
Assessing Seafood Supply Chains: New Public-Private Partnership Will Support Companies in Assessing IUU Fishing Risks Using Vessel Data

Phase 1

April 2022

Full report





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EXECUTIVE SUMMARY

Illegal, unreported, and unregulated (IUU) fishing is estimated to represent as much as 20% of catch worldwide, with losses to the [global economy](#) estimated at \$10-23.5 billion USD per year. IUU fishing poses risks to legitimate seafood providers and the resources they depend on. In recent years, significant strides have been made by industry actors to counter these risks by strengthening traceability and oversight to better understand the origin of their products. However, current risk assessment practices are often impeded by resource constraints and a lack of data and verification mechanisms, leading to low levels of trust in the information received. One major challenge is the difficulty of analyzing and cross-checking information to verify activities at sea.

The Supply Chain Risk Tool (SCRT) project is a partnership of the [Friends of Ocean Action](#), [FishWise](#), [Global Fishing Watch](#), and the [Stanford Center for Ocean Solutions](#), which aims to provide companies accessible and actionable data about their IUU risks down to the vessel level. It leverages private sector influence to steer demand away from potential IUU fishing sources by helping to strengthen risk assessment and due diligence processes. This partnership offers an opportunity to translate renewed industry commitments into real progress towards eliminating IUU fishing.

In this report, we present the results of Phase 1 (January - March, 2022). With generous support from the UK Government's Blue Planet Fund, the SCRT project group led a user-centered design process with seafood companies, industry associations, and their partners (e.g., civil society organizations, consultants) to support stakeholder's IUU fishing risk assessments.

This phase had four main components:

1. Surveys

We compiled survey responses from 20 supply chain companies to understand current practices, resources, and priorities for assessing IUU fishing in their supply chains, as well as to understand obstacles to implementing any new approaches.

2. Interviews

We conducted in-depth interviews with 10 seafood companies and 15 third-party stakeholders who support industry in their IUU risk assessment operations (e.g., consultants, NGOs) to understand their data sources, risk indicators, due diligence strategies, and business priorities.

3. Online Workshop with Experts

We organized an expert workshop with 37 participants across industry, management authorities, consultancies, NGOs, and academics. The objectives were to: (1) define IUU fishing risk and the dimensions a potential tool should consider, (2) identify IUU fishing risk indicators to guide industry action, (3) discern data sources to evaluate IUU fishing risk indicators, and (4) explore potential mechanisms to deliver the information.

4. Pilot Study

In collaboration with the International Seafood Sustainability Foundation (ISSF), we conducted a pilot study to explore whether the proposed vessel-level risk indicators could be reliably estimated. We used the Proactive Vessel Register (PVR), a list of approximately 1,100 fishing vessels which undergo annual third-party audits on their operations and provide publicly available information on key aspects of management and conservation measures. Using this registry, we asked two main questions:

- How many vessels in the PVR consistently broadcast AIS data to enable the unique identification of the vessel?
- From a random subsample of those vessels which consistently broadcast their AIS data (40 total, 20 purse seines and 20 longliners), can we reliably estimate the vessel-level IUU fishing risk indicators proposed by experts?

The user research and pilot study were fundamental to ensure that we develop a solution that responds to identified needs, easily incorporates into existing supply chain due diligence approaches, assesses risks in an effective and actionable way, and can motivate further transparency and data sharing in fisheries and supply chains. This report presents the results of our efforts and delivers concrete recommendations for the design and implementation of a data solution that supports industry and their partners in identifying risks of IUU fishing products in their supply chains.

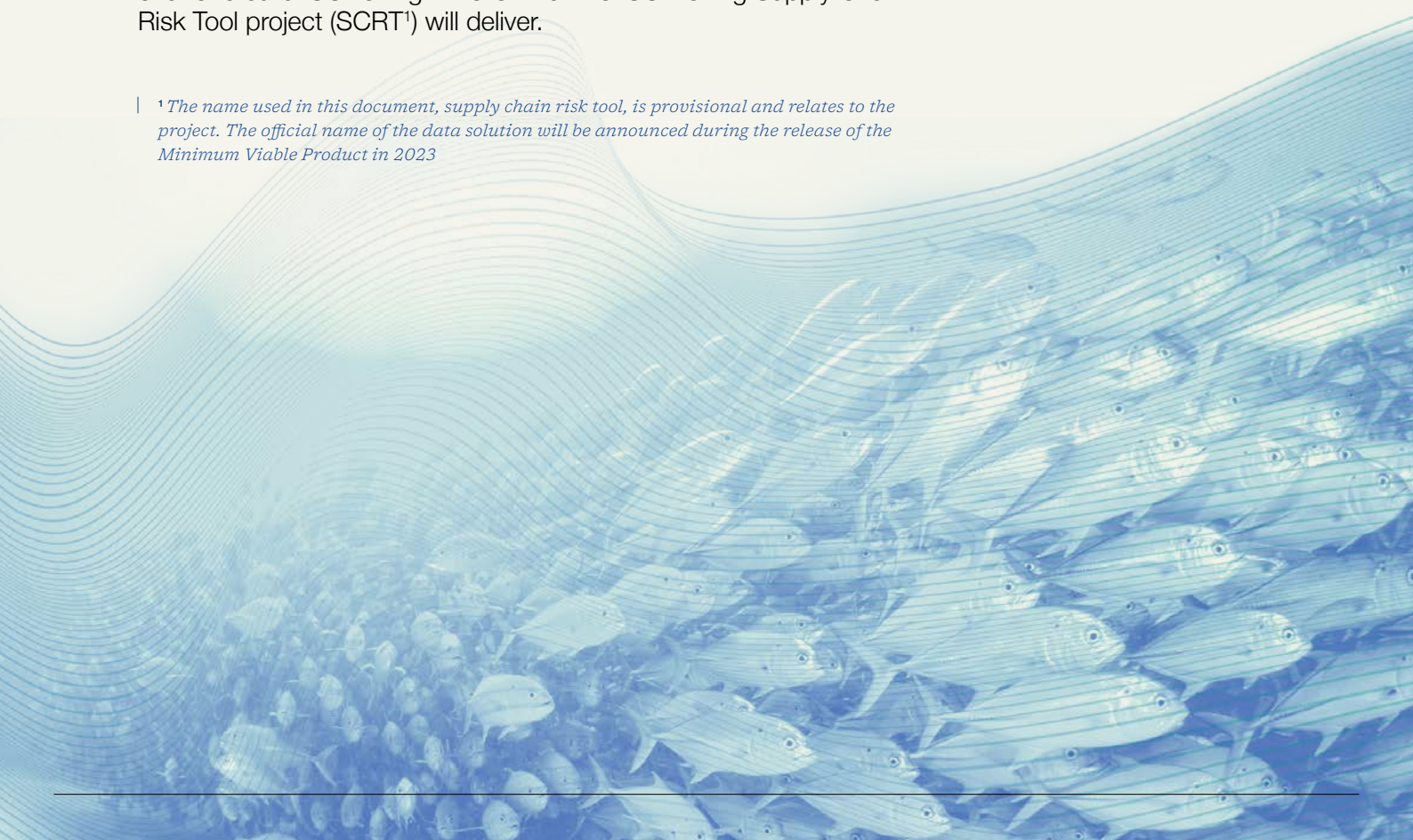


SECTION 1: Introduction

Illegal, unreported and unregulated (IUU) fishing is estimated to represent up to 20% of global catch, with losses to the global economy estimated between **\$10-23.5 billion USD per year**. Not only does IUU fishing compromise the responsible management of fisheries, **take income away from developing countries**, and threaten coastal livelihoods, it has also been linked to **organized crime and human rights violations such as drug smuggling, human trafficking, and slavery**. Therefore, IUU fishing is a problem threatening national and economic security, ecosystem health, sustainable fisheries, and human rights. As such, it has been highlighted as part of Target 4 of Sustainable Development Goal 14: Life Underwater.

With growing interest from governments, industry, academia, and civil society to eliminate IUU fishing from supply chains, stakeholders need tools to better visualize, assess, and act upon potential IUU fishing risks. At present, there are numerous data sources, databases, and tools assisting in identification of IUU fishing risks, but they can be difficult to navigate and operate when validating information provided by seafood suppliers, particularly for vessels' operations at sea. Furthermore, much of the available data needs to be processed and translated into key indicators to facilitate use (e.g., Automatic Identification System [AIS] vessel tracks need to be analyzed to identify any apparent fishing effort within the limits of no-take Marine Protected Areas [MPAs]), a labor and computationally intensive component. Finally, there is no consistent approach in the interpretation of data to assess IUU fishing risks. These concerns highlight the need for an easy-to-use and integrative solution which helps seafood companies cross-check and verify the information they receive from suppliers and identify knowledge gaps to support efforts to curb IUU fishing. This is what the IUU Fishing Supply Chain Risk Tool project (SCRT¹) will deliver.

¹ *The name used in this document, supply chain risk tool, is provisional and relates to the project. The official name of the data solution will be announced during the release of the Minimum Viable Product in 2023*



WHAT IS THE SCRT?

The SCRT is a partnership among the Friends of Ocean Action (FOA) at the World Economic Forum, FishWise, Global Fishing Watch, and the Stanford Center for Ocean Solutions (COS). The project brings together our convening power, academic credibility, technological capacity, and on-the-ground experience collaborating with supply chain actors to support industry operations.

To steer demand away from IUU products, we are building a data solution that leverages private sector influence and makes it difficult for IUU fishing products to enter legal supply chains. This project builds on years of research, analytical innovation, and proposes to tackle the challenges described above by:

- Integrating disparate data sources into a single platform.
- Developing new automated analytical capabilities to provide a more robust understanding of IUU fishing risks in supply chains.
- Delivering a data solution (e.g., user interface [UI] and associated data feed) to make these data actionable by companies).

SCRT offers an opportunity to translate commitments by industry to eliminate IUU fishing into action by providing a consistent and transparent way to illuminate risks of illicit activity. To ensure the utility of the solution, we will engage partners throughout the project’s development to identify their needs, priorities, and strategic implementation.

FIGURE 1: How could the SCRT work?





SECTION 2: User Research – Industry

KEY TAKEAWAYS - FEEDBACK

- A majority of respondents (90%) indicated their sustainability teams carry full responsibility of risk assessments, thus they will be the most important user group to engage.
- The top three motivations for assessing IUU fishing risk are client/consumer demand, reputational considerations, and company policies or commitments.
- There is no consistency in how companies assess IUU fishing risk (see Table 1).
- Common barriers to assessing IUU fishing risks include availability of relevant or updated supplier information, staff capacity and resource constraints, costs, and lack of trust in data received.
- A vast majority of respondents (95%) said they would be interested in using the proposed tool.

