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Timber Testing Final Report

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Contents

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"*Illegal logging occurs when timber is harvested, transported, processed, bought, or sold in violation or circumvention of national or sub-national laws.*"

Miller, Taylor, and White 2006[1]

[1] Miller, F., R. Taylor, and G. White. Rep. Keep It Legal - Best Practices for Keeping Illegally Harvested Timber Out of Your Supply Chain. Gland, Vaud: WWF's Global Forest & Trade Network, 2006.

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Key learnings:

Market surveillance is a viable approach to identifying issues:

- Market surveillance of products regulated in the scope of the ILPA (Illegal Logging Prohibition Act) is a viable approach to identifying importers who may have issues with their due diligence. Findings from the project's market research and timber testing phases suggest that there is more work for importers to perform to mitigate the risk of importing timber or forest products from illicit sources.
- Findings ranged from identifying issues with products that referenced third party certification to the potential identification of conflict timber within products within the market.

There are different approaches to regulatory interventions:

- Two regulatory approaches are possible: one, where regulation occurs at the point of entry into a country, and another, where regulation is within the market itself. Scientific testing can support either or both approaches. The authors recommend that a combination of both regulatory approaches is desired. Regardless of the final approach to the regulation of timber products scientific testing has a role to play at both points on the supply chain. If there is no regulatory coverage within the market itself, then in-market testing provides a sound source of intelligence.
- Certain products favour at-border intervention strategies, such as de minimis imports of Builder’s carpentry or oak barrels where in-market intervention strategies are not possible.
- Other products favour in-market intervention strategies where disruption at the border would be prohibitive and it may take more time to investigate non-compliance such as in co-mingled forest products like MDF, paper and particle board.

Challenges experienced when distributing samples:

- With each laboratory involved in an activity comes a separate set of requirements for sample submission, preparation, handling and labelling. This can require a lot of human resources to manage as well as training, and specialised equipment.
- International shipment of samples also presented challenges such as samples being destroyed by international customs because of sanctions against timber from certain countries.
- Flexibility in testing budgets and a pragmatic approach may be required: Some samples were suspected or declared to be a particular species at the point of sale, however, tests identified they were a different species. In some cases, this could mean the sample may no longer be able to be submitted for a provenance test because the lab may lack reference data for that species.
- One reporting scientist decided not to test two samples that met submission criteria for unknown reasons. If a panel of testing laboratories is to be used in the future it is recommended that strong relationships be developed with these businesses to facilitate the agile and proactive management of these sorts of samples and associated tests.

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The current level of transparency around labelling at retail is poor:

- Only **50 of 120 products** researched with FSC or PEFC certification provided any information about the species or type of wood that they contained. This project has demonstrated that even among third-party certified products, information is absent at the point of sale, and is also absent in most cases when licence numbers are investigated.
- Overwhelmingly timber and forest products are sold without any reference to what they are made from and where they originated. Not only is this a missed opportunity to add value to a product, but the effect of this lack of transparency is likely an unfair playing field for domestically harvested products which may have to conform to stricter legal guidelines than imported products while occupying the same shelf signalling and positioning.
- In general, consumers wish to buy affordable, legal, safe, functional products. They expect that if a product is on sale, it meets certain criteria for which they may tacitly assume a retailer or vendor has sufficiently vetted. If this proves not to be true, the financial damage breaches of trust can cause can be orders of magnitude greater than the value of the products affected.
- In some cases, retailers were dismissive and had no desire for any engagement or communication around responsible sourcing. We highlight a case study where a shop assistant expressed that the retailer they work for "*do not care about where their timber comes from*." After they were asked why they do not segregate their machine-graded pine (which originates from different countries).

A Vulnerability and Critical Control Point (VACCP) risk assessment was a productive activity and should be used in future:

- A risk assessment was performed to produce a stratified sampling plan. This enabled the project to orient itself towards items where attributes were known.
- Product types identified as high risk included Burmese teak, Russian and Chinese plywood, and various tropical hardwood and composite products from Southeast Asia.
- In general, test results that indicated inconsistencies or issues with claimed provenance, species, or both were identified more frequently in product categories assessed to be high-risk than in categories where the risk was assessed to be lower. For example, **37 of 74 imported timber products (50%)** gave results indicating inconsistency with declared provenance, taxonomy, or both. Conversely, issues were not identified in domestically harvested timber products – which the risk assessment predicted.
- VACCP could be further simplified and developed as a beneficial tool for Australian businesses to define mitigation strategies.
- Recommendations are also provided for mitigating risks in the industry. These include increasing transparency, encouraging unannounced audits, encouraging importers to adopt testing, and market surveillance exercises, and improving labelling and packaging standards as part of their risk mitigation strategy.

Considerations for Future Regulators

- In some cases, test results appeared to contradict one another. One example being where one test indicated oak originated from regions in Northern China or Russia Far East, and where another test on the same piece of would indicate the genetic source of the material could be the United States. It will be necessary for personnel undertaking testing of samples in the future to navigate ensuring the right sample is getting the right

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test to deliver the required outcome. It is also critical to recognise that a test result supports an investigation or review, and context is important.

- Turnaround time is a critical measure for any forensic test service provider. Future engagement with testing providers should include a clear definition of expectations before commencing any work to ensure that it is appropriate for the regulator's requirements. Whilst turnaround time is important it is also important that the fastest won't always be the best with the laboratory that performed the fastest turnaround in wood identification across all samples missing that an 'Okoume straw' product did not just contain Okoume, it likely contained another undeclared timber. Three laboratories performing wood identification using light microscopy identified this when reviewing the results. The review and discussion between key scientists regarding these findings from the different service providers was a good example of where collaboration delivered a better outcome.
- Anonymity should be preserved if that is the aim of an activity. Whilst the market surveillance exercise was carried out without material challenges Source Certain wanted to note that communication of intent to conduct market-based sampling work needs to be carefully managed. One business became aware they were being sampled as part of the undercover sampling efforts and responded poorly to this finding. This happened due to Source Certain being named on AusTender as a supplier of sampling services, and Source Certain procuring a sample and making payment by Bank Transfer which alerted the vendor to Source Certain's activities. The issue was resolved by departmental communication and removing the business' sample from the testing regime. In future, clearer communication with the industry, and preservation of anonymity by all parties should be performed. This may need to consider how descriptions and disclosures are managed on portals such as AusTender, as well as using anonymous methods for financial transactions.

Our recommendations

Source Certain makes three recommendations based on the findings of this work.

1. **Build an enforcement team or "illegal logging unit."**

2. **Develop an enforcement strategy and use a systems approach to prevent illegal timber from entering the market.**

3. **Boldly invest in the research and development of pro-timber legality technology and prioritise domestic capacity.**

Build an enforcement team or "illegal logging unit."

The strategic objectives of the illegal logging unit should be to:

- Prevent illegal or inauthentic timber and forest products from being dishonestly placed onto the Australian market.
- Disrupt offending and bring offenders to justice.
- Develop Australia as a global leader in counter illegal logging capability.

Australia has the opportunity to become the leader at addressing illegal logging, both in terms of continuing to uphold its high standards against domestic illegal logging as well as disincentivising and preventing illegal timber and associated trade from entering its marketplace through imports. The use of tests and technology can provide Australia with the means to achieve this through their skilful application by the Government employees.

Illegal logging is a major contributor to global deforestation. To end deforestation by 2030, a 10% annual cut in deforestation is needed globally. In 2022, deforestation only fell by 6.3%. For every year there is a global shortfall in the reduction of deforestation leading to 2030[2], the more severe the reduction measures need to be to compensate for insufficient action. Changes to domestic forest policy alone are insufficient to achieve this target. Swift and decisive action must be taken.

In monetary terms, illegally sourced timber in Australia was estimated to be worth $400 million per annum in 2011. Adjusting this value according to inflation would equate to approximately $540 million per annum in today's money. To benchmark recommended departmental funding based on the valuation of the matter at hand one could look at budgets of international enforcement units. In 2021 the cost of food fraud to the UK food industry was estimated to be between £410 million and £1.96 billion (approximately $780 million to $3.7 billion AUD). The UK's National Food Crime Unit received a budget of £5.8 million in 2021[3] (approximately $11 million), though it does not have as large of a territory to cover and achieves its objectives primarily through stakeholder engagement.

However, it is not sufficient to base the cost of the solution to a problem-based solely on the monetary value of illegal timber, or in terms more suited to evaluating anti-fraud measures. The proceeds of illegal logging fuel wars, transnational crime and terror organisations, and damage to the environment that cannot be accounted for in terms simply related to the value of illicit trade in timber and other forest products. Damage can be considered in terms of threat to national security or international relations, direct environmental damage, or indirect environmental damage such as the increase in frequency of bushfires and flooding Australia experiences because of climate change.

The enforcement team should comprise auditors, policy experts, and officers with experience in front-line enforcement roles such as policing and investigation. Adequate funding and resources are essential for the team to conduct outreach and training programs with importers and other companies that fall under the scope of any amendments made to the Illegal Logging Prohibition Act. Team members with policing experience will provide a clear signal the Government takes the matter of anti-illegal logging enforcement with a level of seriousness and equip the team with staff who are experienced in upholding the law and

[2] Forest Declaration Assessment Partners. (2022). Forest Declaration Assessment: Are we on track for 2030? Climate Focus (coordinator and editor). Accessible at www.forestdeclaration.org.
[3] https://www.food.gov.uk/print/pdf/node/177

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undertaking investigations appropriately but can also effectively and efficiently manage and build cases against entities who fail to comply.

In addition to supporting Australia's native timber industry, and its ~30k importers through the reforms, the communication and stakeholder engagement component of the illegal logging unit may also train or collaborate with other law enforcement units. This may involve those involved in policing organised crime which may be adjacent to illegal logging activities, such as money laundering, or severe breaches of trading and product safety standards.

Develop and implement an enforcement strategy

Source Certain recommends a systems approach to enforcement. The combination of the components used within the strategy is greater than the sum of its parts.

This process may take the form of a funnel (Figure 1) where strategic components are prioritised by lowest cost and broadest scope first, through to activities where costs are greatest but lead to accurately identified outcomes. In Figure 1, risk assessment ranks first as it is one of the least expensive activities to perform while acting as a filter to concentrate efforts on key target areas. Once those areas or specific product categories are identified, screening should be the next priority. Screening can be employed at the border or on market items.

Some items may only be available to be assessed at the border of entry to Australia such as Oak barrels, or direct-to-consumer structural timber sold on mass-market websites like Alibaba.com. Eventually, efforts should be concentrated on distilling issues that are to be high profile targets for enforcement. This may involve costly aspects of investigation such as thorough forensics testing, audits, and forensic accounting depending on nature and severity of the issue that is identified.

