbers of licensed vessels, types, gear/spatial/temporal authorisations, vessel characteristics, capacity, hold sizes, etc	
Catch and effort data		Reported catch and effort from the licensed fleet. • Can serve as 'baseline' data against which estimates of IUU catch are compared • Can help estimate 'typical' catch rates for particular area/gear type/target species combinations that would be applied to "unseen" activity	• You should consider the impact of any IUU activity (e.g. under-reporting, non-reporting) on the integrity of baseline data • Where catch and effort data from licensed vessels are used to estimate likely catch rates/species compositions from "unseen" activity either of licenced or unlicensed vessels, you should consider any likely differences in vessel characteristics, gear used and fishing operations between license and unlicensed vessels.
Fisheries observer data		Independent source of catch, effort and other information against which vessel reporting can be compared. • Often the only information source capable of quantifying the level of discarding.	• Where observer coverage is partial (i.e. observers are not present on all boats, or on all trips), there will often be a bias in the data, because the behaviour of vessels having observers and those not having observers – or trips on which observers are present and those where they are not present - is likely to be

[1] i.e. is the data available for all sectors? All species? All areas? All timeframes? Are there any gaps in the data?

Type of data	Availability by scope element[1] (refer to section 1.1.2)	Data content and potential use	Considerations
		• Often the only information source capable of quantifying impact on the ecosystem, eg incidental mortality of birds/mammals/reptiles/fish and impacts on sensitive benthic habitat • Most useful for providing an estimate of the likely performance of 'unseen' activity, either by unlicenced vessels or by licenced vessels that are not being observed. • May provide direct observations of some IUU activity by the observed vessel – e.g. fishing with illegal gear types, fishing in closed areas, shark finning, etc – but not usually reliable for identifying other vessels that might be IUU	different. These potential biases need to be explored. They can both be controlled for – for instance, comparison of logbooks and landed catch from observed and unobserved boats operating in the same fishery at the same time and place; or comparison of the logbooks of a vessel at times when it has an observer compared to when it does not. If you have only partial coverage and you intend to use the observer data you should consider asking for statistical help to separate observer effects. • Observer data will be unable to generate information on the activities of prohibited gears – for instance if the legal fleet is required to have seal escape panels in their nets and the unlicenced fleet does not have them, observer data will not allow estimation of this impact of unseen activity.
Electronic monitoring data		Similar uses to observer data, but will vary according to coverage and objectives of EM systems.	• Need to consider implications of coverage, camera placement and image quality on capacity to detect different types of IUU activity (e.g. are cameras operating on all operational areas of the vessel, or only at the site of gear deployment and retrieval?; are cameras operating at all times, or only when gear is being actively deployed and retrieved?; is image quality sufficient to detect undersized or prohibited species)

Type of data	Availability by scope element[1] (refer to section 1.1.2)	Data content and potential use	Considerations
			• As with observers, need to consider impacts of any biases in coverage (e.g. do all vessels in fleet have cameras? If not, are some vessel/gear types over/under-represented?) and proportion of fishing activity reviewed • Need to consider potential changes in fisher behavior where EM is present – are there effective comparisons between EM and non-EM trips?
Dockside catch monitoring data		Provides independent record of catch. Landed catch records can be compared with vessel logbook data to identify mis-reporting or under-reporting.	• Provides information on landed catch only; no information on discards • Can provide useful independent 'baseline' dataset where under-reporting of catch (for example to evade quotas) or mis-declaration of species is suspected
Vessel monitoring system (VMS) data		High resolution position information for the licenced fleet. • Can be used to identify IUU fishing with a spatial/temporal component (e.g. fishing in a EEZ without a valid license; fishing in a closed area) • VMS data from multiple vessels (e.g. fishing vessels/carrier vessels) can be used to highlight potential illegal transshipment	• VMS data provides position information, but by itself does not confirm whether fishing is taking place – additional analysis of VMS track history or 'signatures' may be required to detect whether fishing is likely to be occurring, and usually high temporal frequency of reporting (polling) is required for this. • The influence of polling rates on the capacity of VMS to detect offences should be considered (e.g. a vessel with a polling rate of once per day may be polled outside a closed area on consecutive days, but spend a portion of their (non-polled) time within it).