KEY TAKEAWAYS - OPPORTUNITIES FOR A SUPPLY CHAIN RISK TOOL

- Standardizing data collection and visualization can support more streamlined and consistent risk assessment processes.
- Automating data synthesis can bring efficiencies to overcome limited staff capacity and resources for risk assessments.
- Optimized data synthesis allows companies to quickly identify potential risks in their supply chains.
- Long-term benefits, both individual and industry-wide, are likely to outweigh the implementation costs (e.g. staff training, updating processes).
- The fishing industry has a wide array of actors that vary in size, needs, and capacity, each of whom can benefit from a solution that can adapt to their individual context.

The seafood industry plays a leading role in ensuring the products that enter local and global supply chains are legally and responsibly-sourced. Industry stakeholders have the power to promote increased transparency and oversight in the sector by implementing strict sourcing guidelines and conducting robust IUU fishing risk assessments. Between January-February 2022, we executed industry research to understand the seafood industry's IUU fishing risk assessment needs to inform the design of a supply chain risk tool.

We collected feedback using an online Google survey (n = 20) and semi-structured interviews (n = 10) from various nodes of the supply chain including industry pre-competitive collaborations, fishing associations, processors, exporters, importers, distributors, and end-buyers. This feedback was complemented by FishWise's in-depth market-based due diligence expertise, risk assessment work, and supplier/retailer engagement.

The surveys and interviews addressed the following topics:

- Company motivation for IUU fishing risk assessment
- Current risk assessment practices
- Barriers in assessing IUU fishing risk
- Potential value and use of the SCRT
- Likelihood of industry adoption of SCRT

POTENTIAL END USERS

We sought to understand who within companies control IUU fishing risk assessments. An overwhelming majority of respondents (90%) indicated their sustainability teams carry full responsibility of risk assessments, while the remaining stated that corporate social responsibility (CSR) and sourcing teams are also involved in risk assessment. While these trends indicate the core user group to engage with on the design of a solution, it is worth highlighting that assessing risk and acting upon it often falls on multiple teams. It is thus critical to design a solution that is intuitive to use and maintain and integrates across levels of knowledge, technical skills, and priorities.

MOTIVATIONS FOR ASSESSING IUU FISHING RISK

While almost 75% of survey respondents indicated that it was “very important” to “extremely important” for their companies (or organizations) to assess IUU fishing risks, there are a variety of motivations.

- Company policies and/or commitments (90%)
- Company reputation (85%)
- Customer/client demand (70%)
- Regulation such as import controls (60%)
- Certifications (60%)
- Media exposes (35%)
- NGO influence (5%)

CURRENT PRACTICES TO ASSESS IUU FISHING RISK

Trust was a common theme amongst survey respondents explaining how they identify IUU fishing risks. Most respondents indicated that they assess IUU fishing risks internally and often complement it with external websites or tools (e.g., Seafood Watch ratings or IUU vessels lists). We identified a range of formality in processes that companies use, from the least comprehensive or least structured (informal processes) to the most robust and organized (formal processes) (Table 1).

TABLE 1: Types of processes used by industry to assess IUU fishing risks

PROCESS	CHARACTERISTICS
Informal	<ul style="list-style-type: none">• Lack of clear definition in how to define IUU fishing risk and the scope of the assessment• Inconsistent processes or methodologies to assess risk that can be replicated• A reactive and manual process, generally not conducted on a regular basis• Thinking of risk at the supplier level rather than at the product level (<i>i.e.</i>, risk is defined in terms of supplier trust and historic relationships vs. vessel, region, or species risk)
Semi-formal	<ul style="list-style-type: none">• Defined understanding of how to assess IUU fishing risk, but not standardized or comprehensive and with various scopes of assessments• Combination of proactive and reactive assessments conducted manually and with manual verification (<i>e.g.</i>, Excel spreadsheets)• More robust and rigorous analyses, but each company is likely to get different assessment outputs (<i>i.e.</i>, not yet replicable)• Often relies on supplier risk (<i>e.g.</i>, trusted supplier relationship and communications) with some level of fisheries or product risk
Formal	<ul style="list-style-type: none">• Assessments are comprehensive and standardized, and are outsourced to a third-party provider or trusted advisor when no in-house expertise exists• Tools are generally replicable, although scope and kinds of assessments will vary depending on who is running the assessment and/or data available• Proactive assessments conducted generally on biannual or annual basis• Variability within ways to address and mitigate IUU fishing risk (<i>e.g.</i>, desk audit vs. in-person audit)

Only 15% of respondents were “completely satisfied” with the outputs from their existing tools used to assess IUU fishing risks, 30% “very satisfied,” and 30% were “mostly dissatisfied.” This dissatisfaction stemmed from lack of actionable information, minimal or no access to reputable and well-maintained databases, poor quality of data received from upstream supply chain actors, or lack of internal knowledge and capacity to effectively leverage data received for managing and mitigating risk.

CURRENT BARRIERS TO ASSESS IUU FISHING RISK AND VALUE OF A TOOL TO ADDRESS THEM

IUU fishing risk assessment starts with data collection (even if imperfect), and thus industry should strive to increase their efforts to obtain relevant supply chain data. Once data is collected, there are additional challenges detailed below.

1. Lack of available information

Companies do not have adequate access to publicly available information to accurately assess IUU fishing risks. Respondents indicated that while they can locate third-party data sources, they are not always fully comfortable with how comprehensive or robust those tools are. In addition, companies often acknowledge that they need support to make assessments actionable. A tool can overcome the cumbersome challenge of manual data mining across disparate data sources, and offer a “one-stop-shop” for companies to access information that supports a robust risk assessment and verification process. A transparent and robust methodology will increase trust in the analysis. Finally, a tool could deliver insights for due diligence on identified risk indicators, making the data and results actionable and consistent across the seafood industry.

2. Lack of internal capacity

As the variety and volume of products increase within a company, so does the capacity needed for risk assessments. Sustainability, CSR, and sourcing teams balance competing priorities. It can take multiple days to assess a single product or fishery, which is not sustainable for companies with a large seafood portfolio. One company stated that it would take years to get through vetting and assessing all of their longline vessels and would greatly benefit from help in this area. A tool that can assess risk of IUU fishing would allow companies to focus their limited resources and capacity on higher-risk areas and address lower-risk areas over time.

3. Lack of product data

A company's ability to assess IUU fishing risk is dependent on its ability to collect, maintain, and report sufficient supply chain information. The “first mile” of the seafood supply chain from catch to processor is especially important to IUU risk assessment, yet, there is often a shortage of data and minimal transparency at this stage. We found that reliance on upstream suppliers (especially overseas suppliers) for information is a commonly-cited challenge; disparate government recordkeeping and reporting regulations, inconsistency in national traceability systems, data terminology, and even language barriers all pose challenges. Companies who have already invested in some sort of traceability system will be more likely to overcome this challenge, as well as vertically integrated companies.

4. Lack of trust in data

Verification of data is often a leading concern in assessing IUU fishing risks. Companies face challenges when cross-checking and verifying data, which leads to lack of confidence

in the data received. Without the ability to check the accuracy of the data regardless of how robust the data collection is, there is no way to confidently know whether a product comes from an IUU fishing source. To address this barrier, a tool could enable the cross-checking of data received with satellite data at harvest level, and therefore build trust in supply chain data. This information will augment rather than replace other due diligence activities such as audits and spot checks.

5. Elevated costs of risk assessments

Cost is a commonly referenced barrier to identifying risk. These costs include staff time to conduct risk assessments, resources to engage suppliers, expenses to access private databases, dues to participate in industry coalitions, or pay for certifications. When understanding the cost of the proposed tool, it is helpful to break down existing operational costs and costs directly associated with future adoption of a tool or implementation costs. Quantifying these costs and comparing to long-term savings by making risk assessments more efficient will be necessary to challenge the perception that implementing new tools is cost-prohibitive. In the project's next phase, we will model the economic savings that such a tool could provide.

LIKELIHOOD OF ADOPTION BY INDUSTRY

Most survey respondents (95%) would strongly consider incorporating a risk assessment tool like the one proposed here. None indicate a complete lack of interest. While some respondents indicated that they would need to better understand the capabilities and costs of adopting such a tool, there is a positive reaction to adopting a tool that makes IUU fishing risk assessments more efficient and actionable. Although not an endorsement or statement of adoption, this proves that even in its nascent stages of development, such a tool could quickly fill the gaps and challenges in assessing IUU fishing risk and become of value to the seafood industry and NGOs alike. There is a need for a comprehensive data solution that provides insights into vessel activities at sea and instills confidence in companies who are playing by the rules, sourcing legal products, actively working to curb IUU fishing, and supporting responsible seafood supply chains. It will be important for this project to continue engaging with seafood companies and their partners to share updates, create value, and in turn, increase buy-in of this solution.

A NOTE ON DATA PRIVACY

The proposed tool will fuse and regularly update disparate public data sources and make them available through a single platform or for integration into existing tools through an application programming interface (API). In order to use these data to inform responsible seafood sources, industry has suggested that IUU fishing risk assessments be private and only shared with the user. The SCRT team will take this recommendation into consideration and further look into reporting, data sharing, and transparency issues in Phase 2 of the project's development.





SECTION 3: User Research – Third Parties

KEY TAKEAWAYS - FEEDBACK

- Given the labor-intensive nature of risk assessments, seafood companies often rely on support and expertise from third parties such as NGOs, certification bodies, and/or technology providers.
- Similar to the seafood industry, capacity is a barrier for third parties when implementing risk tools within their organizations.
- There is a clear need among stakeholders to better define terms like “fisheries” or “risk” to avoid confusion and/or disagreement.
- Highly supported features of a potential supply chain risk tool include (1) aggregating multiple data sources into a single platform, and (2) enabling verification of activities at sea.

KEY TAKEAWAYS - OPPORTUNITIES FOR A SUPPLY CHAIN RISK TOOL

- Although some parties have their own risk assessment services and tools, there is consensus among those interviewed that a supply chain risk tool could bring value to their operations.
- The public dimension of the supply chain risk tool can support efforts that push for increased data transparency and availability.
- The proposed tool has the potential to streamline available information and constantly update it to inform targeted, discernable IUU fishing risk profiles.



While the private sector has increasingly become a leader on combating IUU fishing products from entering supply chains, they alone are ill-equipped to completely eliminate IUU fishing from their operations due to many social, political, and economic challenges. As explained in Section 2, companies face multiple barriers to adequately monitor their supply chains. As such, companies often outsource their risk assessment operations to third parties, who play important roles in facilitating compliance and ensuring accountability. In our user research, we classified third parties in four broad categories: consultancies, certification bodies, advocacy groups, and research-based organizations.