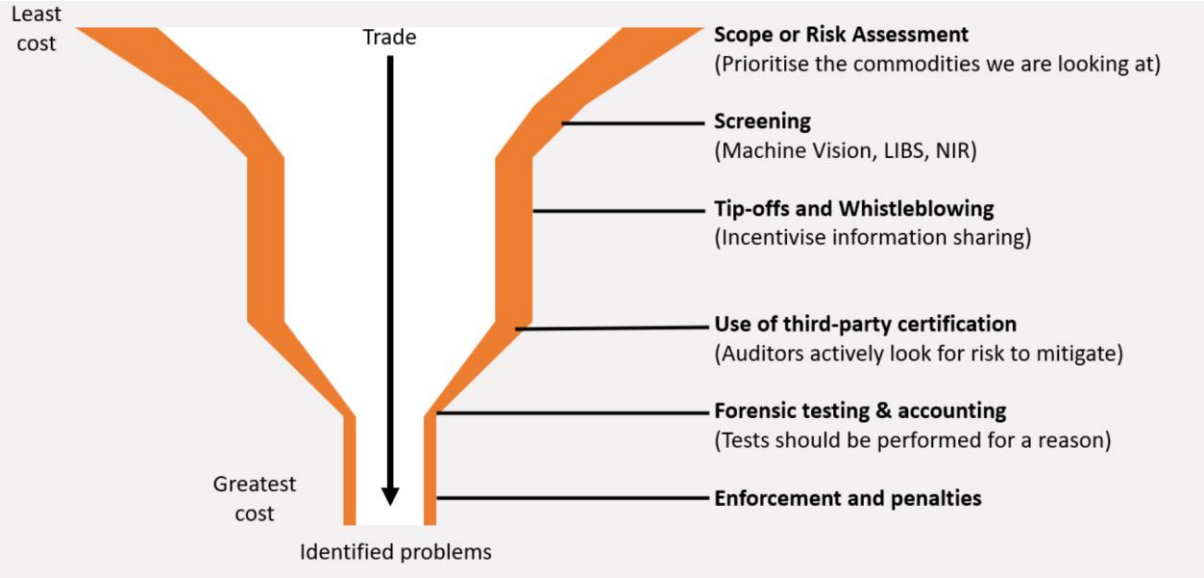

Figure 1:The 'funnel' a hypothetical systems approach to using testing and other investigative activities to identify targets for enforcement actions.

The EUTR was implemented by numerous European Competent Authorities as a market-side intervention. One of the earliest successful rollouts of the EUTR was by the UK competent authority, named the National Measurement Office (NMO) (*now Regulatory Delivery*).

Based on the report published by NMO, Pillet, and Sawyer [4] we have illustrated their engagement strategy and approach in Figure 2.

Depending on how the reforms take shape, it may also be necessary to consider the appropriate actions for batches of products identified by some means to contain or have a high risk of containing illegal timber. For serious environmental crimes such as Ivory poaching, when Ivory is seized by authorities it is destroyed by burning. Other strategies could involve donating seized timber to charities given the fact that once a tree has been cut down and processed into a finished good, the damage cannot be reversed, and the material cannot be returned to nature. This raises questions of the extent to which importers or traders may or may not need to recall products affected by illegal or high-risk timber.

The enforcement strategy should:

- Treat illegal logging and associated trade as serious crimes.
- Be fair and proportionate to members of the native timber industry and the ~30k importers.
- Utilise fines and other punitive measures against offenders, both individuals and body corporates as strong disincentives to engaging in the trade of illegal timber.
- Incorporate a sufficiently large budget for stakeholder communication and engagement in support of the industry in the changes required to comply with the reforms.

[4] National Measurement Office, Pillet, N., & Sawyer, M., EUTR: Plywood imported from China (2015). London; National Measurement Office.

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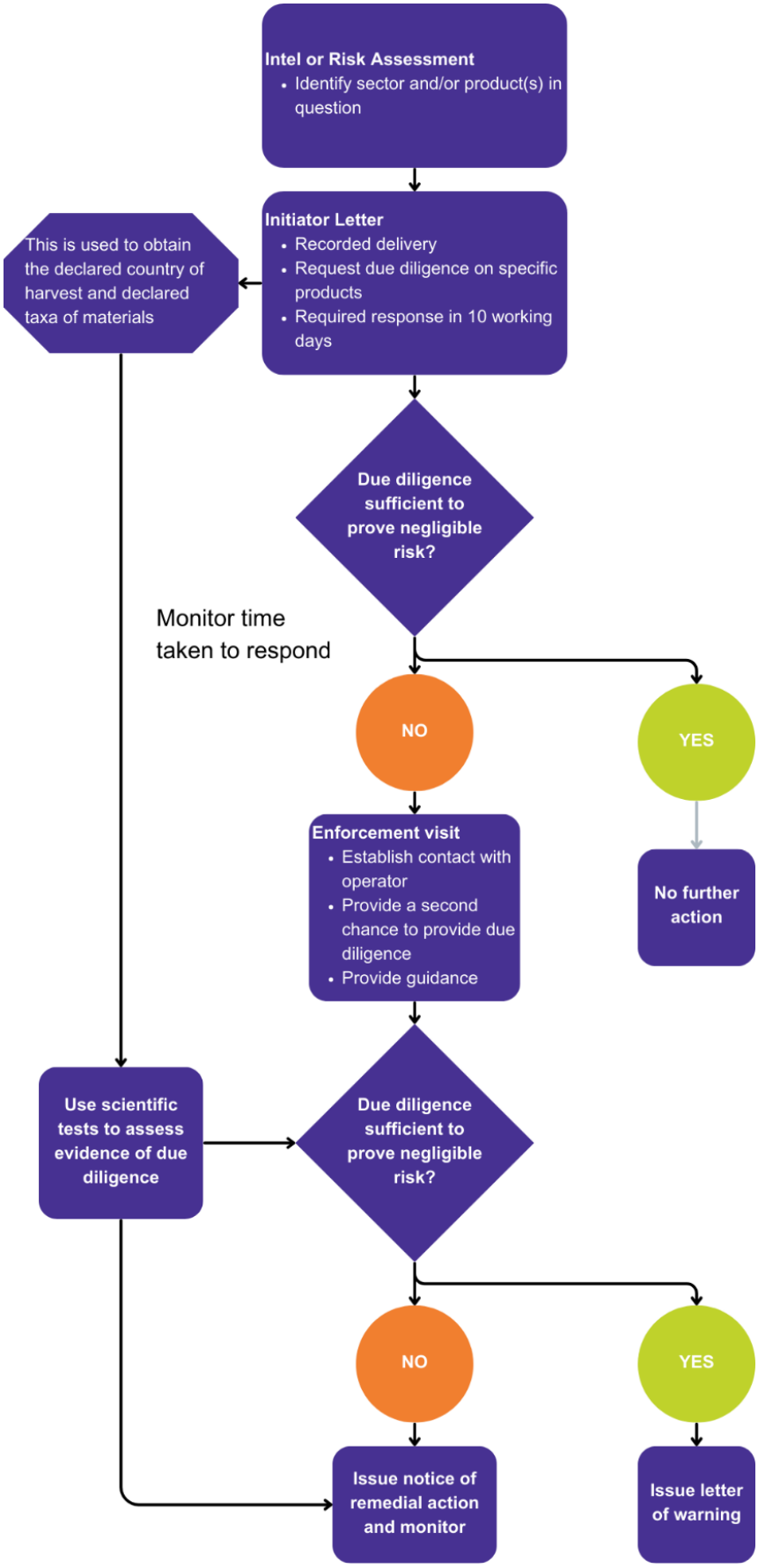

Figure 2: Schematic of the Enforcement engagement strategy used in the UK. Adapted from Pillet & Sawyer, National Measurement Office 2015.

Boldly invest in pro-timber legality technology and prioritise domestic capacity

"If the only tool you have is a hammer, it is tempting to treat everything as if it were a nail."

Abraham Maslow

By some estimates, including those of the World Bank, the global trade in illegal timber may be worth $240 billion each year. By value, this is the largest environmental crime and is the third largest category of international crime after narcotics and human trafficking.

Proving timber has been illegally harvested is exceptionally challenging thanks to the sophistication of organised crime and the complexity of global supply networks. Enforcement agencies are only able to use technology that has been developed to date, which thanks to stakeholder uptake and investment is advancing. However, it is not advancing quickly enough to address the sheer scale of illicit trade and its most harmful effects, global deforestation and climate change.

The ability to develop technology to address illegal logging is a matter of the rate of investment. If anti-illegal logging policy outpaces technological development, it will mean that policymakers can't deliver on their well-intentioned promises to the electorate.

It has also been a key learning from this project that there are many reasons why an economy, including an advanced economy such as Australia, would disproportionately benefit from investment in domestic capacity. Logistical barriers, sanctions, time-zone differences, and the availability of experts to testify limit the application of technology and scientific evidence to address anti-illegal logging policy.

It is well-recognised that developing economies need support with anti-illegal logging capacity building. Australia continues to be a major supporter and contributor towards this effort. However, as the illegal timber trade continues to become more sophisticated in response to regulatory intervention, Australia as a prominent consumer economy and a leader in anti-illegal logging demand-side regulation needs to up the ante with investment into domestic technology.

We recommend developing a sovereign capacity building and research and development funding framework to enhance the traceability of Australia's forest products, develop novel methods to identify illegal timber, and promote the trade in legal and sustainable forest products. Achieving this will:

- Enhance and support trust and adoption of traceability through demonstration of value-add and return on investment.
- Support mutually beneficial outcomes with Asia-Pacific partners and other countries.
- Improve two-way, producer-consumer information flows to identify value-add creation and distribution opportunities and drive business development.
- Support access to the market in economies that have enacted significant changes in entry requirements for timber and other forest-risk associated commodities.
- Develop Australia as a global leader in counter-illegal logging capability.

Summary of findings from testing

There are ongoing concerns about the availability of timber from potentially illegal sources in products that are regulated by the Illegal Logging Prohibition Act. This project was undertaken to assess claims of provenance (country of harvest) and taxonomy (genus or species) that were available at retail. This report provides a Final Report on activity conducted by Source Certain as part of work contracted under contract C12377.

176 products were collected from 40 retailers or traders across 45 locations in 4 states. To date, 671 tests have been performed by four participating laboratories. 174 products were submitted for tests, 2 failed to meet the criteria for submission. Tests for 43 of the 174 products, **approximately 25%**, were found to have results indicating an inconsistency with declared provenance, taxonomy, or both.