Type of data	Availability by scope element[1] (refer to section 1.1.2)	Data content and potential use	Considerations
Automatic Identification System (AIS) data		Automatic Identification System is a transponder based tracking system maintained by larger vessels for safety at sea purposes. • Potentially useful for the detection of vessel position information (e.g. may be coupled with VMS data to detect instances of illegal fishing or transhipment activity)	• Commercially available through services such as www.marinetraffic.com and www.vesselfinder.com • Only compulsory on vessels >300 GT under IMO, but other jurisdictions have compulsorily required it for some fleets (all EU fishing vessels >15m) • Need to consider rates of coverage and voluntary switch offs for fleets in which AIS not compulsory
Objective inspection derived data capable of determining the "unseen" activity of licenced and unlicenced fleets, and licenced fleet non-compliance			
At-sea surveillance and dockside or at-sea inspection data		Reports from inspections conducted dockside or at sea, using standard procedures. • independent quantitative and usually standardised data on rates of non-compliance across IUU activities (e.g. rates of offence/inspection for different offences; rates of unlicensed vessel detection per patrol hour) • At sea inspections can provide data on infringements not easily detected through land-based or aerial surveillance – e.g. use of illegal gear, possession of prohibited species. They may also detect discarding.	• Surveillance by sea-borne assets (inspection vessels) is costly and MCS authorities generally try to maximise their efficiency by targeting vessels with a history or behaviour that suggests that they will be at high risk of being non-compliant against some regulation. Non-compliance levels derived from such data cannot therefore be applied uncritically across the fleet. Data need to be stratified, and should be analysed after consultation with MCS authorities. • The effectiveness of inspections may also need to be considered, i.e. proportion of offences likely to be detected by inspections.
Prosecutions data		• Can provide a record of volumes and species composition per infringement.	• Can be small datasets and influenced by single large events – e.g. large busts • Need to consider extent to which available prosecution data is likely to be representative of all illegal activity – e.g.

Type of data	Availability by scope element[1] (refer to section 1.1.2)	Data content and potential use	Considerations
		• May be used in combination with other approaches (e.g. expert judgement) to scale up across sector.	are only large infringements taken to prosecution? Is compliance effort only focused on higher level crimes?
Aerial surveillance data		Reports from overflights of the vessels seen and their positions • Can provide some quantitative basis for infringement rates (e.g. rates of unlicensed vessels detected per patrol hour or numbers in a particular area), which may be used to scale up across wider area/time. • Can provide information on some infringement types (e.g. use of some illegal gears detectable from the air) but not others (e.g. possession of illegal species in vessel holds).	• As above, need to consider influence of compliance strategies and targeting – i.e. non-randomness of compliance effort – on dataset – although these are often less likely than with sea-borne assets. • Need to consider likely effectiveness of inspection – i.e. proportion of different types of offences likely to be detected by inspections. For instance, sea-borne inspections may detect discarding or slipping of the catch, but aerial surveillance is unlikely to. • Aerial surveillance data may not be sufficient to detect whether vessels were fishing.
Satellite – passive visual images or Synthetic Aperture Radar (SAR)		Satellite imagery requires complex processing, but historical images are often available at low cost (real-time images are costly). • Can detect presence of vessels across large areas of remote ocean. • Can be coupled with other forms of data (e.g. VMS, AIS) to identify unauthorised vessels, transshipment.	• Satellite surveillance is restricted by the type of imagery required, the availability of satellites to undertaken this, the area that an image covers and the resolution delivered. • Passive visual satellite images can be hindered by clouds. SAR is not hindered by clouds, but has inability to detect small vessels or those with low radar image (wood, fiberglass) and can be confused by some sea states and floating objects (e.g. icebergs). • Satellite surveillance may be able to detect vessels, but cannot distinguish