In order to better understand how a supply chain risk tool could provide value to these organizations, we interviewed

15 representatives from 12 different organizations that play a role in helping seafood companies fight IUU fishing. Interviews were semi-structured and covered these topics

- The organization's role in the fight against IUU fishing
- The obstacles in implementing other IUU fishing risk assessment tools
- The value of a supply chain risk assessment tool to the work the organization is doing

The information gained through interviews was complemented with insight from a two-day expert community workshop organized by the project team on March 1-2, 2022.

ROLES IN THE FIGHT AGAINST IUU FISHING

Interviewees described in-depth what their organizations are doing to fight IUU fishing and, when relevant, how they support risk assessments. We summarize our findings below:

- **Consultancies:** Current practices for assessing risk are labor-intensive, often falling far beyond the capabilities and expertise of companies' procurement officers. Industry actors generally partner with organizations (technology providers and NGOs) that offer consulting services to supplement internal supply chain management practices.
- **Certification programs:** Through standards and compliance goals, certification bodies create market incentives for responsible and sustainable fishing practices. Through certification processes, and sustained evaluations, certification bodies facilitate self-reinforcing positive interactions between consumers and industry.

– **Advocacy groups:** Operating at arms-length from industry, advocacy groups leverage their proximity to consumers, media, and policymakers to provide transparency and hold industry accountable. They are often central in monitoring, investigating, and reporting IUU fishing in the seafood sector.

- **Research-based organizations:** Research-based groups are predominantly concerned with public tool creation, framework development, data streamlining, and vessel observation and intelligence programs. Conceptually, they function as the think tanks for responsible fishing practices and provide information that empowers stakeholders to enact change.

OBSTACLES FACED BY OTHER RISK ASSESSMENT TOOLS

Most of the actors interviewed have had experience with other tools that are designed to assess sustainability and/or risks of IUU fishing or human rights abuses in seafood supply chains. Frequently, these tools, in the form of assessment

frameworks or guidelines, did not have the uptake as expected. The interviewees perceived the main obstacles to successful implementation of available and upcoming frameworks and tools:

- Lack of personnel capacity or funding to implement the tools within their organizations
- Lack of engagement with industry stakeholders during design and release stages resulted in tools not being fit-for-purpose
- Concern among stakeholders about how certain terms like “fisheries” or “risk” are defined leading to disagreement with the approach taken by the available tools
- Stakeholders were unable to provide granular enough information and in the correct format required by a tool
- Insufficient incentive to use the tool because it did not represent an improvement over their current practices to assess risk



VALUE OF A SUPPLY CHAIN RISK TOOL
TO THIRD PARTIES

All 15 interviewed third-party stakeholders expressed support for the development of a supply chain risk tool and specified how the tool would provide value to their operations. These benefits are organized by the actor group in the table below.

LIKELIHOOD OF ADOPTION BY
THIRD PARTIES

Throughout the interviews and workshop, several third party individuals expressed excitement about the two key data features of a supply chain risk tool: (1) aggregating multiple data sources into a single platform, and (2) enabling the verification of activities at sea.

It is important to recognize that each third party group plays a different role in the fight against IUU fishing, and thus their data and insight needs will vary significantly (as

opposed to industry, for which a primary need is to validate that their operations are free of IUU fishing products). This point was reinforced during the expert workshop, where we collected feedback on how the tool could be implemented. Responses ranged from using the tool to augment current sustainability and IUU fishing risk assessment methodologies, to supporting industry partners, and using publicly available information for advocacy campaigns for the implementation and monitoring of the Port States Measures Agreement (PSMA) and other international instruments to combat IUU fishing.

TABLE 2: Value of a supply chain risk tool to different stakeholders interested in IUU fishing risk assessments

CONSULTANCIES	CERTIFICATION PROGRAMS
<p>Streamline risk assessments: It is challenging to collect, track, and analyze data to maintain updated risk assessments. The proposed tool will streamline available and continuously updated data into targeted, discernable IUU fishing risk profiles.</p> <p>Expand traceability: The tool can support traceability efforts by highlighting data requirements to perform IUU risk assessments.</p> <p>Maintain integrative capacity: The tool can be embedded or used in tandem with existing tools and initiatives to augment the accuracy and utility of existing risk analysis efforts.</p>	<p>Bridge the gap in chain of custody (CoC) certifications: The proposed tool can complement certification schemes by highlighting risk in situations where industry players are sourcing from fisheries that are certified but may still be involved in IUU fishing.</p> <p>Assist in standard-setting: The proposed tool can help a certification program refine the principles, criteria, and guidelines against which fisheries are assessed, to better identify risks of IUU fishing with the applicant or certificate holder and support monitoring and oversight of program implementation.</p> <p>Support conformity assessment bodies (CABs): Once a given product is certified, a tool could support CABs in performing surveillance audits of certified fisheries.</p>
ADVOCACY GROUPS	RESEARCH-BASED ORGANIZATIONS
<p>Reinforce transparency initiatives: The public dimension of the tool, which centralizes publicly available information for anyone to consult, will expand efforts that push for increased data transparency and availability.</p> <p>Support targeted advocacy: Standardized data, as opposed to abstract risk points, can spur more targeted advocacy and lobbying efforts. The tool can assist in translating numerous, complex data sets into simplified conclusions and insights to inform action.</p>	<p>Fill gaps in information The proposed tool could be used by researchers to glean insights and new indicators and models to infer risk and promote best practices.</p>



SECTION 4: User Research – Recommendations for design and implementation

KEY TAKEAWAYS - FEEDBACK

- Credibility, followed by transparency, standardized methodology, and risk outputs are key components of a proposed supply chain risk tool.
- Companies are more willing to invest in technologies that could be easily integrated into their existing systems, platforms, and tools.
- There is a need to align with existing standards and guidance, the most common being the GDST Standards 1.1.
- Companies indicated that there is a need to understand how risk assessment tools can guide action through a better understanding of the indicators used.
- Continued engagement with future user groups will be instrumental in improving the design and implementation of the tool.

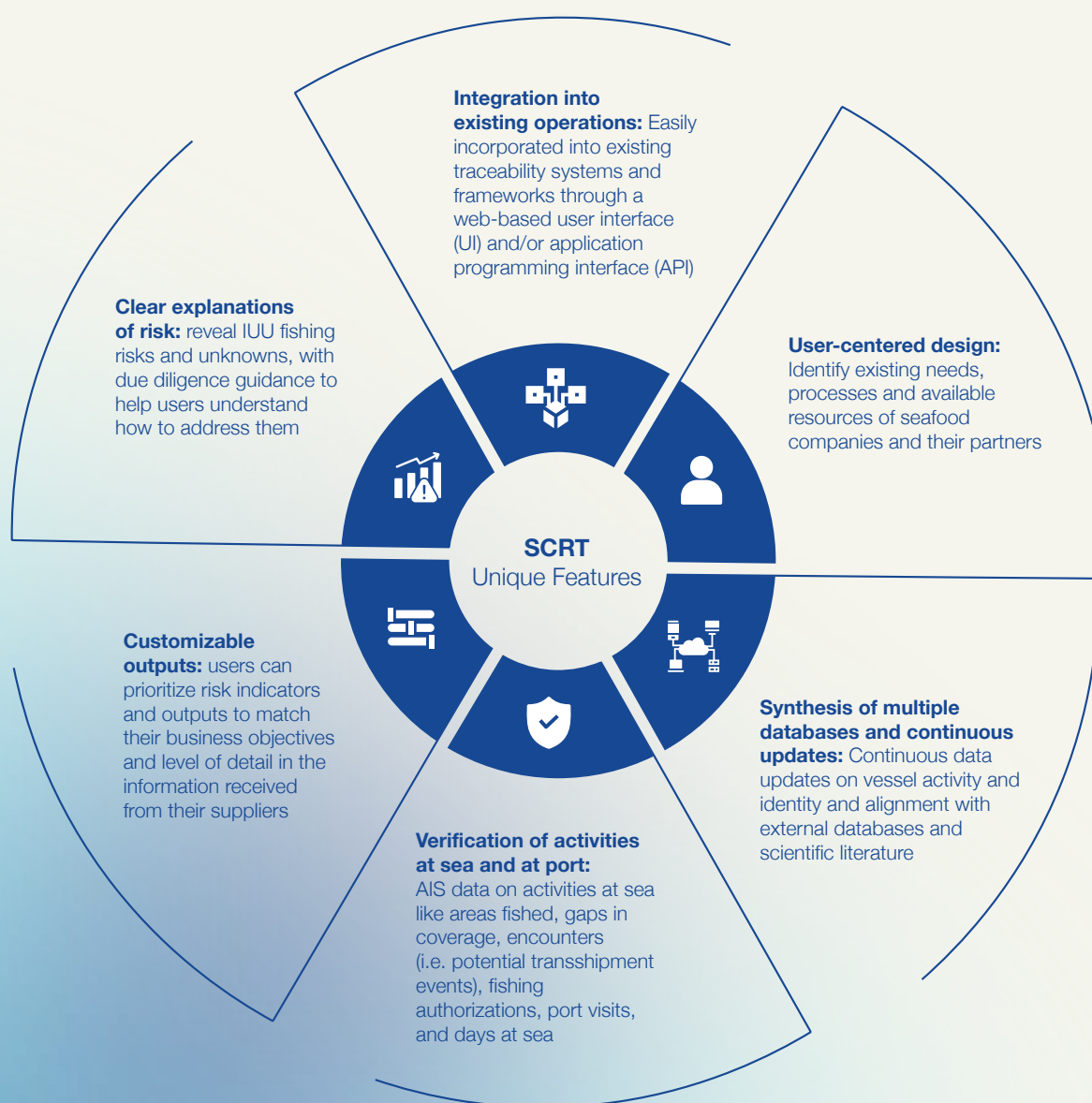
KEY TAKEAWAYS - OPPORTUNITIES FOR A SUPPLY CHAIN RISK TOOL

- Flexibility in a final delivery mechanism (API and UI) will allow for broader support and integration into companies' existing business practices and systems to approach risk in ways that fit their business needs.
- Data integration will allow companies to engage with one tool vs. multiple, thereby complementing existing workflows but providing greater breadth in data.
- By collating data through a robust risk assessment tool, companies will have additional capacity to focus efforts on engaging their supply chains and supporting traceability and transparency efforts.
- Including guidance and/or resources with the risk outputs can motivate companies to take action via due diligence work.

Adoption of a new risk tool, especially when companies are inundated with requests for participation in user research, pilots, and pre-competitive collaborations, will be wholly reliant on the value it brings to support their day-to-day business practices. The SCRT team collected feedback on the unique characteristics that the proposed tool could have to make it attractive for a wide range of potential users as a trusted source for assessing IUU fishing risk. These are summarized in Figure 2.