The testing undertaken revealed that issues were primarily found in products that were imported into Australia, as opposed to products where the timber originated from Australia. If results are focused on imported wood categories “Oak, teak, and birch products”, “Softwoods” and “Veneers, engineered wood products, and plywood” **37 of 74 imported timber products** (**50%**) gave results indicating inconsistency with declared provenance, taxonomy, or both. In contrast, all tests performed on timber grown in Australia indicated that the provenance and taxonomy of the products declared at retail were correctly labelled.

We note that at the time of this report, there still exists a growing need to develop techniques to verify the provenance of timber produced in Australia. Assessment of provenance claims within the Australian timber industry will increase in importance as the effects of state-level bans on native logging affect the availability of Australian forest products at retail.

Nonetheless, inconsistencies concerning declarations of taxonomy were identified in products manufactured in Australia from imported materials. The types of products where these issues were detected were co-mingled fibre-based products such as tissue paper, toilet paper, and printing paper. Furthermore, some of these products contained fibre-declared species at high risk of originating from sources associated with conflict such as *Larix sibirica* (Siberian larch), which can be found growing at scale in Russia. There are other sources of this fibre as this species can be sourced from FSC-certified plantations in Sweden, Finland, and Ukraine. However, these sources offer relatively low availability/abundance. The risk importers face of sourcing conflict timber (knowingly or not) is significant and can only be mitigated through due diligence activities.

27 of the 43 items (**63%**) that had issues with either provenance or taxonomy, were sold with claims of third-party certification such as FSC or PEFC. In eight cases, products were marketed with claims of third-party certification where: it had been terminated several years prior to the product being purchased for testing, produced no evidence that the producer of the product had a license (e.g. only providing the licence number of the certification body), or the species used in the product was not listed as a species that can be used under the third-party certification license.

This indicates a lack of ability of third-party certification to act as an assurance to support the integrity of a product that is carrying a claim within the consumer market and undermines the credibility of the certification mark itself. These findings indicate importers are likely relying to heavily on third-party certification as a solution to conclude the negligible risk of illegal provenance. This finding is consistent with the conclusions of enforcement activities from

other economies that have enacted similar due diligence-based demand-side laws on illegal logging.

Introduction

As part of the sunsetting review and reforms of the Illegal Logging Prohibition Act (ILPA), it was deemed necessary to investigate how testing could support assessments of due diligence in the context of timber legality.

Tests exist for verifying the type of wood used in a product, and for assessing where the wood came from within a product (provenance verification). As tests provide evidence of authenticity that is independent of traditional paper-based traceability systems, they serve as a relevant means of assessing if an importer has performed a due diligence assessment on the timber and forest products imported and traded in Australia. If a product is found to have timber of the wrong taxa (genus/ species etc.) or wrong provenance a question arises as to whether the importer has performed due diligence to ensure this unexpected timber is from a legal and low-risk source, or if the importer failed to carry out due diligence entirely.

As ILPA is undergoing reviews and reforms, the time is also right to suggest what reforms should be made to further dissuade illegal timber from finding a market in Australia. Strengthening the enforcement of Australia's anti-illegal logging laws should disincentivise activities that contribute to forest loss and deforestation around the globe. It should also help ensure a healthier and fairer competitive landscape for businesses trading in timber and forest products within Australia as illegal and grey market timber unfairly outcompete legally sourced timber. If enforcement lacks adequate mechanisms to combat illegal logging and uphold the law and the situation is left to the market to regulate itself, the market will reward the most unscrupulous operators for their ability to buy the least expensive timber.

This end-of project report details the extent of the presence of inauthentic timber and forest products on sale in Australia, how non-compliant products can be targeted and found (and by proxy the companies that placed these products on the market), where different types of tests can be applied to different products, how tests complement each other, and how tests must be used in the wider context of assessing the behaviour of importers and traders.

Why should scientific testing be used to support enforcement strategies?

Science-based authentication has continued to grow in importance and utility as a tool to support enforcement on both supply-side and demand-side economies according to the Timber Regulation Enforcement Exchange[5], a network of international enforcement agencies tasked with addressing issues surrounding illegal logging and organised by Forest Trends.

In 2015, the Office for Product Safety and Standards of the United Kingdom (formerly the National Measurement Office) identified that testing could be a useful tool in European Union Timber Regulation (EUTR) projects to establish when an offence had been committed under Article 6 with a greater degree of certainty[6]. This was one of the earliest uses of timber testing within a market surveillance framework by a national authority in anti-illegal logging demand-side regulation. The utility of testing for competent authorities has become apparent, hence its inclusion as a tool to check on operators (i.e. importers) as part of the European Union Deforestation Regulation (EUDR) under Article 18[7]. The EUDR supersedes the EUTR and has extended its scope beyond timber to include other 'forest risk' commodities which are associated with deforestation such as cocoa, coffee, rubber, palm oil, soya, beef, and their derivatives.

Historical surveillance testing efforts, such the national timber DNA testing program[8] performed in Australia in 2020, concluded that up to 40% of the imported species of timber on sale in retail outlets were potentially misrepresented in terms of their species and origin. Though limited in scope, this finding indicated a potentially high proportion of timber and forest products imported into Australia may originate from supply chains lacking adequate due diligence regarding authenticity and legal sourcing. Such failures underscore the necessity for future projects aimed at identifying deficiencies in compliance with the Illegal Logging Prohibition Act.

The objective of the Timber Testing Program (2023-2024) was to investigate the provenance and taxonomy claims and declarations made on timber and forest products. The selection of products has been based on a risk-assessment process and therefore is not representative of the market, but rather a subset identified as higher risk.

[5] https://www.forest-trends.org/wp-content/uploads/2019/04/TREE-London-Summary-Note.pdf

[6] https://assets.publishing.service.gov.uk/media/5a750eeeed915d5c5446535b/Chinese_Plywood_Research_Report.pdf

[7] REGULATION (EU) 2023/1115 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL, Official Journal of the European Union, L 150/206, 9.6.2023

[8] https://www.timberbiz.com.au/dna-testing-shows-40-of-imported-timber-incorrectly-labelled/

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Methods used in this project

The project involved researching products suitable for testing, identifying transparency and communication issues within the supply chain, purchasing products covertly without inducing demand characteristics from vendors/body corporates, conducting analysis at laboratories based in Australia and overseas, and interpreting the findings of test results in context of all available information. Figure 3 shows the process of these steps as a timeline schematic. We note that the timeline provided here applies to the structure of this project, however, future activities may be performed in a short period subject to recommendations included in this report.

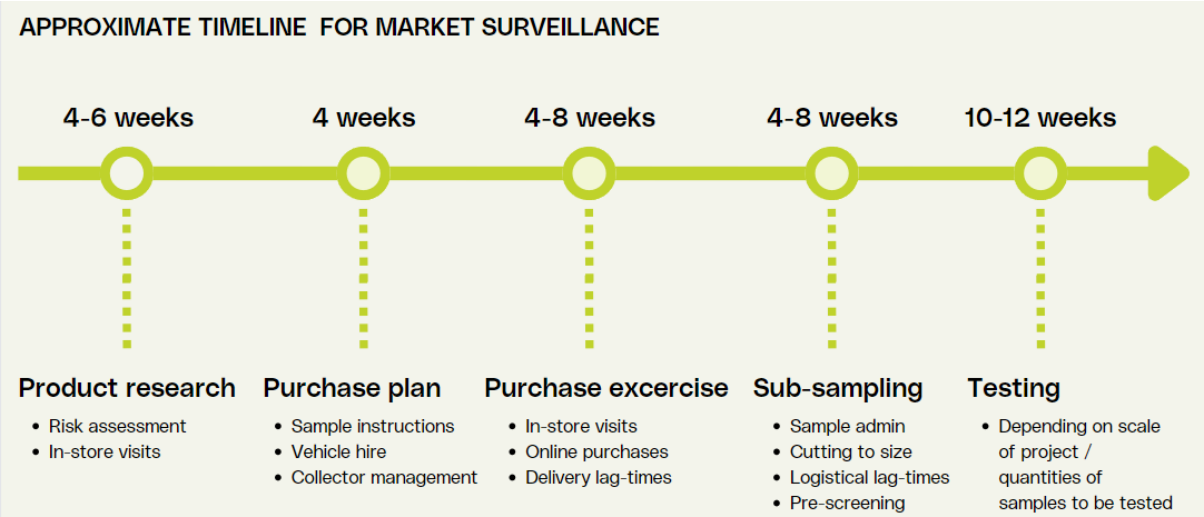

Figure 3. Schematic of the timeline and approach used in this project to conduct market surveillance and product testing. Note that this timeline can be reduced in future based on recommendations included in the report.

Methods used to produce a stratified timber purchase plan

A risk assessment was conducted based on publicly available data on Australian imports, with a focus on ABARES AFWPS data from 2019 to 2022, utilising a VACCP sheet created by Source Certain. While detailed information was unavailable for all listed species, Source Certain assessed the risk of categories and supplier countries based on this data, with inferences made to species (e.g., softwoods from Czechia are likely to be *Picea abies* and *Pinus sylvestris*, softwoods from New Zealand are likely to be *Pinus radiata*). The result of the risk assessment produced risk scores for each category and country, allowing for the ranking and weighting of samples.

Pre-selection based on volume in trade results in 107 country / product categories which are then assessed using the VACCP sheet. The VACCP comprises five sections with the following weightings:

- Sector / importer assessment – 10%
- Supplier / exporter assessment – 20%
- Motivation assessment – 20%
- Effort / complexity assessment – 20%
- Likelihood of discovery assessment – 30%

Each section includes multiple questions answered on a scale from 1 to 5, where 1 represents the lowest risk response and 5 represents the highest risk response. The vulnerability assessment calculates weighted averages from the assessment sections to derive a risk number. The risk number is further adjusted based on the sample budget,

providing advised sample quantities per category. This approach ensures a budget-defined weighted sampling strategy reflecting perceived risks identified in the VACCP.

Another way of using the VACCP is to highlight the critical control points in a supply chain and aim to use mitigation strategies to reduce the risk number for the product or category year on year.

Test methods and their applications

This project looked at the following testing techniques:

- Traditional wood anatomy testing using light microscopy for taxonomic verification and identification.
- Fibre analysis for taxonomic verification and identification.
- DNA sequencing for taxonomic identification.
- DNA barcoding for taxonomic identification.
- DNA fingerprinting for provenance determination of wood.
- Stable isotope ratio analysis for provenance determination of wood.
- Trace element analysis for provenance determination of wood.