Type of data	Availability by scope element[1] (refer to section 1.1.2)	Data content and potential use	Considerations
			between fishing and other vessel types (except by size) nor identify if fishing is taking place.
Data for top-down estimates of IUU			
Stock assessments		A stock assessment model can be set up to estimate unreported catches where there exist inconsistencies between modelled stock trajectories and the source data: reported catch, age/length distributions in the catch and independent indicators of stock abundance such as catch per unit effort or independent surveys. • Can be compared against reported catch data to estimate total unaccounted for catch • Can be used as a cross-check to determine plausibility of IUU estimates given known biological productivity of stocks	• Require robust, reliable stock assessments • Although good estimates of unreported catch quantity can often be made, these methods cannot determine the source of unreported catches • Methods work best when there are periods of high contrast, for instance when a period of high compliance is followed by a period of low compliance.
Trade/market data		Trade data are regularly collected by authorities in many jurisdictions • Data on exports or imports can be matched against catch reports from legal fishers to identify any discrepancies.	• Trade-based approaches work best where a high proportion of the product is exported, preferably to a limited number of destination markets, and where the species is easily identified and recorded in trade: for instance blue fin tuna is individually recorded, but most gadoids are simply whitefish. • Relies on having clear customs codes matchable between import and export destinations • Need to consider issues such as different product types and conversion factors to

Type of data	Availability by scope element[1] (refer to section 1.1.2)	Data content and potential use	Considerations
			whole fish, potential for double counting, re-exports of fish, latency in the supply chain and the possibility of misclassification under generic product names
Additional data complementing the main methods above, useful in triangulation or risk assessments.			
Expert judgement		Can be used to 'fill in blanks' and triangulate/scale up estimates using other data	• May be main/only source of information where empirical data are limited • Requires robust elicitation processes to ensure information credible and replicable where necessary
Stakeholder surveys		Specific surveys of stakeholders designed as part of an IUU study. • Can be used to seek a collective stakeholder view on the nature and scale of IUU activities. • Can be used to identify likely IUU activities and may serve as a cross-check on estimates	• Survey design should seek to limit subjectivity, ensure replicability • Rarely likely to be the primary data source for estimates, but may serve as a useful cross-check for data-based estimates.
Confidential informant (CI)		May be used to generate 'inside' information where publication of the source would otherwise mean the information is not available • Best used during a risk assessment when planning the IUU study rather than as a source of information for the study itself, except when it is used as a means of triangulation of other IUU estimates derived by the study.	• Not easily able to be verified by a third party, and subject to individual bias on behalf of the informant. • Should not be used as a primary source of information in an IUU estimation study. Should be used sparingly and only for the purposes of corroboration/triangulation of alternative sources of information/data
Media reports/anecdote		Can be used to identify 'high profile' IUU activities and cases in different areas	• Typically of limited value in estimation given reporting tends to focus on high

Type of data	Availability by scope element[1] (refer to section 1.1.2)	Data content and potential use	Considerations
		• Best used during a risk assessment when planning the IUU study rather than as a source of information for the study itself, except when it is used as a means of triangulation of other IUU estimates derived by the study.	profile cases (e.g. large 'busts', detention of foreign flagged vessels, large successful prosecutions), with limited reporting on more 'mundane' IUU and limited access to the details of cases settled out of court
Independent field surveys		Specifically designed studies to quantify elements of IUU fishing. Can be targeted towards IUU activities of interest (e.g. presence of illegal gear in the water) • If well-designed, can support robust, data-driven estimates of IUU activity	• Need to consider relationship between surveyed sample and broader population/fishery if results are scaled up
Gear trials		Specifically designed study to examine how illegal gear performs. • Can be used to estimate the catch rates of target and bycatch fish species as well as impacts on birds, mammals and the seabed, of different gears, including gears likely to be used in IUU fishing. • Will complement observer data.	• As noted above, observer data cannot provide information on the use of illegal gears or the lack of use of mandatory gears, because the licenced fleet on which they operate will not be using these gears. • Experiments must be managed well, and the judgement made that acquiring the data on the performance of the 'unseen' activity justifies what will be an adverse environmental impact of the experiment itself.
Local market surveys		Can be used to identify prevalence of illegal products (e.g. prohibited species, under-sized individuals) in local markets • Best used during a risk assessment when planning the IUU study rather than as a source of information for	• Unlikely to be able to estimate IUU quantitatively • Need to ensure representativeness/rigour in survey design • Need to consider local social factors (e.g. willingness to display prohibited species)