Along with the above features, workshop participants also noted that a reputable tool is a key factor in determining their support. Participants also noted the importance of having a publicly available and standardized methodology to assess IUU fishing risk and ensure consistency of the output.

FIGURE 2: SCRT unique characteristics of a supply chain risk tool to increase likelihood of adoption



OUTPUTS AND MODES OF DELIVERY

A key component of the user-centered design process was to identify the best outputs and modes of delivery of a supply chain risk tool for stakeholders. To overcome capacity challenges of seafood companies, there is a benefit for a mixed model of both pushing risk analyses on a regular basis (e.g., a stakeholder may subscribe to regular updates through email about a set of IUU fishing risk indicators) and pull risk analyses as needed (i.e., active consultation of the tool and the full set of indicators available).

The ability of a company to proactively *pull* information from the database will be useful, especially if they assess risk frequently, change sourcing often, need to vet suppliers rapidly, or cross-check information on a recurring basis. On the other hand, companies with less bandwidth or capacity to pull information or do not need access to risks (i.e. sourcing is relatively static) may prefer *pushed* information and/or analyses on a less frequent basis or only if risk indicators or databases change. One

interview respondent introduced the idea of a dashboard that can easily be accessed for a “birds-eye view” of their supply chains that would be useful to access by steering committees, publicly reporting out progress against company commitments, and getting a holistic view of risk across the entirety of their supply chains or product portfolio rather than on a product-by-product basis.

While much of the seafood industry is still paper-based, it will be important to showcase the benefits of using a digital platform to make processes more efficient and develop a delivery mechanism that could appeal to a broad audience. More user research will be required to engage paper-based users. It would also be advantageous to have an option for delivering data streams through an API to existing software applications used by companies. The benefit of data integration is to allow companies to engage with one tool vs many, thereby complementing existing workflows but providing greater breadth in data. Other ideas gathered from the expert community workshop included:

- A color-coding scheme similar to Seafood Watch (although one interview participant noted that color-coding isn’t as widely recognized outside of the United States)
- Summary reports that can be shared with a user’s suppliers, highlighting areas of concern and recommendations to address them
- A combination of a dashboard or landing page and an automated report
- An interactive web interface to highlight aggregated scores with the ability to dig into specifics

In general, the more integrated a tool or platform can be for a company, the fewer steps that a company has to take to assess risk, in turn, impacting their willingness to invest time and resources in new technology. By collating difficult-to-find risk assessment information for them, companies can then focus their efforts on engaging their supply chains and working together to combat IUU fishing while simultaneously becoming advocates for transparency and data sharing.





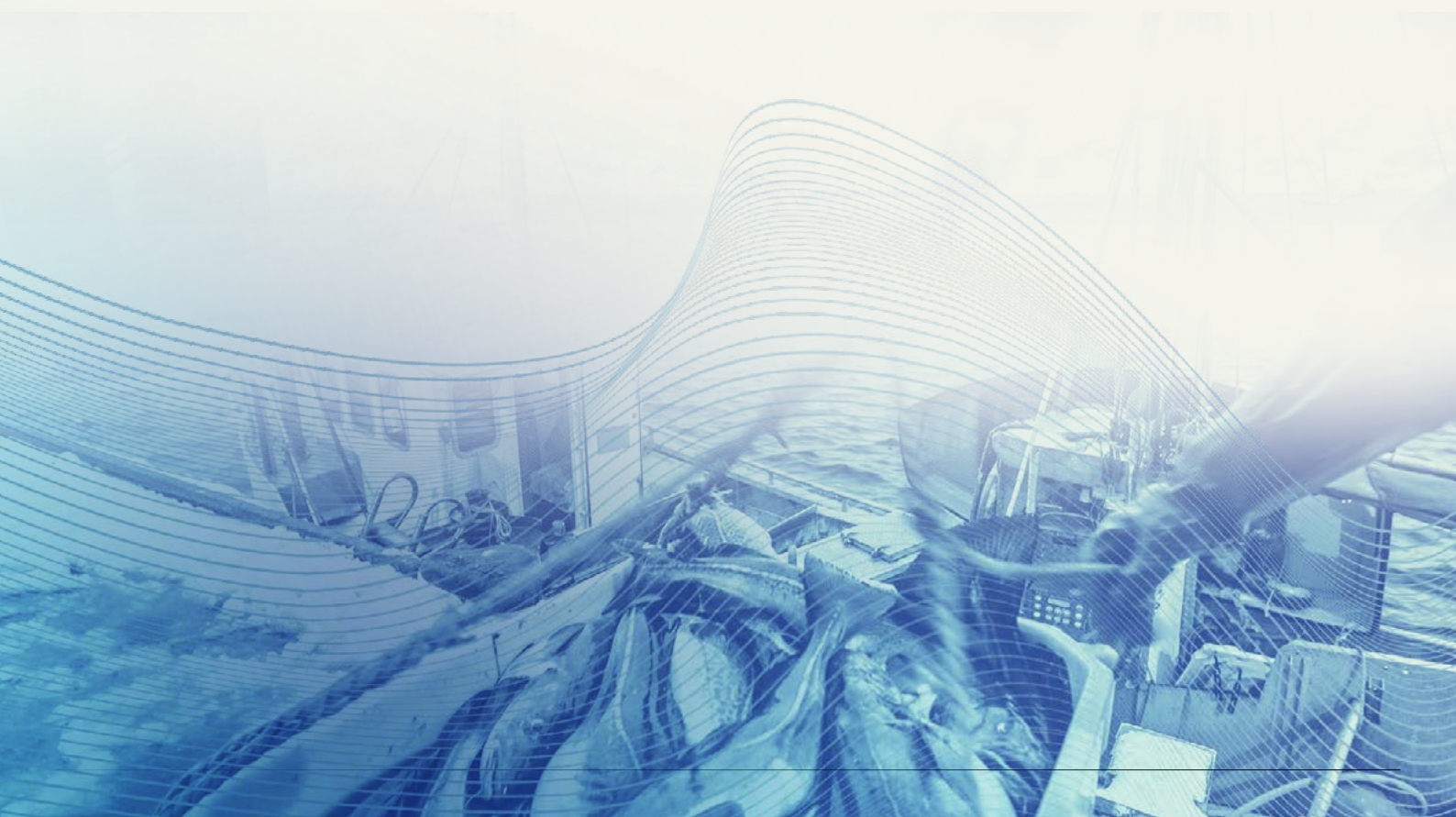
SECTION 5: IUU Fishing Risk Indicators

KEY TAKEAWAYS - FEEDBACK

- The relative importance of risk categories and indicators differ depending on the user group.
- Vessel-level indicators are of high importance to almost all user groups but not all companies have vessel-level information.
- Risk analyses and outputs will differ between data-rich and data-limited supply chains.
- Risk categories such as PSMA ratification status, verification of vessel identity and licenses/authorizations, presence of vessels on IUU fishing lists, and analyses of vessel activities at sea were important across multiple user groups.

KEY TAKEAWAYS - OPPORTUNITIES FOR A SUPPLY CHAIN RISK TOOL

- It will be important to socialize some of the less supported risk indicators (e.g., historical vessel data) and link them to actionable risk mitigation measures.
- There is clear potential to build the proposed supply chain risk tool prioritizing the risk indicators that are relevant across target user groups.
- It will be important to clearly communicate what indicators can and cannot say, and explicitly state how data gaps might represent risk factors.



Identifying IUU fishing risk requires an understanding of the potential risk exposures and how they could be identified throughout supply chains. We provided an initial list of risk categories and asked stakeholders throughout the surveys, interviews, and workshop to rank them from 1 (least important) to 6 (most important) according to their relevance to understand and act upon IUU fishing risk. Figure 3 presents the aggregated results by stakeholder group.

Consulting groups, industry, and regulatory bodies have a broader set of risk categories that are of medium to high importance when evaluating risks. Additionally, there were some risk categories that were of high importance to most stakeholder groups, such as PSMA ratification status, verification of current vessel identity, presence of vessels in IUU fishing lists, fishing license/authorizations, consistent use of satellite monitoring systems (e.g., AIS & VMS), and vessel activity at sea. Other indicators, such as IUU fishing risk related to a fishery, country of landing/processing, historical info on vessel identity and/or activity, EU card against the flag state, and use of flags of convenience/open registries, were less important for respondents across most stakeholder groups. This could be due to a variety of factors, including that such indicators might not be perceived as directly

related to actionable risk mitigation measures (e.g., while historical data is important, current identity and activities are more relevant).

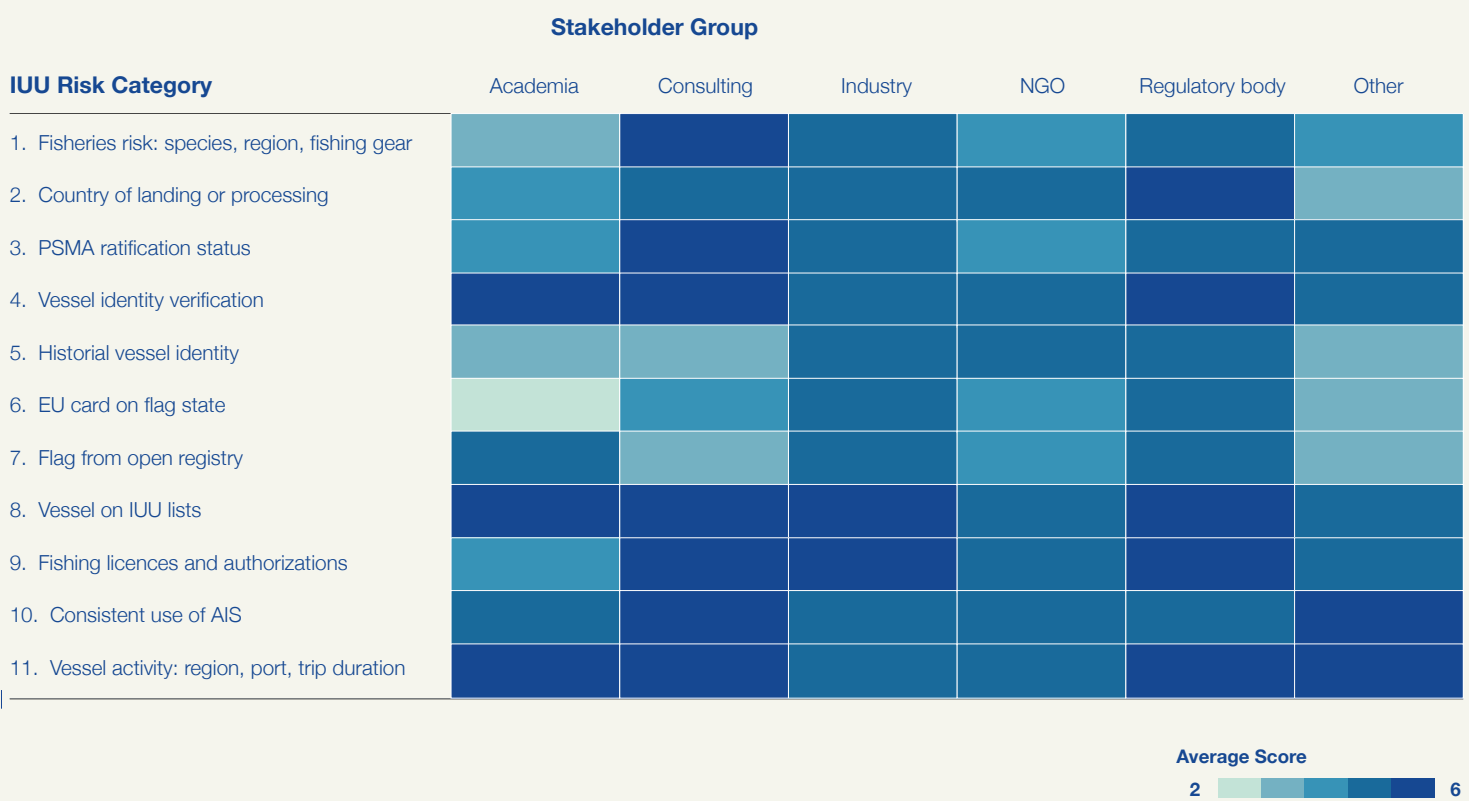
Additionally, we collected feedback on other indicators that would be relevant to incorporate into the tool if reliable data could be found to assess them robustly. Not all of these are critical to include in the first pilot phase, but could be built into the tool as it scales. The indicators below are not presented in any particular order.