These are not the only scientific techniques that exist to identify what wood is and where the wood came from. In addition to the previously mentioned techniques, a short overview will also be provided for:

- Direct Analysis in Real Time – Time of Flight – Mass Spectrometry (DART-TOF-MS) for taxonomic verification.
- Near Infrared (NIR) spectroscopy for taxonomic verification.
- Laser Induced Breakdown Spectroscopy (LIBS) for taxonomic verification.

Even then, this is not an exhaustive review of wood identification techniques. Many variations on these techniques exist with different expert practitioners, new techniques are continually being developed by innovative and passionate scientists who dedicate their time to finding ways to help end the trade in illegal timber.

Source Certain notes that all methods are limited by reference databases or baselines for comparison. However, emerging techniques need more development than others before they reach critical mass for roll-out. We also note that *all* techniques need to be continually enhanced and developed, especially in the context of building the necessary capacity to test wood at scale domestically within Australia very soon.

Wood anatomy testing using light microscopy

Wood anatomy testing is a method that can be used to identify what an unknown piece of wood is or verify the type of wood based on accompanying claims. In general, wood can usually only be identified to genus, which is often equivalent to the common or trade name of the wood. Various laws exist that specify knowing what species of wood is being used. As such, wood anatomy testing has been historically overlooked as a way to identify wood for the purpose of legal compliance. However, it is one of the least expensive and most accessible techniques for identifying wood with abundant online resources available such as InsideWood[9] and the International Association of Wood Anatomists[10] (IAWA) guidelines.

Across participants in the Asia Pacific Economic Co-operation Expert Group on Illegal Logging and Associated Trade (APEC-EGILAT), wood anatomy testing is reportedly the most used technique for identifying wood with respect to legal compliance.

It can be used to identify very small pieces of wood (less than 5 x 5 x 5 mm) in solid wood products or products where the fragments of wood are sufficiently large to permit feature identification.

This makes it suitable to use for:

- Solid wood.
- Plywood.
- Laminate and veneer products.
- Charcoal.
- Particle board, where the fragment size is at least 6mm in length.

Fibre testing

Variations of the wood anatomy method allow for the assessment of co-mingled and fibre-based products such as medium-density fibreboard (MDF) and paper. This variation is often referred to as “fibre analysis” and needs to be performed by specialist laboratories that can break down fibre products into their constituent fibres. However, analysis of fibres alone reduces the ability of an analyst to identify features to verify the declared taxa within a product. Furthermore, fibre analysts can’t solely rely on slide collections of solid wood or digital slide collections such as InsideWood, so often specialist fibre analysis laboratories have developed their own datasets and collections of fibres for them to have the most relevant types of samples for comparing test samples to.

Fibre testing works well to identify, verify, and quantify the presence of types of wood in:

- Fibreboard products such as MDF
- Paper
- Cardboard

[9] https://insidewood.lib.ncsu.edu/search?0
[10] https://www.iawa-website2.org/

Artificial Intelligence/machine vision tools using wood anatomy

Though wood anatomy is one of the most accessible forms of wood identification, it is recognised that the forensic need for wood identification far outweighs the amount of capacity for wood anatomy testing even in advanced economies such as the United States[11].

As wood identification via microscopy is a specialist skill, requiring many hours of training to educate an analyst, methods to identify wood using machine vision and artificial intelligence have been developed to scale forensic capacity. These tools are generally intended to be used as initial screens for wood identification so that relatively more expensive and slower lab tests aren't performed. Two main tools have been developed, these are Xylotron [12] and Xylorix [13]. Within the systems of these tools are further variants in the form of different apps for users, and different implementations.

Xylotron is an open-source, machine-vision wood identification tool developed by the US Forest Service Forest Products Laboratory and the University of Wisconsin – Madison, Department of Civil and Environmental Engineering. Over 20 000 images from more than 5000 unique specimen blocks, comprising nearly 1000 species have been used to develop the models that the Xylotron hardware uses to identify wood. Species identification accuracy can vary depending on what type of wood needs to be identified. However, for example Xylotron can be used to distinguish between *Eucalyptus globulus* (Sydney blue gum), *Eucalyptus nitens* (silvertop/shining gum), and hybrids of *Eucalyptus globulus* and *nitens* (*Eucalyptus nitens-globulus*) with an overall accuracy rate of 93.5% [Hermanson 2018, unpublished].

Xylorix is a machine vision system developed for use on Android and OSX platform mobile phones by Malaysian technology company Agritix[14]. Using a small magnifying glass that clips onto a mobile phone, Xylorix provide multiple apps that both assist with wood identification, such as Xylorix pocketwood – an app library of end-grain images of wood, and automatically identify wood such as Xylorix Inspector and Xylorix Enforcer.

Though both tools have been developed for use to screen wood at the border of entry to a country, among other use cases, it is worth noting that to make use of them both requires destructive surface preparation of the wood to be performed. Provided that front-line officers are provided with the power to shave small sections from solid wood objects should the need arise, these tools may be a valuable resource for identifying wood at the border when time is most constrained but most legal declarations about provenance and taxonomy are available.

These tools work best with:

- Solid wood where at least 10 x 10mm of end-grain is visible. They both can work with smaller sample sizes.
- Some plywood/laminated products provided that veneers are sufficiently thick and other layers can be "hidden" from the camera during the identification process.
- Both tools rely on being able to capture a good quality and relatively large image of the end-grain of the sample.

[11] Wiedenhoeft, A. C., Simeone, J., Smith, A., Parker-Forney, M., Soares, R., & Fishman, A. (2019). Fraud and misrepresentation in retail forest products exceeds U.S. forensic wood science capacity. PLOS ONE, 14(7). https://doi.org/10.1371/journal.pone.0219917

[12] Hermanson, J. C., Dostal, D., Destree, J. C., & Wiedenhoeft, A. C. (2019). The Xyloscope—a Field-Deployable Macroscopic Digital Imaging Device for Wood. https://doi.org/10.2737/fpl-rn-367

[13] https://www.xylorix.com/

[14] https://www.agritix.com/

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Stable Isotope Ratio Analysis

Analysis of the stable isotope ratios of light elements (e.g., carbon, oxygen, hydrogen, nitrogen, and sulfur) is a discipline that has existed since the mid-20th century. Users of stable isotope analysis include ecologists, climate scientists, biogeochemists, hydrologists, forensic scientists, anthropologists, atmospheric chemists, and those involved in trade regulation[15].

The use of stable isotope analytical techniques is often used to differentiate foods based on their geographical origin. Though research in stable isotope analysis has continued since the 1950s, advances in technology and understanding have led to it being widely adopted as a means to authenticate the origin of food and drink. The same principles used to authenticate food have also been applied to timber provenance research. Methods using the measurement of stable isotope ratios exist as official standards. Examples include: AOAC 998,12 for the detection of cane sugar to honey, EU Reg 2676/90 which refers to multiple official methods to authenticate wine, and EU Reg 584/2011 to control the geographic origin of Grana Padano DOP, though there are many more examples. Likewise, the use of stable isotope analysis to verify the geographical origin of timber is also included in the EUTR [Regulation (EU) No. 995/2010] and UKTR to verify the declared origin of timber and ensure its legality.

Stable isotope analysis works well with:

- Solid wood.
- Plywood – though sample preparation can become challenging when layers are very thin (0.5mm or less).
- Engineered wood products such as laminate flooring.
- Wood chips.

Trace Element Analysis

The potential for using trace element distribution patterns (elemental fingerprinting) to determine the provenance of trees (timber) in the international, regional, and local sense, is primarily because trees are known bio-accumulators of metals and have also been proposed as an amelioration mechanism for the clean-up of contaminated land. When used in bioremediation the tree accumulates metals from non-natural sources leading to a diversity in the elemental signature of the various parts of the plant including wood and leaves while remaining viable and able to deal with unnatural concentrations of metals in the soil. This aspect makes the use of metal inter-relationships to determine the provenance of trees even more relevant as it implies a possibility of locating recovered timber back to its place of origin on both the national and local scale.

Source Certain implements Trace Element Analysis as a proprietary solution called TSW Trace. TSW Trace Technology has been considered as a forensic tool to geoprovenance timber as part of the adjustments to the Illegal Logging Prohibition Regulation[16]. It utilises triple quadrupole inductively coupled plasma mass spectrometry (ICP-MS), and inductively coupled plasma-atomic emission spectroscopy (ICP-AES) amongst other tools. TSW Trace was first applied to link stolen or smuggled gold back to its mine of origin in the 1970's and was commonly referred to as "gold fingerprinting". TSW Trace has been used to assess forensic

[15] West, J. (2010). Isoscapes. https://doi.org/10.1007/978-90-481-3354-3
[16] DAWE 2021, Sunsetting Review of the Illegal Logging Prohibition 2012: consultation paper, Department of Agriculture, Water and the Environment, Canberra, May. CC BY 4.0.

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evidence in criminal investigations globally over the past 40 years, including in several high-profile cases.

At present this technique is limited by the availability of reference samples to construct reference databases. In turn, this is limited by the demand for tests to verify the provenance of timber at the granular level.

Within the current state of development this method is suitable for testing:

- Solid wood.
- Wood chips.
- Plywood.
- Laminated products.
- Engineered timber.
- Charcoal.

Laser Induced Breakdown Spectroscopy - LIBS

LIBS is a form of trace element analysis. Its use for screening both the provenance and taxonomy of wood is a matter of active research for the US Fish and Wildlife Service, US Department of Agriculture, and US Geological Survey[17]. Currently, it poses to be a tool for rapid determination of *Dalbergia* species in screening settings. Source Certain notes that it is orders of magnitude less sensitive than laboratory benchtop spectroscopic methods. However, its application in a mobile setting may be of future interest for potential implementation as a screening tool at border control.

LIBS may be a suitable option for looking at solid wood samples. However, regardless of how subtle the LIBS sampling mechanism is, it isn't a 'non-destructive' test. Sampling from wood products using a laser will leave blemishes.

DART-TOF-MS

Direct analysis in real time – time of flight – mass spectrometry (DART-TOF-MS) is a laboratory-based forensic mass spectrometry technique that is used by multiple institutions to identify the species or taxonomy of wood. This method was pioneered by scientists at the US Fish and Wildlife Service (US FWS) Forensic Laboratory in Ashland, Oregon[18]. By collecting over twenty thousand reference samples of wood from xylaria (wood collections) around the world, the US FWS has developed a database of chemical profiles of wood known as the ForeST© (Forensic Spectra of Trees) database.