Type of data	Availability by scope element[1] (refer to section 1.1.2)	Data content and potential use	Considerations
		the study itself, except when it is used as a means of triangulation of other IUU estimates derived by the study.	and extent to which relevant species are traded through local markets vs other supply chains.

Table 2: Basic decision support tool to assist in choosing an IUU estimation methodology.

Approach	When would you use it?	Methodology	When would you use it?	Pre-requisites/ Main data needs	Pros	Cons	Example studies
Top down	Where only the total amount of IUU volume or 'missing catch' is required	**Stock assessment based**	Where illegal activity in known to have occurred but the magnitude is unknown	• Pre-existing stock assessment model • High level computational power • Advanced statistical expertise	• Strongly data-driven – offers a potentially more precise and credible estimate of missing catch than more subjective approaches • Estimates cannot be 'biologically unreasonable' • Provides statistical estimates of confidence	• Typically requires high level stock assessment expertise and computational power • Provides single estimate of unaccounted for catch – does not distinguish between different types of IUU activity • Limited value for MCS planning unless underlying IUU activities are well known	Payne et al, 2005; Plaganyi et al, 2011; ICES, 2014
		Trade based	Where illegal activity in known to have occurred but the magnitude is unknown	• Species subject to trade, ideally to a limited number of markets • Ability to match reported catches against exports and imports (e.g. through customs codes) • Good information on post-harvest supply chains (e.g. proportion	• Strongly data-driven – offers a potentially more precise and credible estimate of missing catch than more subjective approaches • Provides statistical estimates of confidence	• Customs codes may not be available for all products • Can be temporal mismatches between catch and trade • May not distinguish between illegal and legal catches • Provides single estimate of unaccounted for catch – does not distinguish between	Clarke et al, 2006; Clarke et al, 2009; Plaganyi et al, 2011;

Approach	When would you use it?	Methodology	When would you use it?	Pre-requisites/ Main data needs	Pros	Cons	Example studies
				exported vs domestic sale) • Good information on wet-weight conversion rates for imported product forms		different types of IUU activity • Limited value for MCS planning unless underlying IUU activities are well known	
Bottom up	Where more 'granular' information on the relative contribution of one or more IUU activities to the overall IUU problem is required	**Single issue – unseen activity**	Where an estimate of activity (volume, species composition, value) is required for an unseen type of IUU activity (e.g. fishing by unlicensed vessels)	• Some information to estimate the quantity of the activity (e.g. number of days fishing by unlicensed vessels) and the quantity of the impact (e.g. average catch rate/species composition for that vessel/gear type in that area) • Some mechanism to estimate the statistical confidence in estimates	• Can be strongly data-driven if information available • Estimates can be tailored to each IUU activity • Provides estimate of the relative contribution of individual IUU activities to overall IUU problem	• Information often very limited for 'unseen' activities – assumptions and more subjective info sources (e.g. expert judgement) often required	Sabourenkov & Miller, 2004; Agnew & Kirkwood, 2005; Ball, 2005; Kleiven et al., 2012; Free et al, 2015; MRAG Asia Pacific, 2016; Oozeki et al, 2018
		Single issue – known vessels	Where an estimate of activity (volume, species composition, value) is required	• Some information to estimate the extent of the activity (e.g. proportion of the fleet under-reporting) and the	• Can be strongly data-driven if information available • Estimates can be tailored to each IUU activity	• Information often very limited for 'unseen' activities – assumptions and more subjective info sources (e.g. expert	Bremner et al, 2009; Aanes et al, 2011