- Identified IUU fishing risk of the first port of landing
- Transshipment controls and activity and cross-referencing this with AIS/VMS data
- Catch certificates (if applicable)
- Analysis of vessel beneficial ownership
- Registration of the fishing company and vessels
- Fishing bans
- Interpol analyses of fisheries crime
- Observer coverage (carrier and fishing vessels)

- Timely delivery of electronic monitoring (EM) data to RFMOs and flag States
- Information around tax havens/offshoring
- Monitoring of labor conditions

As the tool is developed, it will be important to identify areas of information that might be data-rich and data-poor thus impacting analyses. This will be further explored in Phase 2. Offering varying granularity of risk analyses that are compatible with the level of information a company currently has on product origin could be another unique feature that sets the SCRT apart from other risk tools. This adaptability could allow companies who, for example, do not have vessel-level data to at least evaluate risk at a fleet level while providing actions that can be taken to acquire vessel-level data. Similarly, a company that currently does collect vessel-level information would be able to get more nuanced and specific risk analyses. As indicated by a workshop participant, a tool that caters to all levels of risk (regional, fleet, vessel) would be very useful, especially if it was consistent in its analysis. This will showcase that even in data-limited situations, a supply chain risk tool could provide value and motivate a process to gradually get to that vessel-level information.

FIGURE 3: Ranking of IUU fishing risk indicator importance from stakeholder groups





SECTION 6: Pilot Study

KEY TAKEAWAYS - FEEDBACK

- Out of 1,155 vessels in the Proactive Vessel Register (PVR), 63% purse seiners and 72% longliners were identified and matched to AIS data.
- We evaluated vessel-level IUU fishing risk indicators for a subsample of 40 vessels randomly selected.
- A total of 15 vessels were flagged with suspicious behavior because they had at least one or more changes in vessel name or flag, long average trips lengths (>100 days), fishing in unauthorized RFMOs, fishing inside MPAs, or showed numerous AIS gap events (>20 gaps).
- Further inspection of these 15 vessels revealed that the behavior was not suspicious for 7 vessels when looking directly at the vessel tracks. Further due diligence is recommended for 8 vessels.
- This analysis revealed the importance of consistent AIS transmissions with proper identity data to enable the monitoring of vessels' activities at sea.
- Further analyses are required to understand the duration of gaps and the quality of available AIS data.

KEY TAKEAWAYS - OPPORTUNITIES FOR A SUPPLY CHAIN RISK TOOL

- This analysis demonstrates the potential of a data-driven approach to identify IUU fishing risk.
- Constant transmission of AIS and vessel identity data is a requirement for the proposed tool to deliver more insightful information that can be acted upon or further inspected at the vessel level.
- Automating analysis of AIS and vessel identity data to identify suspicious behavior could be incorporated into existing workflows as opposed to creating a new siloed approach.
- By unlocking new analytical approaches to illuminating vessel activities at sea, the proposed tool can unlock new avenues for seafood companies to engage with their suppliers.

ISSF AND THE PROACTIVE VESSEL REGISTER

In 2009, scientists, leaders in industry, and environmental champions launched ISSF based on shared concerns about the future of tuna fisheries and a desire to make changes in the industry. ISSF's 26 participating companies represent the majority of the world's canned tuna production. As a collaborator to the SCRT project, ISSF participated in the user research process and has continuously provided feedback on the data sources and analytical approaches considered for inclusion in the risk assessment. Additionally, ISSF continues to provide opportunities to engage with their industry partners to encourage participation in the design and adoption of a supply chain risk tool.

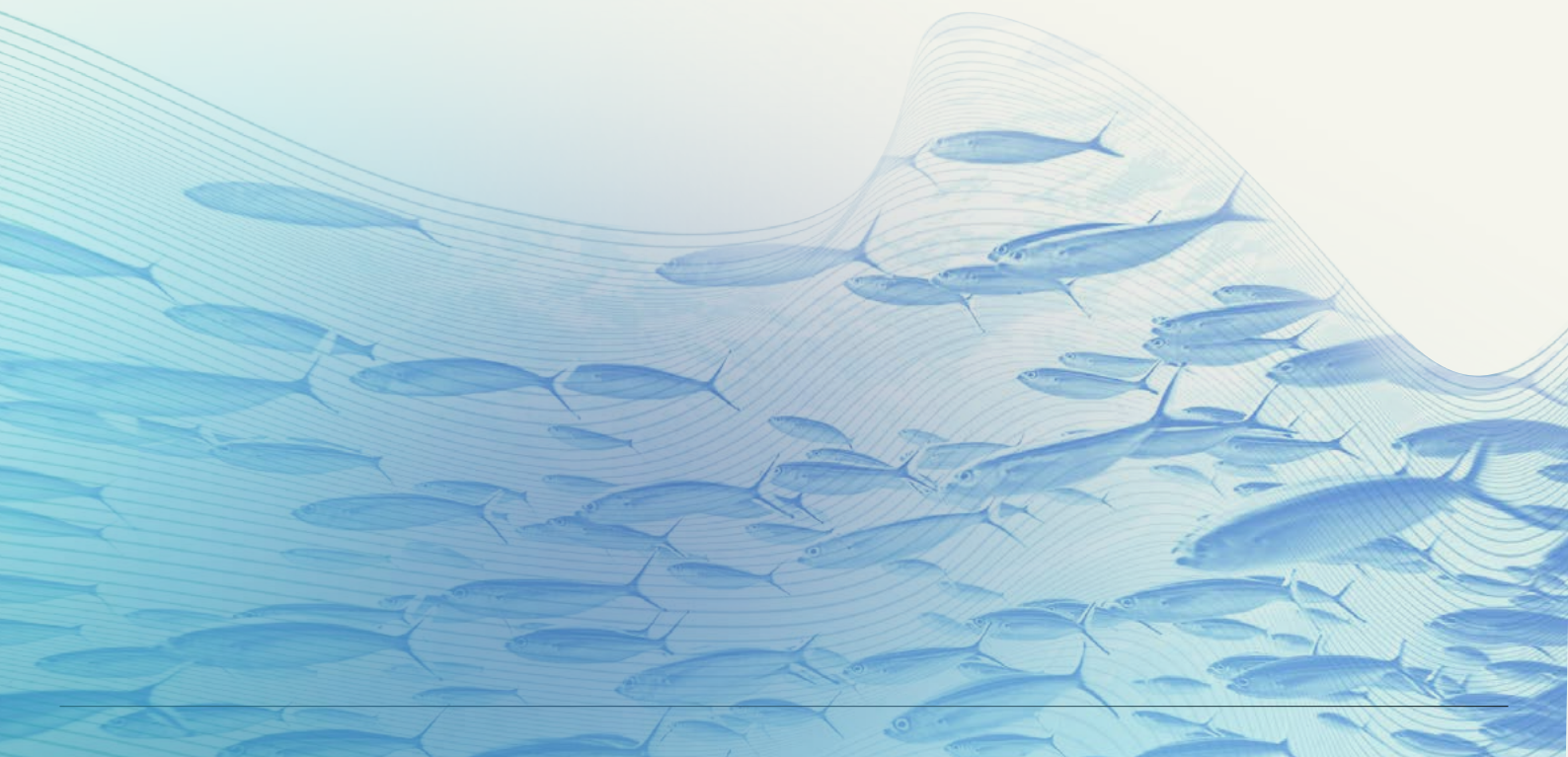
During this first phase of work, we conducted a pilot study by using the 1,155 vessels listed in the ISSF PVR in December 2021.

When included in the PVR, vessels undergo annual Level 1 auditing to assess the vessel attributes and compliance. Through random selection approximately every three years, each vessel undergoes a Level 2 (more detailed) audit, while level 3 audits are on-site inspections that occur if a risk factor is triggered during Level 1 or 2 audits. All audits are performed by MRAG Americas, ISSF's independent third-party auditor.

OBJECTIVES

Leveraging the open-source and trusted information that ISSF provides through the PVR, we had two objectives to determine proof of concept of a supply chain risk tool:

- Estimate the percentage of vessels on the PVR that transmit AIS data reliably enough to monitor their activities at sea effectively and explore patterns in existing gaps.
- Estimate a list of 14 vessel-level IUU fishing risk indicators highlighted through the user research that span from EU carding of flag States to matching AIS vessel tracks to RFMO authorizations (see methods for the full list) to show that our analytical approach can assess risk in a reliable way using the data that we have currently available.



METHODOLOGY

AIS Transmissions

Although the use of AIS is not globally mandated for fishing vessels, there is a growing number of flag and coastal States mandating its use through their national or regional fisheries regulations. Increasingly, industry is seeking its use by the source vessels. AIS devices broadcast the location of a vessel along with other information, including identity, course, and speed. Global Fishing Watch uses publicly broadcasted AIS transmissions to estimate vessel information and vessel activity, including [fishing, encounters, and loitering events](#).