DART-TOF-MS allows a user to sample a piece of wood similar in size to a matchstick, analyse it and identify its taxa via matching its chemical profile to data on the ForeST© database. The US FWS has recognised that enforcement interventions are needed at the border where timber is unloaded. This is partly because a legal declaration of the type of wood contained in a shipment is available as part of Lacey Act import requirements. Scientists at the US FWS Forensic Laboratory have been developing ways to take the

[17] Celani, C. P., McCormick, R. A., Speed, A. M., Johnston, W., Jordan, J. A., Coplen, T. B., & Booksh, K. S. (2023). Author Response for "Evaluation of Spectral Collection Strategies for Identification of Dalbergia Spp.. Using Handheld Laser Induced Breakdown Spectroscopy (LIBS)." https://doi.org/10.1002/cem.3479/v2/response1

[18] Price, E., McClure, P., Huffman, A., Voin, D., & Espinoza, E. (2022). Reliability of wood identification using Dart-Tofms and the Forest© database: A validation study. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.4020716

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DART-TOF-MS on the road in a mobile laboratory even though DART-TOF-MS is a large laboratory instrument.

DART-TOF-MS is suitable for analysing:

- Solid wood where the smallest fragment is approximately match-stick size.

DART-TOF-MS can be less suitable for analysing wood where it has been chemically treated or processed. However, methods can be adapted that may permit analysis of more complex or processed wood products in future.

Near Infrared – NIR

NIR methods for identifying wood exist as laboratory-based methods as well as field-deployable tools[19]. The method assumes that the Near Infrared spectra of a piece of wood is reflective of its chemical profile. Chemical profiling of wood to identify it has been widely explored and demonstrated to be effective. The need to sometimes identify wood in the field, such as in a log yard or shipping yard before import or export, underscores the relevance of NIR as a relevant wood identification technology.

DNA fingerprinting

The provenance of wood can be assessed using tests based on DNA fingerprinting. As with all provenance tests, a collection of reference samples of the relevant species/genera of wood over its growing region is required. Genetic markers, such as microsatellites and single nucleotide polymorphisms, within the reference samples are identified that are best related to different geographic sources. Based on these markers, test samples can be compared the baseline reference samples in order to permit provenance verification. This has been demonstrated to be a robust and trustworthy system for provenancing wood [20]and has even been used as evidence in a recent illegal logging conviction[21] in conjunction with evidence from other DNA-based techniques.

Ultimately, DNA fingerprinting reflects the genetic heritage of plant material with respect to provenance. Due to this it can create some caveats on results in species that can be both at risk in the wild and at risk in plantations such as teak and oak.

Nonetheless, even when test results emerge with caveats, they can still produce useful information that may lead to questions that should be answered by an importer.

According to guidelines provided by DNA fingerprinting experts, DNA fingerprinting works well with:

- Relatively large solid wood samples (50 x 50 x 50mm).

There can be some unknown factors with obtaining successful results from DNA fingerprinting, all of which are contingent on successful amplification of DNA. During this

[19] Snel, F. A., Braga, J. W., da Silva, D., Wiedenhoeft, A. C., Costa, A., Soares, R., Coradin, V. T., & Pastore, T. C. (2018). Potential field deployable NIRS identification of seven Dalbergia species listed by CITES. Wood Science and Technology, 52(5), 1411–1427. https://doi.org/10.1007/s00226-018-1027-9

[20] Degen, B., H-N Bouda, and C. Blanc-Jolivet. Tech. Development and Implementation of a Species Identification and Timber Tracking System with DNA Fingerprints and Isotopes in Africa. Grosshansdorf, Schleswig-Holstein: Thünen Institute of Forest Genetics, 2015.

[21] https://www.doublehelixtracking.com/news/2019/2/21/plant-dna-evidence-supports-landmark-lacey-act-conviction-of-bigleaf-maple-theft

project, larger pieces of wood that were supplied for testing generally fared better than smaller pieces of wood that were submitted as not all samples that were sent for various DNA analyses achieved successful outcomes. However, some very small samples of wood (approximately 1cm^3) obtained successful DNA fingerprinting results in this project. The level of processing, the state a piece of wood is in and how it is handled before submitting it to the testing laboratory can all be factors in achieving successful DNA results.

Our conclusions surrounding DNA testing in wood from this project is that the limitations around sample types makes it best practice to thoroughly discuss the testing needed with the DNA experts chosen in order to maximise chances of success.

DNA barcoding

Using a set of markers obtained from performing DNA sequencing against targeted taxa of timber, a DNA barcoding test can be developed for verifying declared taxa. In some cases, it can be more efficient in terms of scientific method development to develop DNA barcoding tests to verify test samples to genera rather than specific species. This is because some genera comprise potentially hundreds of traded species, such as oak (*Quercus* spp.). DNA barcoding can provide highly robust evidence of what a piece of wood is.

As with all DNA-based methods, the state the sample is in will directly affect the quality and quantity of DNA that can be amplified from a test sample.

However, barcoding can be a very useful tool for assessing whether a piece of wood is or isn't in breach of CITES (convention on international trade in endangered species) appendices. This is because unlike techniques such as wood anatomy that may only be able to verify a CITES species to its genus, DNA techniques can verify species. As regulating the trade in 'species' is the prime directive for CITES, DNA barcoding and other techniques can be the most relevant tools to use in this circumstance.

According to guidelines provided by DNA experts, DNA barcoding works well with:

- Relatively large solid wood samples (50 x 50 x 50mm).
- Smaller sample sizes can be tested but they should be discussed with the DNA forensic expert prior to submission.

DNA sequencing

DNA sequencing can be used as a forensic technique in wood identification in several different ways. Within this project, sequencing was used as a means to perform blind identifications of the taxonomy of test samples by comparing sequenced DNA to published sequences of particular species. In instances where DNA was successfully extracted from the various sample types submitted to the DNA partner laboratory, the technique proved effective for successful identification.

Furthermore, sequencing can be used to identify and relate individuals. This is of critical importance as evidence when dealing with cases of timber theft. A recent landmark Lacey Act case into the theft of big leaf maple burls from national parks in Washington, United States used sequencing to relate the stolen burls to the criminal who carried out the environmental destruction and the stump where the burl originated from. This may be a highly useful technique in future if thefts of timber occur following the ban on logging in native forests in Australian states.

In these types of cases, where freshly harvested timber is being tested is most likely to have the best quality DNA that has not degraded.

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Caveats to consider when planning wood identification tests

To be certain a piece of timber is from a legal source, one needs to know “what” it is and “where” it came from. However, wood identification tests should not be conflated with tests of timber legality. All tests performed on products should be done so with great consideration of context. The meaning that can be derived from a test result isn’t as simple as "right” and “wrong”. Some laboratories use RAG (Red, Amber, Green) grading systems to provide summaries of test results. Sometimes, simply quantifying the number of ‘green’ results does not translate to a testing program indicating a line of supply is low risk.

A test sample might claim to be a highly risky species – a test may confirm it is the risky species, this does not make the due diligence surrounding that test sample adequate, nor does it make the product low risk; in fact, it confirms that it is high risk. The role of a due diligence officer within a company should be to take on all information from all available sources when carrying out evaluations. Similarly, enforcement officers should take all information they have at their disposal into account when carrying out evaluations.

Likewise, identification of taxonomy and provenance should be carried out where both pieces of information are declared and available before analysis. If these pieces of information aren’t known in advance, what insight will the test results hope to provide?

Users of tests should also consider that a test result indicating a piece of wood originates from a high-risk source does not automatically mean the timber is illegally logged. It may indicate that there is a risk of it which should be appropriately mitigated, but unfortunately despite the prevalence of illegal timber on the global marketplace – sufficiently proving timber is illegal is challenging.

Provenance and taxonomy are important attributes to verify to ensure that timber has been legally harvested, but they are not the only attributes. No test included in this report has the ability to detect if a sugar glider family lived in a tree that was wrongfully cut down. No test in this report can demonstrate if out-of-season harvesting has occurred. No test in this report directly indicates if the land a tree was felled on was legally obtained. Tests can form a part of due diligence, but comprehensive work is needed to support that timber has been legally sourced, processed, and traded.

Findings from the market research exercise

Source Certain was assigned the task of developing a prioritised timber purchase plan based on a list of 52 taxa (genus/species) of timber provided by the Department of Agriculture Fisheries and Forestry. To accomplish this, Source Certain conducted a market research study, including a Vulnerability Assessment and Critical Control Points (VACCP) risk assessment. The goal of using VACCP was to create a weighted, stratified sampling plan, the timber purchase plan. Higher-risk products received more weight in sampling, while lower-risk products received less.

Following the VACCP assessment, in-store and online research was conducted to identify relevant products with origin and taxonomic claims (e.g., trade names, species, or genus). The timber purchase plan created by Source Certain comprises a list of products and retailers consistent with the target commodities and producer countries of imported timber products. This plan serves as a tool for Source Certain and the Department of Agriculture, Fisheries, and Forestry to make informed decisions about which products to sample and subject to origin and species analyses.

Findings from the VACCP risk assessment

The top risks identified by the VACCP risk assessment (Figure 4) included:

- Burmese teak (rough-sawn or as composites such as doors).
- Russian plywood (e.g., birch plywood, and larch or pine LVLs).
- Veneers and plywood products made in China (e.g., Bintangor-faced plywood).
- Other composite products from Southeast Asia such as plywood (e.g. Meranti-faced marine plywood), doors, and mouldings.

Products classified as solid softwoods from New Zealand or Europe, while considered "medium risk," were associated with the lowest level of risk. No product categories received a "low risk" classification as more mitigation measures would be necessary to achieve “low risk” classification under the criteria used.

General recommendations to reduce risk based on the assessment

To reduce the risk index in the assessed commodities, several actions should be implemented throughout the supply chain:

- Increase transparency and/or reduce supply chain complexity.
- Promote unannounced 2nd and 3rd party supplier audits with a timber legality theme.
- Educate buyers/Australian importers to request specifications, declarations of conformity, proof of origin/provenance, Independent Certificates of Analysis (CoA), and additional analyses (e.g., provenance and taxonomic verification via various methods).
- Promote the use of testing for information confirmation and risk mitigation. Testing is underutilised in the timber sector but widely accepted in other industries as delivering unique insights about supplier and product authenticity.
- Invest in research to enhance test performance and reduce costs (e.g., conduct screening before costly forensic tests).
- Encourage improved labelling and packaging standards, such as QR codes and distributed ledger systems, on products and packaging used for material shipment.