Approach	When would you use it?	Methodology	When would you use it?	Pre-requisites/ Main data needs	Pros	Cons	Example studies
			for an unseen behaviour for a known group of vessels (e.g. under-reporting by licensed vessels)	quantity of the impact (e.g. average volume/species composition of under-reporting) • Some understanding of how available information sources (e.g. observers) have sampled population of known vessels (random? targeted?) • Some mechanism to estimate the statistical confidence in estimates	• Provides estimate of the relative contribution of individual IUU activities to overall IUU problem	judgement) often required	
		Multiple issues	Where the objective is to estimate total IUU activity across a fishery/stock/area and information is desired on the relative contribution of each activity	• As above • Mechanism/s to account for differing levels of statistical confidence in estimates across different IUU activities	• Potentially provides more accurate estimate of overall activity than some top down approaches • Can be strongly data-driven if information available	• Can be time consuming • Data may be limited for some risks	MRAG Asia Pacific, 2016

Approach	When would you use it?	Methodology	When would you use it?	Pre-requisites/ Main data needs	Pros	Cons	Example studies
					• Provides estimate of the relative contribution of individual IUU activities to overall IUU problem • Reproducible methodologies allow changing nature of IUU to be tracked over time		
Combined approaches	Where information and resources are available to support independent estimates using multiple methodologies	Multiple	Triangulation across multiple methodologies	• As above, for individual methodologies	• Allows for triangulation of estimates • Reduces impact of uncertainty in single methodologies	• Data to support estimates using distinctly different approaches may not be available • May be time consuming	Plaganyi et al, 2011; Oozeki et al, 2018

IUU estimation study - Template for test scenario description

For each test scenario to be considered in the study, all relevant information describing the fishery and considering available data s
This may include, but is not limited to:

Fishery		Location	

Criterion	Sub-Criterion	Description	Example data type/sources
Value	Species	Monetary	High/low value fishery
	Trade	Monetary	$/year / %GDP
		Volume (kg)	Annual catch/quota
		Trends – sudden changes	Catch statistics
	Socio economic	Numbers employed	Govt databases/RFMO
		Alternative livelihood (% population employed)	Relevant for small scale, less so for industrial fisheries
		Food security conflict	Markets data – food/fish meal/export/local market
	Political	Charismatic species	Yes/no
		Traditional fisheries / new fisheries	Yes/no
	Conservation status	IUCN	Yes/no
	Exploitation status	Over, fully, under	Stock assessments
	Bycatch /non target species	Gear / area specific or species specific	Bycatch mitigation measures
	Straddling stocks		Yes/no
		Limited / open access	Management body – EEZ/ABNJ/RFMO
		Vessels authorized / licensed	Vessel lists/cap on licenses

Conservation status	Management regime	MCS tools	VMS/observers/REM/port inspections/traceability tools
		Data availability	Catch/landing/processing/sale statistics
	IUU fishing	Known IUU	Yes/no
		Previous studies	By whom - academic, advisory body, national, etc.
		Sources of information and intelligence	Government, industry, NGO, development partner - is it quantified or anecdotal?
Complexity	Single species		Yes/no
			Selective gear/fishing methods
	Multispecies		Yes/no
		Which species	one target and bycatch or multiple target species
		Management system	quota/choke species/effort controls
Supply chain	Lengthy – including processing	Including transhipping / other potential “leaks”	Traceability information - CDS
	Transboundary		Traceability information - CDS
	Simple	Direct sale to consumer	Traceability information - CDS
Geographic	Regional / sub-regional / national		RFMO/RFB/national laws

List of contacts	