The analysis presented in this report relies on commercially available AIS data and other publicly available information. The AIS data is limited to those vessels that transmit and provide accurate vessel identity information. Because of the limitations of AIS data, lack of complete and accurate public vessel databases and registries, and modeling limitations, AIS detected encounters and loitering events should be considered as estimates ([Kroodtsma et al. 2018](#), [Miller et al. 2018](#)). Potential fishing is distinguished from loitering events and encounters by using a convolutional neural network that uses AIS based data such as vessel speed, direction, and rate of turn to classify if a fishing vessel is likely fishing or transiting (not fishing) (See [Kroodtsma et al. 2018](#)). As AIS data varies in completeness, accuracy, and quality, it is possible that some fishing effort may not be identified and conversely, that some fishing effort identified is not fishing. However, Global Fishing Watch continues to improve and calibrate the models used to ensure fishing effort designations are as accurate as possible.

Matching AIS data to vessels in the PVR

Vessels on the PVR as of December 1, 2021 were evaluated for matches with AIS data for this analysis. To do this, PVR vessel data was matched to the AIS vessel data using multiple vessel identifiers, such as a ship's name, international radio call sign, IMO number, and the Maritime Mobile Service Identity (MMSI) number. When the identity information in the PVR was not sufficient to uniquely identify a vessel in the AIS records, Global Fishing Watch used additional vessel registries/databases to confirm its identity, including the primary RFMO registries described here and 30 other vessel registries/databases.

There were three potential outcomes of the matching exercise: *Match*, *Loose Match*, and *No Match*, which are further described below:

Match: Vessels were matched between registry records and AIS according to how closely the values of multiple core identity fields (ship name, callsign, IMO number, and MMSI) matched. These matches include:

- Ship name match and callsign match,
- ≥ 2 matches in the fields of [shipname, callsign, flag] when IMO number field matches,
- ≥ 2 matches in the fields of [shipname, callsign, flag, IMO number] when MMSI field matches

Loose Match: Loose match is a lax matching that relies solely on shipname and flag. The shipnames from both registry and AIS must perfectly match as well as the current flag of the vessel. Users must take into consideration that the loose match category may result in false or undesired pairings. An example is vessels named "FREEDOM" from the USA. There are more than twenty vessels that share that name; therefore, users must use the loose-match results carefully (*i.e.*, use it only for vessels with relatively unique names per country).

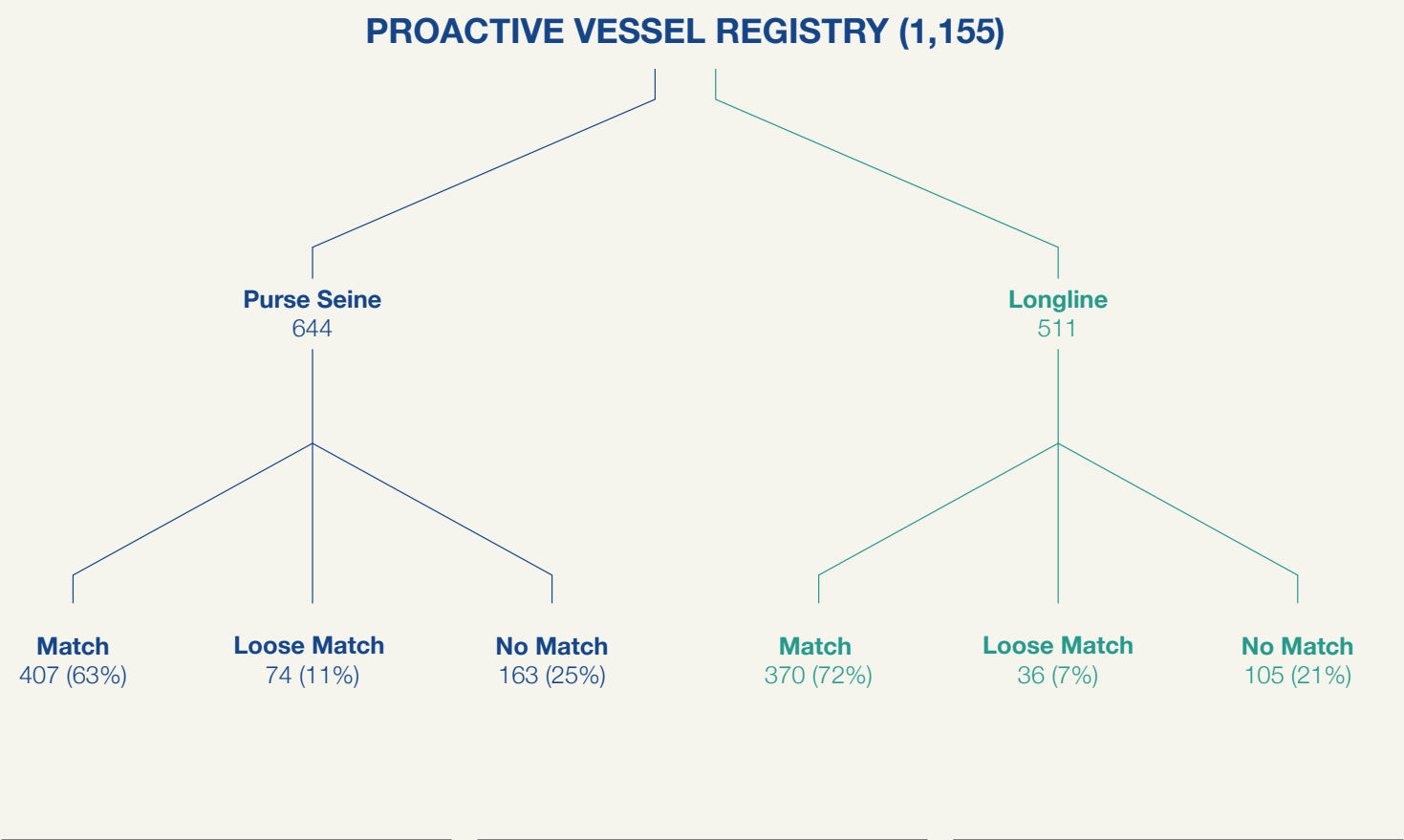
No Match: When there was not sufficient information to match a vessel even by shipname and flag.

² AIS data tends to be sparser and more limited for vessels equipped with Class-B AIS devices ([Kroodtsma et al. 2018](#)), with AIS device class often depending on flag State regulations, vessel length, and vessel purpose. For further analysis of Global Fishing Watch AIS data quality refer to: [Taconet, Kroodtsma, and Fernandes 2019](#).

TABLE 3: IUU fishing risk indicators – methodology and application

INDICATOR	METHODOLOGY	HOW DOES IT INFORM RISK?
Vessel Participation in the PVR	Vessel matches to ProActive Vessel Registry	Vessels undergo third party audits, less risk for IUU fishing
IUU-listed vessel	Vessel matches to TMT IUU Vessel List	Known vessel with IUU fishing activity
Vessel flag change in last 5 years	By using a combination of IMO number, RFMO vessel number, and/or national registration number, Global Fishing Watch was able to track flag changes.	Numerous flag changes could be indicative of IUU fishing risk
Vessel name change in last 5 years	By using a combination of IMO number, RFMO vessel number, and/or national registration number, Global Fishing Watch was able to track vessel hulls across changes in a vessel name.	Numerous identity changes could be indicative of IUU risk
Flag with open registries	Flag matches to International Transport workers' Federation (ITF) Flag List	These flags have been recognized as enabling IUU fishing activities
Most recent flag carded by EU	Flag matches EU Card List	Government-identified risk
Most recent flag identified as of IUU fishing concern by U.S.	Flag country matches NOAA's biennial report to Congress .	Government-identified risk
Vessel gap events	Disabling events are calculated based on (1) gap events greater than 12 hours in duration; (2) beyond 50 nautical miles offshore; (3) in a location where AIS reception quality is above 5 positions per day; and (4) vessel averages greater than 20 positions per 12 hour period during the 48 hours prior to the gap event.	A disabling event is an AIS gap likely due to intentional AIS disabling. Gaps can mask IUU fishing
Identifying events in RFMOs and authorization	Authorization is based on if a fishing event is detected in the following RFMOs: ICCAT, IOTC, WCPFC, IATTC, CCSBT, SPRFMO, NPFC. A fishing event by a vessel is considered to be authorized if the vessel has matching registry records from at least one highlighted RFMO where and when the event is taking place.	Fishing outside of authorized regions may indicate illegal or unregulated fishing
Identifying Events in No-Take MPAs	Fishing events occur in no-take MPAs , which are areas where extractive activities (such as fishing) are prohibited	Fishing inside no-take MPAs is considered IUU fishing
Encounters (transshipment)	Vessel encounters are defined by Global Fishing Watch as when a fishing and carrier vessel are within 500 meters of each other for at least 2 hours and traveling at < 2 knots, while at least 10 kilometers from a coastal anchorage. We also check if the carrier used has any ties to IUU fishing by cross-checking any fishing vessels on TMT IUU Vessel List that have transshipped or encountered the carrier vessel. SCRT users would need to provide transshipment authorization records to validate that all transshipment activities identified by AIS were authorized.	Encounters, where two vessels meet at-sea, may indicate possible transshipment activity between two vessels. Unauthorized transshipments pose IUU fishing risks
Days at sea before going to port/anchorage	Global Fishing Watch defines ports/anchorages as any 0.5-kilometer grid cell with 20 or more unique vessels stationary for greater than 12 hours. A port visit includes the port entry and exit of a vessel if the vessel stops. A vessel "enters" port when it is within 3 kilometers of a defined anchorage. A vessel has 'stopped' when it has entered port and slowed to a speed of 0.2 knots and has started movement again when it moves over 0.5 knots. A vessel "exits" port/anchorage when it is at least 4 kilometers away from the previously entered port. from the previously entered port	Vessels that do not visit ports regularly might be associated with IUU fishing or forced labor activities. Fishery/region context is necessary to interpret risk with this indicator

FIGURE 4: Proportion of PVR purse seine and longline vessels that were cataloged as *Match*, *Loose Match*, and *No Match*



RESULTS

Data Quality and Availability

A total of 1,155 vessels from the PVR were analyzed to determine their AIS data availability through the classification system described above (*Match*, *Loose Match*, *No Match*). Out of these, 644 were purse seine and 511 were longline vessels. The figure below shows the corresponding classifications in number of vessels and percentages relative to their vessel type. It also shows those vessels that have an IMO number and those that have a TUVI number, which is a number issued by the tuna RFMOs during the process of creating a [Consolidated List of Authorized Vessels](#), even for those not eligible for IMO numbers.