SourceCertain

Vulnerability assessment

SourceCertain

Legend:

Sector/company assessment | Sector/sector assessment | 0.3 | Weighting for sampling

Low Risk RN 1 =1.0 - 2.3
Medium Risk RN 2 =2.4 - 3.7
High Risk RN 3 =3.7 - 5.0

Nr.	Supplier / Commodity	Name supplier	Exporter assessment	Motivation assessment	Effort assessment	Likelihood of discovery assessment	Σ = Risk Number	Risk index 0 - 100 (%)	Sampling suggestion
23	Myanmar / Doors	Myanmar	0.96	0.75	0.90	1.14	4.03	76%	4
67	Russia / Plywood	Russia	0.87	0.65	0.90	1.23	3.93	73%	3
27	Malaysia / Doors	Malaysia	0.69	0.90	0.90	1.14	3.92	73%	3
51	Myanmar / Hardwood Roughsawn	Myanmar	0.96	0.65	0.80	1.20	3.89	72%	3
25	China / Doors	China	0.60	0.85	0.90	1.20	3.84	71%	3
100	China / Veneers	China	0.60	0.85	0.90	1.20	3.84	71%	3
102	Malaysia / Veneers	Malaysia	0.69	0.80	0.90	1.14	3.82	70%	3
22	India / Doors	India	0.73	0.75	0.90	1.14	3.81	70%	3
70	Malaysia / Plywood	Malaysia	0.69	0.75	0.90	1.17	3.80	70%	3
59	China / Mouldings	China	0.60	0.85	0.85	1.20	3.79	70%	3
24	Vietnam / Doors	Vietnam	0.60	0.80	0.90	1.20	3.79	70%	3
68	China / Plywood	China	0.60	0.75	0.90	1.20	3.74	68%	3
94	Russia / Softwood Dressed	Russia	0.87	0.55	0.80	1.23	3.73	68%	3
26	Indonesia / Doors	Indonesia	0.51	0.85	0.90	1.17	3.72	68%	3
36	Myanmar / Hardwood Dressed	Myanmar	0.96	0.55	0.80	1.11	3.70	68%	3
60	Malaysia / Mouldings	Malaysia	0.69	0.85	0.85	1.02	3.70	67%	3
58	Peru / Hardwood Roughsawn	Peru	0.73	0.70	0.80	1.17	3.69	67%	3
105	United States / Veneers	United States	0.51	0.85	0.90	1.14	3.69	67%	2
75	Brazil / Plywood	Brazil	0.69	0.60	0.90	1.20	3.68	67%	2
104	Spain / Veneers	Spain	0.56	0.85	0.90	1.08	3.67	67%	2
101	Italy / Veneers	Italy	0.56	0.85	0.90	1.08	3.67	67%	2
55	Solomon Islands / Hardwood Roughsawn	Solomon Islands	0.73	0.65	0.80	1.20	3.67	67%	2
71	Indonesia / Plywood	Indonesia	0.51	0.80	0.90	1.17	3.67	67%	2
54	Papua New Guinea / Hardwood Roughsawn	Papua New Guinea	0.78	0.60	0.80	1.20	3.67	67%	2
73	United States / Plywood	United States	0.51	0.85	0.90	1.11	3.66	66%	2
16	Vietnam / Cooper's Products	Vietnam	0.60	0.80	0.80	1.17	3.66	66%	2
40	Solomon Islands / Hardwood Dressed	Solomon Islands	0.73	0.65	0.80	1.17	3.64	66%	2
64	Italy / Plywood	Italy	0.56	0.80	0.90	1.08	3.62	66%	2
39	Papua New Guinea / Hardwood Dressed	Papua New Guinea	0.78	0.55	0.80	1.20	3.62	65%	2
69	Vietnam / Plywood	Vietnam	0.60	0.65	0.90	1.17	3.61	65%	2
65	Poland / Plywood	Poland	0.56	0.75	0.90	1.11	3.60	65%	2
37	Malaysia / Hardwood Dressed	Malaysia	0.69	0.65	0.80	1.17	3.60	65%	2
53	Malaysia / Hardwood Roughsawn	Malaysia	0.69	0.65	0.80	1.17	3.60	65%	2
13	France / Cooper's Products	France	0.51	1.00	0.80	0.99	3.59	65%	2
44	Ecuador / Hardwood Dressed	Ecuador	0.78	0.55	0.80	1.17	3.59	65%	2
103	Netherlands / Veneers	Netherlands	0.47	0.85	0.90	1.08	3.58	65%	2
20	Poland / Doors	Poland	0.56	0.75	0.90	1.08	3.57	64%	2
61	Indonesia / Mouldings	Indonesia	0.51	0.90	0.85	1.02	3.57	64%	2
74	Chile / Plywood	Chile	0.51	0.70	0.90	1.17	3.57	64%	2
35	China / Hardwood Dressed	China	0.60	0.70	0.80	1.17	3.56	64%	2
63	Chile / Mouldings	Chile	0.51	0.70	0.85	1.20	3.55	64%	2
47	Brazil / Hardwood Dressed	Brazil	0.69	0.60	0.80	1.17	3.55	64%	1
6	Russia / Builder's Carpentry	Russia	0.87	0.45	0.80	1.14	3.54	64%	1
12	Spain / Cooper's Products	Spain	0.56	0.85	0.80	1.05	3.54	64%	1
18	Italy / Doors	Italy	0.56	0.75	0.90	1.05	3.54	64%	1
30	Chile / Doors	Chile	0.51	0.75	0.90	1.05	3.50	62%	1
11	Portugal / Cooper's Products	Portugal	0.56	0.80	0.80	1.05	3.49	62%	1
14	Italy / Cooper's Products	Italy	0.56	0.80	0.80	1.05	3.49	62%	1
41	Fiji / Hardwood Dressed	Fiji	0.69	0.60	0.80	1.11	3.49	62%	1
21	Austria / Doors	Austria	0.51	0.75	0.90	1.02	3.47	62%	1
43	United States / Hardwood Dressed	United States	0.51	0.75	0.80	1.11	3.46	61%	1
17	United States / Cooper's Products	United States	0.51	0.90	0.80	0.96	3.46	61%	1
95	China / Softwood Dressed	China	0.60	0.60	0.80	1.17	3.46	61%	1
98	Brazil / Softwood Dressed	Brazil	0.69	0.50	0.80	1.17	3.45	61%	1
15	Hungary / Cooper's Products	Hungary	0.47	0.80	0.80	1.08	3.43	61%	1
66	Finland / Plywood	Finland	0.38	0.75	0.90	1.11	3.43	61%	1
38	Indonesia / Hardwood Dressed	Indonesia	0.51	0.65	0.80	1.17	3.42	60%	1
52	Indonesia / Hardwood Roughsawn	Indonesia	0.51	0.65	0.80	1.17	3.42	60%	1
76	Netherlands / Softwood Roughsawn	Netherlands	0.47	0.75	0.80	1.11	3.41	60%	1
19	Germany / Doors	Germany	0.42	0.75	0.90	1.05	3.41	60%	1
85	United States / Softwood Roughsawn	United States	0.51	0.70	0.80	1.11	3.41	60%	1
57	United States / Hardwood Roughsawn	United States	0.51	0.75	0.80	1.05	3.40	60%	1
97	Chile / Softwood Dressed	Chile	0.51	0.60	0.80	1.17	3.37	59%	1
29	United States / Doors	United States	0.51	0.65	0.90	1.02	3.37	59%	1
82	China / Softwood Roughsawn	China	0.60	0.50	0.80	1.17	3.36	59%	1
7	China / Builder's Carpentry	China	0.60	0.55	0.80	1.11	3.35	59%	1
49	Italy / Hardwood Roughsawn	Italy	0.56	0.65	0.80	1.05	3.34	59%	1
50	Hungary / Hardwood Roughsawn	Hungary	0.47	0.70	0.80	1.08	3.33	58%	1
48	France / Hardwood Roughsawn	France	0.51	0.70	0.80	1.02	3.32	58%	1
84	Chile / Softwood Roughsawn	Chile	0.51	0.55	0.80	1.17	3.32	58%	1
45	Chile / Hardwood Dressed	Chile	0.51	0.55	0.80	1.17	3.32	58%	1
46	Uruguay / Hardwood Dressed	Uruguay	0.60	0.55	0.80	1.08	3.32	58%	1
79	Poland / Softwood Roughsawn	Poland	0.56	0.55	0.80	1.11	3.30	58%	1
86	Canada / Softwood Roughsawn	Canada	0.38	0.70	0.80	1.11	3.28	57%	1
87	Germany / Softwood Dressed	Germany	0.42	0.65	0.80	1.11	3.27	57%	1
78	Czechia / Softwood Roughsawn	Czechia	0.47	0.60	0.80	1.11	3.26	57%	1
88	Austria / Softwood Dressed	Austria	0.51	0.55	0.80	1.11	3.26	56%	1
8	Vietnam / Builder's Carpentry	Vietnam	0.60	0.45	0.80	1.11	3.25	56%	1
34	France / Hardwood Dressed	France	0.51	0.60	0.80	1.02	3.22	55%	1
90	Latvia / Softwood Dressed	Latvia	0.47	0.55	0.80	1.11	3.21	55%	1
89	Lithuania / Softwood Dressed	Lithuania	0.38	0.60	0.80	1.11	3.18	54%	1
9	Indonesia / Builder's Carpentry	Indonesia	0.51	0.45	0.80	1.11	3.16	54%	1
31	United Kingdom / Hardwood Dressed	United Kingdom	0.42	0.65	0.80	0.99	3.15	54%	1
62	New Zealand / Mouldings	New Zealand	0.38	0.85	0.75	0.87	3.14	53%	1
32	Germany / Hardwood Dressed	Germany	0.42	0.60	0.80	1.02	3.13	53%	1
99	Canada / Softwood Dressed	Canada	0.38	0.55	0.80	1.11	3.13	53%	1
80	Lithuania / Softwood Roughsawn	Lithuania	0.38	0.60	0.80	1.05	3.12	53%	1
92	Sweden / Softwood Dressed	Sweden	0.38	0.60	0.80	1.05	3.12	53%	1
1	Italy / Builder's Carpentry	Italy	0.56	0.45	0.80	1.02	3.11	53%	1
56	Canada / Hardwood Roughsawn	Canada	0.38	0.65	0.80	0.99	3.11	53%	1
77	Germany / Softwood Roughsawn	Germany	0.42	0.50	0.80	1.08	3.09	52%	1
3	Austria / Builder's Carpentry	Austria	0.51	0.50	0.80	0.99	3.09	52%	1
72	New Zealand / Plywood	New Zealand	0.38	0.65	0.90	0.87	3.09	52%	1
91	Estonia / Softwood Dressed	Estonia	0.33	0.60	0.80	1.05	3.07	52%	0
93	Finland / Softwood Dressed	Finland	0.38	0.55	0.80	1.05	3.07	52%	0
96	New Zealand / Softwood Dressed	New Zealand	0.38	0.70	0.70	0.99	3.06	51%	0
81	Finland / Softwood Roughsawn	Finland	0.38	0.45	0.80	1.11	3.03	51%	0
83	New Zealand / Softwood Roughsawn	New Zealand	0.38	0.65	0.70	0.99	3.01	50%	0
2	Germany / Builder's Carpentry	Germany	0.42	0.45	0.80	1.02	2.98	49%	0
33	Estonia / Hardwood Dressed	Estonia	0.33	0.50	0.80	1.02	2.94	49%	0
4	Estonia / Builder's Carpentry	Estonia	0.33	0.50	0.80	0.99	2.91	48%	0
28	New Zealand / Doors	New Zealand	0.38	0.60	0.80	0.84	2.91	48%	0
5	Finland / Builder's Carpentry	Finland	0.38	0.45	0.80	0.99	2.91	48%	0
10	New Zealand / Builder's Carpentry	New Zealand	0.38	0.50	0.80	0.84	2.81	45%	0
42	New Zealand / Hardwood Dressed	New Zealand	0.38	0.60	0.70	0.84	2.81	45%	0

Figure 4. Risk scores from Source Certain's VACCP matrix and the suggested sampling stratification method that was used to inform sample quantities in the initial timber purchase plan.