The proportions of *Matches*, *Loose Matches*, and *No Matches* were similar

across purse seine and longline vessels (Figure 4). A total of 25% of purse seine and 21% of longline vessels resulted in No Matches. While this might seem like suspicious behavior, there are legitimate reasons why a vessel cannot be matched to AIS track data. These include:

- Non-intentional misspelling of MMSI and other typos in identity information that result in inability to match the vessel to an AIS track
- Vessels below 300GT are not required to transmit AIS
- AIS might be turned off if the ship's captain believes that its operation might compromise the safety of the vessel

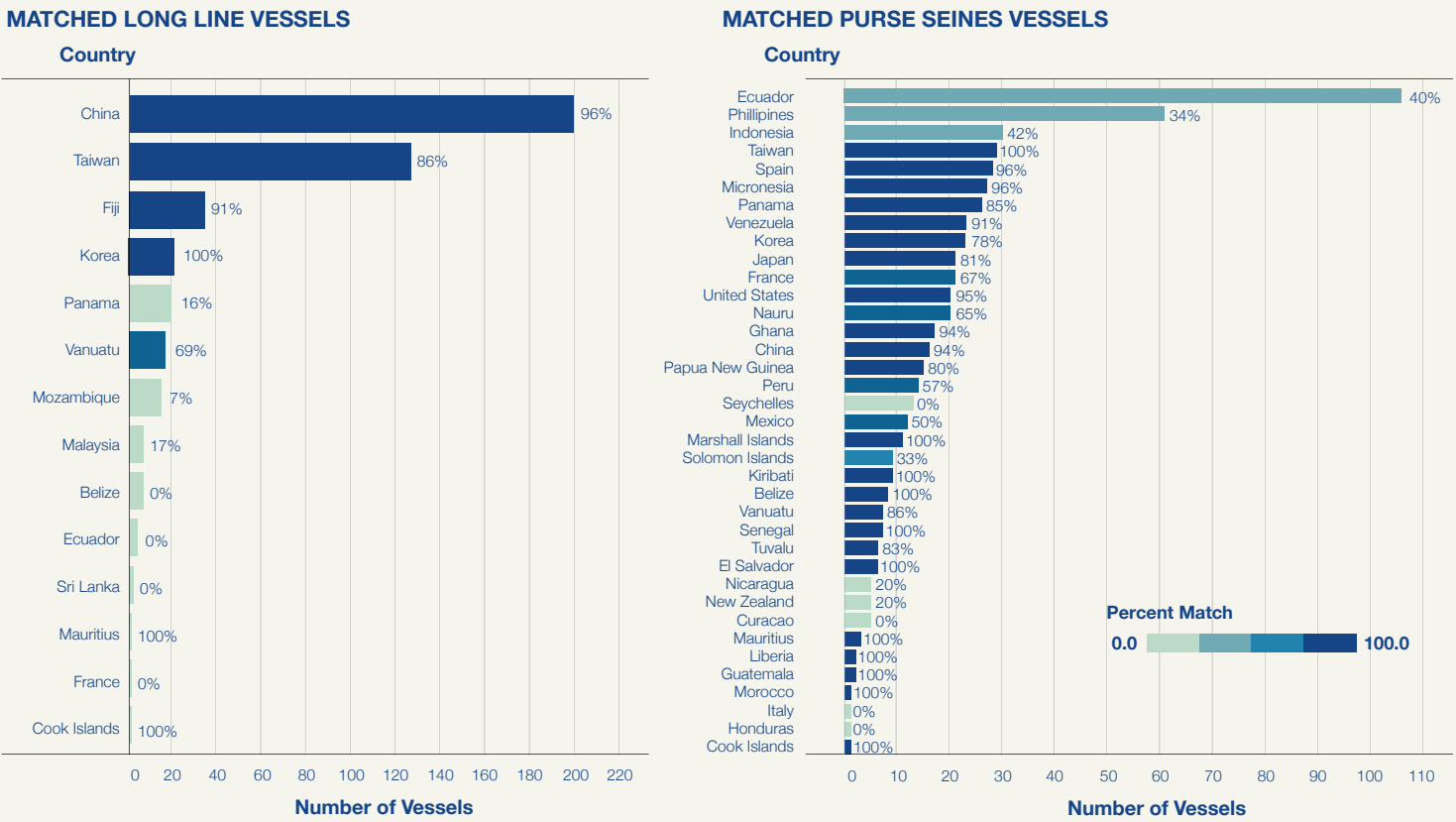
These reasons (and others) could lead to a *Loose Match* or *No Match*, and further

investigation of the vessels would be required to confirm if they had valid reasons for the lack of information.

Given that RFMO policies are stricter for purse seiners, it is surprising that 25% of them were a *No Match* and another 11% a *Loose Match*. This merits further investigation.

We also inspected matching patterns based on flag States to elucidate any patterns occurring on a country basis. Flag States have the authority to enforce regulation, inspection, and certification of vessels' operations, thus they could act as enablers in combating IUU fishing.

FIGURE 5: Number of vessels for longline and purse seine vessels aggregated by their flag State*



*The length of the bar represents the total number of vessels per country, while the color indicates the percentage of vessels that were a Match.

Longline vessels - country patterns

A total of 14 flag states were identified for longline vessels in the PVR, with China (n = 199), Taiwan (n = 126), Fiji (n = 34), and Korea (n = 21) representing most of the vessels. These four countries also had Match rates higher than 85%, which means that most of their vessels were successfully matched to AIS records. Except for Vanuatu (69%), Mauritius (100%), and Cook Islands (100%), other countries with longline fleets had Match rates below 20%. This exercise shows that AIS data transmissions are not as ample in some countries, and further work could be done to ensure AIS is effectively used to enable more transparency at sea. It is also worth noting that some of these countries are sharing or considering sharing their VMS data more publicly, which was not considered in this pilot study.

Purse seine vessels - country patterns

A total of 37 flag States were identified for purse seine vessels in the PVR, with Ecuador (n = 107), the Philippines (n = 61), and Indonesia (n = 31) having the most purse seine vessels registered. However, these three countries had Match rates below 45%, meaning that a large proportion of the purse seine vessels on the PVR could not be completely matched to AIS data. More detailed analyses are required to determine how to improve the Match rates of these countries. It is worth noting that of the 37 flag States with purse seine vessels on the PVR, 22 countries have more than 85% of their vessels matching AIS tracks, showcasing the potential for effectiveness of purse seine vessels' regulations across countries.

Assessing Vessel Level Indicators

A subsample of 40 Match vessels (20 longline & 20 purse seine) were randomly selected to be further evaluated through the IUU fishing risk indicators outlined in Table 3. Tables 4 & 5 below show the results per vessel and how they performed against the different metrics that help to illuminate IUU fishing risks.

TABLE 4: Initial vessel-level IUU fishing risk indicators for 20 longline vessels

VESSEL	FLAG												
LL 1	CHN	None	No	No	Yes	43	32.4	17,610	14,549	2,961		15	
		None	No	No		4	30.1	1,357	1,357			1	
LL 2	CHN	None	No	No	Yes	12	51.4	6,167	6,014	126			
LL 3	CHN	None	No	No	Yes	6	86.8	3,077	3,050	22		3	
LL 4	CHN	None	No	No	Yes	19	73.4	11,388	4,502	6,654		25	
LL 5	CHN	None	No	No	Yes	3	166.1	11,188	234	10,722	6	2	9
LL 6	FJI	None	No	No	No	21	34.1	9,138	6,381	2,692			
LL 7	FJI	None	No	No	No	24	59.3	2,732	2,420	213		3	
LL 8	TWN	None	No	No	Yes	11	114.4	6,037	29	5,811	2,524	53	
LL 9	TWN	None	No	No	Yes	16	61.8	5,008	801	4,190		9	
LL 10	TWN	None	No	No	Yes	14	73.0	10,015	2,406	7,537		1	
LL 11	TWN	None	No	No	Yes	13	73.8	7,541	5,734	1,743		21	
LL 12	TWN	None	No	No	Yes	10	40.7	5,041	1,337	3,702	15		
LL 13	KOR	None	No	No	No	1		22,657	1,874	20,354		2	9
LL 14	VUT	None	Yes	No	No	7	148.8	13,437	144	13,161	162	14	12
LL 15	FJI	None	No	No	No	18	84.2	10,171	6,493	3,455		14	
LL 16	FJI	None	No	No	No	8	110.1	870	439	417		3	
LL 17	CHN	None	No	No	Yes	19	76.5	16,830	16,013	389		2	
LL 18	CHN	None	No	No	Yes	46	33.6	19,256	17,255	1,826		24	
						3	44.9	1,586	1,531	55			
LL 19	CHN	None	No	No	Yes	8	75.4	7,594	4,988	2,537		21	1
LL 20	CHN	None	No	No	Yes	93	14.4	14,718	14,430	4		2	
						20 40 60 80	0 50 100 150	0K 10K 20K	10 100 1,000 10,000	0K 10K 20K	0K 1K 2K	0 20 40	0 5 10
		Fishing in no-take MPA	Flag in Open Registries	EU Carded	US Flag of Concern	Total Trip Count (#)	Average Trip Length (days)	Fishing Events (hours)	EEZ Fishing Events (hours)	RFMO Fishing Event (hours)	Unauthorized Fishing Event (hours)	Gap Events (#)	Vessel Encounters (#)

TABLE 5: Initial vessel-level IUU fishing risk indicators for 20 purse seine vessels

VESSEL	FLAG												
PS 1	ECU	None	No	Yes	No	10	20.84	1,015	276	734			
PS 2	ESP	None	No	No	No	1	8.89	5	5			1	
PS 3	SLV	None	No	No	No	47	27.44	2,880	2,557	309		83	
PS 4	PNG	None	No	No	No	6	19.62	27	27			1	
PS 5	KOR	MPA Fishing	No	No	No	32	20.87	1,679	1,547	129	129.2	16	
	SEN	None	No	No	Yes	39	21.10	4,730	4,237	409	45.2	3	
PS 6	ECU	None	No	Yes	No	17	23.27	1,393	656	729		2	
PS 7	CIV	None	No	No	No	10	25.43	55	52	3	3.5	2	
	SEN	None	No	No	Yes	26	18.98	2,262	2,163	78		1	
PS 8	IDN	None	No	No	No								
PS 9	PHL	None	No	No	No	11	49.38	1,052	1,051			1	
PS 10	CHN	None	No	No	Yes	47	28.00	2,451	2,445	1		147	4
PS 11	GHA	None	No	No	No	45	31.23	8,703	2,758	5,868		2	
PS 12	JPN	None	No	No	No	35	38.01	7,143	7,046	20		8	
PS 13	CHN	None	No	No	No	46	30.57	9,084	8,919	29		5	
PS 14	ESP	None	Yes	No	No	9	48.96	166	28	138		2	
PS 15	FRA	None	No	No	No	19	22.69	252	95	157		34	
PS 16	FSM	None	No	No	No	45	26.53	4,805	4,749	25		27	
PS 17	TWN	None	No	No	Yes	29	27.23	2,538	2,530			92	
PS 18	ECU	None	No	Yes	No	2	32.30	3	3			11	
PS 19	NRU	None	No	No	No	17	34.45	3,676	3,042	603		6	14
PS 20	PNG	None	No	No	No	24	28.93	4,932	4,895	2			
	PAN	None	Yes	Yes	No								
						0 20 40	0 20 40	0K 4K 8K	10 100 1,000	0K 2K 4K 6K	0 50 100	50 100 150	0 5 10 15
		Fishing in no-take MPA	Flag in Open Registries	EU Carded	US Flag of Concern	Total Trip Count (#)	Average Trip Length (days)	Fishing Events (hours)	EEZ Fishing Events (hours)	RFMO Fishing Event (hours)	Unauthorized Fishing Event (hours)	Gap Events (#)	Vessel Encounters (#)

Vessel behaviors were classified as suspicious during the analyzed period (2017-2021) if they had at least one or more changes in vessel name or flag, long average trips lengths (>100 days), fishing in unauthorized RFMOs, fishing inside MPAs, or showed numerous AIS gap events (>20 gaps). Fifteen vessels were deemed suspicious for one of the above-mentioned reasons. Further, six randomly selected vessels (three purse seine and three longline) were further examined on a track by track basis. This in-depth inspection was done using the Global Fishing Watch map, and tracks were examined from 2017 to 2021 to understand whether the suspicious behavior highlighted by the first-pass analysis was indicative of IUU fishing risk. The table below shows our conclusions.

This exercise shows that not all suspicious behavior identified with a first-pass AIS analysis is bad behavior. We operated under the premise that when the analysis flags a vessel as suspicious, it is important to further investigate.

TABLE 6: In-depth analysis of fishing vessels that were detected to have suspicious behavior

VESSEL	FLAG	SUSPICIOUS BEHAVIOR	CONCLUSION FROM TRACKS	RESULT
PS5	Republic of Korea, Senegal	Flag change, prior MPA fishing, unauthorized fishing	Changed flag to Senegal in 2018 with accompanied transit to Senegal coast. After flag change, most fishing is off W. Africa coast and rarely turns off AIS	No IUU fishing risk found using the current indicators
PS15	France	>30 Gaps	Vessel lands catch in Seychelles and Mauritius, turns off AIS for most fishing events and turns on AIS only for traveling.	Needs further exploration
PS17	Taiwan	>90 Gaps	Rarely has AIS on	Needs further exploration
LL5	China	Long trips with transshipments	AIS on for the majority of the time, vessel rarely goes into port, some trips extending over 1 year	Needs further exploration
LL19	China	>20 Gaps	Vessel leaves AIS on for most of the time but AIS is not transmitting before it lands in China	Needs further exploration
LL8	Taiwan	Long trips with unauthorized fishing	Leaves AIS on, no unauthorized fishing detected, unless authorization needed in overlapping area of ICCAT and CCSBT RFMOs	No IUU fishing risk found using the current indicators

LEVERAGING THE SUPPLY CHAIN RISK TOOL TO PROMOTE INDUSTRY TRANSPARENCY AND ACCOUNTABILITY

The results of this pilot study show the complexity and usefulness of using AIS data to promote the verification of activities at sea in seafood supply chains. The two main findings are:

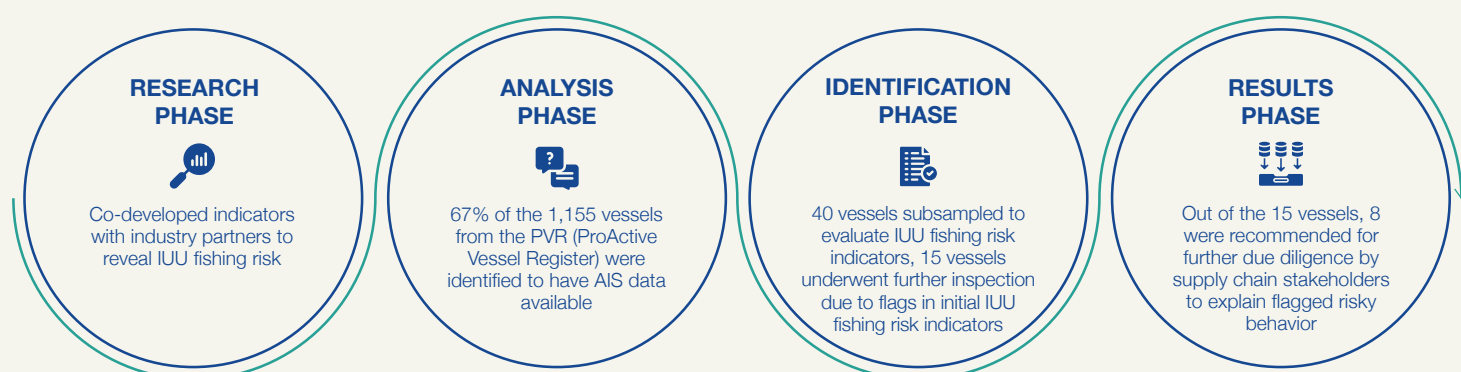
- Out of the 1,155 vessels on the PVR, 63% of purse seine and 72% of longline vessels had a successful *Match* to AIS data. Conversely, 37% of purse seine and 28% of longline vessels did not. This is a clear opportunity for further engagement to ensure continual and accurate identification of vessels on the water. In order to do this, companies and governments can promote the mandated use of AIS along with minimum data requirements for correctly broadcasting vessel identity values, such as IMO, ship name, MMSI, call sign and flag.
- The detailed analysis of IUU fishing risk indicators for 40 vessels serves as a proof of concept that once AIS tracks are clearly identified and transmitted consistently, the proposed tool offers important new capabilities to cross-check activities at sea. This could motivate industry and government actors to re-think their data verification strategies and use these examples as illustrative of the possibilities that new analytical approaches can unlock.

This analysis also showed the possibility of providing actionable information to tuna buyers to help implement and oversee their responsible sourcing strategies. If buyers have policies requiring the use of unique vessel identifiers and/or AIS, a supply chain risk tool can help them identify and further investigate fleets and/or vessels where there may be gaps. By enabling continual and accurate identification of fishing vessels, it will be easier for buyers to cross-check and verify information provided by their suppliers. This saves time, effort, and money, and shows the value of use and sharing of AIS. Additionally, the tool has shown the feasibility of compiling multiple data sources and analyses that are currently hosted in several websites/initiatives/databases. By building a single data platform that provides easy and structured access to this information, companies will be able to ask appropriate questions about the legality of the seafood they are buying and will have the capacity to verify the claims. However,

it is also important to recognize that such a tool has limitations. For example, it does not say if a vessel is underreporting catch, catching unauthorized species, using illegal gear types, catching undersized fish, finning, among other things. As such, companies need to engage their suppliers on these topics via due diligence efforts. The proposed tool has the potential to help prompt these additional checks but does not substitute them. These more detailed inquiries will lead to more transparency and data sharing in supply chains.

We encourage the use of these results to further promote collaborations and commitments towards increased transparency in seafood supply chains. As new technologies and analytical tools become available, it will be easier, faster, and more accurate to ensure that seafood supply chains remove market access to unsustainable and IUU fishing.

FIGURE 6: Showing the tool in action – ProActive Vessel Register (PVR) pilot project roadmap





SECTION 7: Next Steps

The work done during Phase 1 fits within the broader scope of the SCRT project roadmap, and allowed the team to better understand user needs and priorities, and potential obstacles to implementing a new tool. It also allowed the project team to explore and compile the databases and analytical tools needed to estimate the IUU fishing risk indicators. Phase 1 succeeded in collecting feedback from a range of potential users, generating interest and securing engagement in the project, and testing coverage and the strength of connecting Global Fishing Watch data on vessel activity to an external platform, the ISSF Proactive Vessel Register.

To ensure the tool is useful and used, it is important to consider user needs, priorities and how to share information that they can act upon. Feedback received from the surveys and interviews needs to be translated into potential features and functionalities of a tool. Insights from the user research will also be used to devise options on how the information can be delivered for effective and seamless implementation into existing supply chain management systems (e.g., through a data feed). We present below the roadmap for the SCRT project.

FIGURE 7: SCRT product development roadmap





CONTACT US FOR MORE INFORMATION

If you would like more information on the SCRT or wish to participate in its design, please contact the development team: scrt@weforum.org

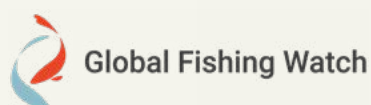
PARTNERS



FishWise is a non-profit sustainable seafood consultancy based in Santa Cruz, CA, that takes a holistic approach to sustainability to protect ocean health and workers' rights. Offering expertise trusted by labor and human rights and conservation organizations, seafood buyers and suppliers, and government representatives, FishWise offers a range of services that empower businesses and a diverse community of collaborators to lead the transition to a sustainable and ethically responsible seafood industry.



Friends of Ocean Action is a unique, informal group of over 70 global ocean leaders from a range of sectors who are fast-tracking solutions to the most pressing challenges facing the ocean. Its members – the Friends – come from business, civil society, international organizations, science and technology. Friends of Ocean Action is hosted by the World Economic Forum, in collaboration with the World Resources Institute. It aims to drive meaningful action and transformative, high-impact and scalable initiatives to help achieve the Sustainable Development Goal for the ocean, SDG14, for a healthy and thriving ocean. Website: friendsofoceanaction.org Twitter: @FriendsOfOcean



Global Fishing Watch is an international nonprofit organization dedicated to advancing ocean governance through increased transparency of human activity at sea. By creating and publicly sharing map visualizations, data and analysis tools, we aim to enable scientific research and transform the way our ocean is managed. We believe human activity at sea should be public knowledge in order to safeguard the global ocean for the common good of all.



The Stanford Center for Ocean Solutions catalyzes research, innovation and action to improve the health of the oceans for the people who depend on them most. The Center capitalizes on Stanford's deep expertise in ocean science and in the many other disciplines crucial to solving ocean problems including engineering, computer science, political science, design and business. By translating research insights into solutions at scale for oceans and people, the Center is building a generation of leaders who are equipped to work across disciplines and across sectors.