Discoveries from engaging with retailers

Generally, interactions between retail staff and sample collectors were positive. Retail staff aimed to provide useful information to support the woodworking projects samplers claimed to be performing. Apart from one case, retailers were not made aware of the end-use of the material being sampled to not induce demand characteristics. In the case of bulk timber purchase, the knowledge gap between the retailer and the sampler was brought into play. Though Source Certain's samplers have experience with wood and woodwork, woodworking can be an elitist sector where customers can be made to feel foolish due to their relative lack of experience with different materials.

It is not unusual in the timber retail sector for staff to attempt to support customers and give them advice to find materials, use them properly and ensure their longevity. Given that woodworking projects were not the motivation for collecting samples from retail, samplers were advised to claim they had a woodworking project when asked questions by retail staff.

Of particular note, a decking supplier in Perth gave copious amounts of helpful information about the way different species react under different conditions. This supplier also seemed to lament the use of tropical hardwood for decking based on environmental destruction concerns given that it was a "rainforest hardwood" and advocated for the use of domestically produced timber.

Source Certain uses male and female staff for market surveillance. Gender dynamics can occur in sectors that are still male-dominated such as timber and how that can influence reactions with undercover samplers.

For the female sampling experience, many items were purchased online where no interaction between store assistants existed. In the cases where in-store visits were carried out, female staff did not report obvious discomfort or gatekeeping from retail staff. Instead, female samplers reported feeling uneasy about explaining the unusual specifications of the timber being purchased. Most of the timber being purchased was requested to be cut to 1 lineal meter so that it could fit in a van for transport. Many products are sold at 2.1m or even 4m lengths. Having to provide stores with a story as to why they needed it in this way was reported as awkward at times.

However, conducting store visits with a prepared plan, knowing the items to be sampled, and placing order requests online before arriving at stores made the female purchasing experience much easier. It is also thought that the fact that samples were purchased, as opposed to being seized, encouraged mostly positive reactions from retail staff.

We also note that almost every product that has been purchased has context as to why it was sampled, we provide four case studies about interesting samples for the report to emphasise the importance of carrying out market surveillance. Observing the way products are marketed provided insights into risks that may not be visible at other supply points.

Lastly, despite the overall success of covert sampling, one retailer was inadvertently notified of undercover sampling activities. This retailer requested payment for their products via bank transfer. The bank transfer carried Source Certain's business name. As the retailer was under audit from the Department of Agriculture, Fisheries and Forestry at the time the retailer reacted badly and looked up Source Certain, found the contract between Source Certain and DAFF on AusTender and proceeded to phone one of Source Certain's sampler collectors to address the issue. This emphasises the importance of ensuring payment methods are covert. At the time of the report, no further contact has been made between the retailer and Source Certain.

Case study 1 - s 47G(1)(a) comb

Australia has placed a tariff on timber and wood products from Russia. Provided this tariff is paid the fact that wood originates from Russia is not immediately a legality risk.

However, the fact that s 47G(1)(a) sells combs made from Russian Birch long after the Russian invasion of Ukraine is of interest. Two combs were purchased, one in July, and one in September. s 47G(1)(a) supplier of these combs had their FSC status suspended in 2021, two years before it was sold as an FSC Fair-trade product. Today FSC's COC check now reports that the supplier s 47G(1)(a) is now terminated. It is also noted that following this, combs are now labelled as "A 100% Birchwood Product" in the place where the FSC information used to reside on the product label.

s 47G(1)(a)

Sample 5. Note: Labelled as FSC 100% s 47G(1)(a) FSC status: Terminated Termination date: s 47G(1)(a) Purchased: 17/07/2023	Sample 11. Note: Labelled as a 100% birchwood product Claimed to have originated from s 47G(1)(a) and made in Russia. Purchased: 04/09/2023

Case study 2 - s 47G(1)(a)

During a visit to s 47G(1)(a) a risk was identified with Machine Graded Pine s 47G(1)(a) The sampler asked a store assistant for help purchasing pine from a specific supplier. The store assistant explained to the sampler that there are multiple suppliers for the same item ID and that just because a cover is above a particular item ID, it doesn't mean it came from that supplier. When the sampler said they were looking for Swedish wood, the store assistant went on to say, "s 47G(1)(a) *do not care about the origin of their timber.*" While it is not an encouraging piece of communication, it is recognised that this is likely a training issue with staff. However, the practice of having multiple suppliers for a particular item ID is potentially more problematic.

s 47G(1)(a) sources material from Southern Hemisphere origins. Pine from suppliers in Sweden or Finland (e.g., s 47G(1)(a)) is currently vulnerable to the risk of being from Russia due to the ease of substitution and the potential for mislabelling in the Baltic Sea area. While there is no reason to suspect these suppliers, it is not uncommon for suppliers (and their downstream buyers) to underestimate the ability of material from other sources to find its way into supply even when they claim supply is vertically integrated.

By not segregating suppliers and item IDs, or labelling the products clearly, the risk s 47G(1)(a) face is an inability to check the sources of its MGP at retail. It may also not be able to properly respond if wood from a supplier is found not to be true to its declared harvest origin. To mitigate this risk, changes in practices in the warehouse may be needed.

s 47G(1)(a)

Case study 3 - s 47G(1)(a)

s 47G(1)(a) offers a product called s 47G(1)(a) which they claim originates from sustainable plantations in Australia based on their website's photographs and descriptions.

However, s 47G(1)(a) are also available on s 47G(1)(a) from two vendors, namely s 47G(1)(a) and s 47G(1)(a) As of this report, both sellers assert FSC certification. Yet, a cross-check with FSC's public search reveals that both sellers had their FSC certification terminated in 2022. Additionally, both s 47G(1)(a) listings claim that the LVLs are made with pine or larch. However, FSC-listed species suggest the presence of other taxa, although this information isn't reliable due to the termination of FSC certification for both vendors.

Source Certain acquired three LVLs from s 47G(1)(a) to undergo testing for taxonomic verification/identification and origin verification. It's worth noting that the sampled product's specific identification as an s 47G(1)(a) s unclear. Several factors made this product noteworthy for analysis, including the vendor's association with questionable suppliers, potential misrepresentation of the product's Australian origin, and uncertainty regarding the wood's taxonomy, which could be larch, pine, or another unidentified species.

s 47G(1)(a)

Photo of s 47G(1)(a) products on the s 47G(1)(a) website	Photo of s 47G(1)(a) products on the s 47G(1)(a) website

s 47G(1)(a)

s 47G(1)(a)

Sample procured by Source Certain from s 47G(1)(a) Unfortunately the text on the sample is hardly legible. We can discern the following text: s 47G(1)(a) For the purpose of the project we have assumed the material is larch from Australia based on item descriptions available on s 47G(1)(a) website.	s 47G(1)(a) Status: s 47G(1)(a) FSC listed species: *Eucalyptus globulus, Pinus radiata, Populus alba L., Quercus alba*

s 47G(1)(a)

s 47G(1)(a)

Name: s 47G(1)(a)

Claim to be FSC as at 01/11/2023
Certificate code: s 47G(1)(a)

Licence code: s 47G(1)(a)
Status: Terminated
Termination date: s 47G(1)(a)

Species claim on s 47G(1)(a): Larch
FSC species: *Eucalyptus diversicolor* F. Muell., *Pinus spp., Populus spp.*

Case study 4 – s 47G(1)(a) finger-jointed panels

s 47G(1)(a) offers various item IDs for s 47G(1)(a) finger-jointed panels, including Item No. s 47G(1)(a) During the market surveillance and purchasing period spanning from June 2023 to October 2023, products have been observed in Western Australia and Victoria marketed as "FSC 100%."

Source Certain consistently monitored FSC's public certificate search during this timeframe. While it is evident that the factory responsible for producing the product, s 47G(1)(a) has listings for *Aucoumea klaineana* Pierre in other product lines, it lacks a listing for this species under W9.1 Finger-jointed wood (see below). Notably, the sole FSC-certified sources of Okoume are in Gabon. Although FSC has taken significant steps to mitigate the risk of illegal timber being exported from Gabon, numerous reports from non-governmental organisations (NGOs) have highlighted potential legal sourcing risks associated with timber from Gabon, including Okoume[22].

s 47G(1)(a)

[22] EIA. (2019). (rep.). Toxic Trade. Forest Crime in Gabon and the Republic of Congo and Contamination of the US Market. (pp. 1–84). Washington, DC: EIA. https://us.eia.org/wp-content/uploads/2019/03/Toxic_Trade_EIA-web.pdf

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Test results

Guide to the grading system – RAG

Statistics in this report pertain to identified misdeclarations, such as incorrect provenance or taxonomy. Correct declaration does not necessarily mean that there was sufficient due diligence conducted. This is exemplified in cases of where overt claims are made at retail about using timber from high-risk sources and/or species such as teak from Myanmar.

Additionally, consistent language or a unified grading system was not employed across participating laboratories, necessitating the use of a simplified red, amber, green (RAG) grading system for summarising findings, with reference to original laboratory reports where required for more details.

We cannot provide RAG statistics on products where species are not declared such as MDF, paper and paperboard. However, it is possible to identify what wood fibres are present within these products which can give some indication about the types of risk an importer should consider mitigating against. Nevertheless, it can be argued that outside of the Convention on International Trade in Endangered Species (CITES), risks around sourcing illegal timber are primarily based on the country, or region, the logs were harvested in, rather than what species the log is.

> **Red**: Strong evidence indicates that the provenance or taxa (e.g., genus or species) is inconsistent with the declared information about the product. For example, if a product labelled as 'American oak' is found to match oak from Asia with high probabilities, it would be graded as 'red'. Deliberate inclusion of fibres not permitted in the product's species list would also be graded as 'red'.
>
> **Amber**: There is reason to suspect that the provenance or taxa is not consistent with the declared information about the product. This grade may indicate issues, although there might be some uncertainties in the testing method. For instance, a product with a small inclusion of fibres not listed in the species list, potentially ending up in the product accidentally, would be graded amber.
>
> **Green:** Insufficient evidence suggests that the provenance or taxa is incorrect. A product or sample might receive a green grade if it wasn't possible to obtain test results, if the sample aligns with its declared provenance or taxonomy, or if the limitations of the tests cannot provide definitive evidence of an issue.

Additionally, this report considers test results as 'additive'. If a product receives a green grade for one test but red for another, the overall grading for that product would be considered 'red'. This is because different technologies used for testing may detect issues differently. Moreover, an incorrect declaration of taxonomy also signals a potential due diligence shortfall. Each sample is graded on a case-by-case basis, considering all available evidence. RAG grading serves as an alert system and is not a substitute for thorough appraisal and evaluation.

Oak, teak, and birch products (n=24)

This category included solid timber products including dimensional lumber, solid wood furniture, and solid wood items made of oak, teak, and birch.

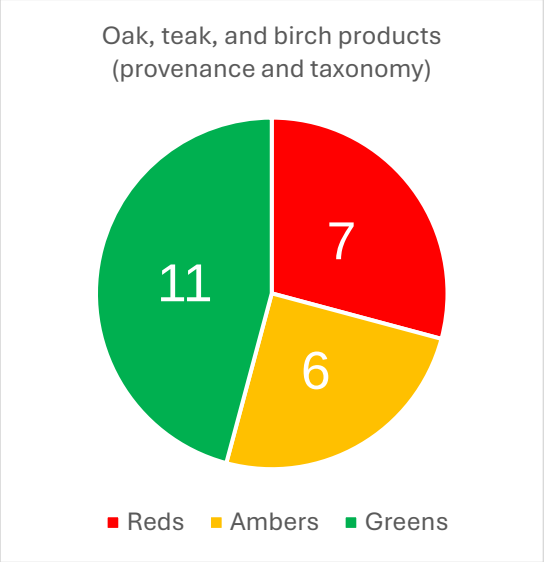

Figure 5: Summary of findings for oak, teak, and birch products

A summary of the findings is illustrated in Figure 1.

Summary of Findings:

- Total products with anomalies (n = 13)
  - Taxonomic anomalous results (n = 0)
    - All taxonomic claims made about products were shown to be correct.
  - Provenance anomalous results = 13 products
    - Stable isotope evaluations
      - 5 'Red' – strong evidence to suggest the declared origin is not as declared.
      - 6 'Amber' – reason to suspect declared origin may be not as declared.
    - DNA evaluations
      - 3 products were identified where the declared origin was indicated to be incorrect.

Notes:

- Two products (Russian birch wooden combs) were not allowed into Germany when sent via a UK laboratory by German Customs Officers. When sent from Australia, the same two products were received into Germany without issue.
- One product was tested where the stable isotope and DNA results appear to contradict each other. On cross-examination the results may support each other, however, this should be carefully discussed with the experts from each forensic laboratory before a conclusion is made. Discussion of positive results post-report with testing laboratory is the best way to derive useful conclusions.
- One product was omitted from testing due to a compromise of anonymity.

Softwoods (n=25)

This category included solid timber products including dimensional lumber, solid wood furniture, and solid wood items made of pine, spruce, and larch. This category also included three solid wood birch items; birch is not a softwood but was included due to its current risk profile and to make up for a shortfall in sampling for this category due to the lack of information of softwood provenance or species claims at retail.

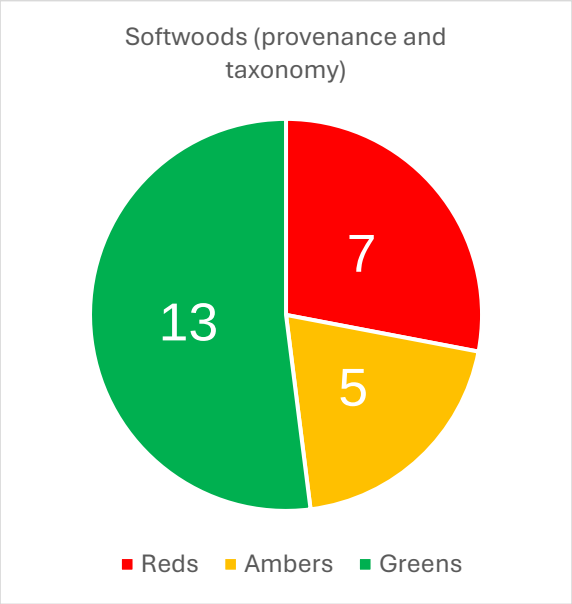

Figure 6: Summary of findings for softwood products.

A summary of the findings is illustrated in Figure 2.

Summary of Findings:

- Total products with anomalies (n=12)
  - Taxonomic anomalous results (n=0)
    - All taxonomic claims made about product were shown to be correct.
  - Provenance anomalous results (n=12)
    - Stable isotope evaluations
      - 7 ‘Red’ – strong evidence to suggest the declared origin is not as declared.
      - 5 ‘Amber’ – reason to suspect declared origin may be not as declared.

Veneers, engineered wood products, and plywood (n=25)

This category included veneers backed onto medium density fibreboard, birch plywood, laminated veneer lumber, and engineered flooring.

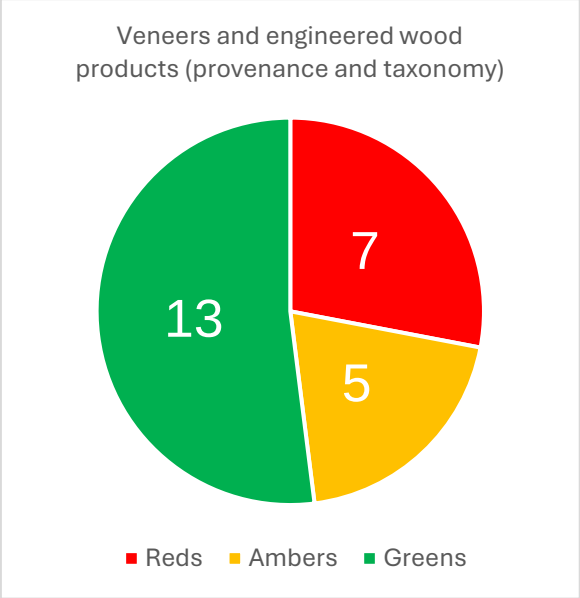

Figure 7: Summary of findings for veneers, engineered wood products and plywood products.

A summary of the findings is illustrated in Figure 7.

Summary of Findings:

- Total products with anomalies (n= 12)
  - Taxonomic anomalous results (n=2)
  - Provenance anomalous results (n = 10)
    - Stable isotope evaluations
      - 5 'Red' – strong evidence to suggest the declared origin is not as declared.
      - 5 'Amber – reason to suspect declared origin may be not as declared.

Notes:

- The two products with anomalous results for taxonomy were a wooden veneer straw. Three labs tested these straws with wood microscopy, each lab received different straws. The type of product tested is not currently under the scope of the regulation.
  - The straws were made of two veneers glued together with a fibrous, non-wooden, material.
  - One lab found that the component they tested was consistent with the declared taxa.
  - Another lab identified a type of wood in the straw that was not consistent with the declared taxa but didn't successfully identify what it was.
  - The third and final lab identified what the anomalous wood was.
  - The discrepancy in results between the labs can be explained by the initial lab overly adhering to agreed procedures of only testing one piece of wood per product. In this case, this approach missed the

anomalous wood. The second lab took their time with the sample which allowed for the successful identification of the anomaly. The final lab spent yet more time to identify the type of wood. This case-study highlights the trade-offs between speed and taking the time to be thorough, as well as the benefits of sharing information.

Domestic timber (n=20)

This category included sandalwood (*Santalum spp.*), radiata pine (*Pinus radiata*), silver wattle (*Acacia dealbata*), and Victorian ash (*Eucalyptus regnans*).

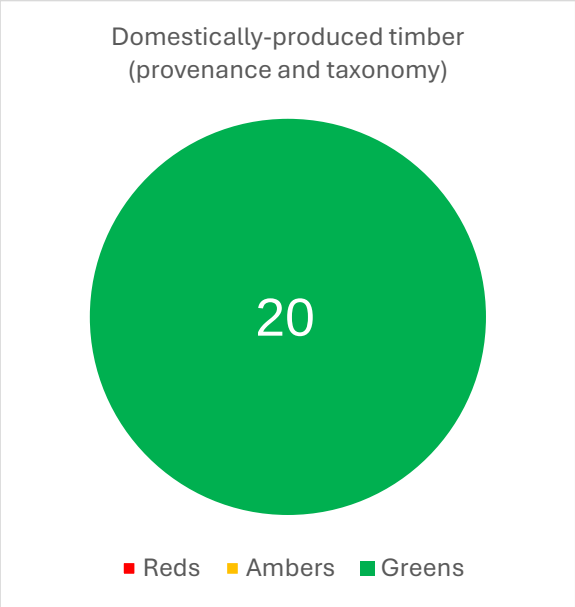

Figure 8: Summary of findings for domestic timber products.

A summary of the findings is illustrated in Figure 8.

Summary of Findings:

- Total products with anomalies (n = 0)
  - Taxonomic anomalous results (n = 0)
    - All taxonomic claims made about products were shown to be correct.
  - Provenance anomalous results (n = 0)

Domestic and imported hardwoods (n=25)

This category included solid wood products made of beech (*Fagus sp.*), cumaru (*Dipteryx sp.*), acacia (*Acacia sp.*), mango wood (*Mangifera sp.*), jarrah (*Eucalyptus marginata*), meranti (*Shorea sp.* and *Parashorea sp.*), spotted gum (*Corymbia maculata*), blackbutt (*Eucalyptus pilularis*), silvertop ash (*Eucalyptus sieberi*), and merbau (*Intsia sp.*).

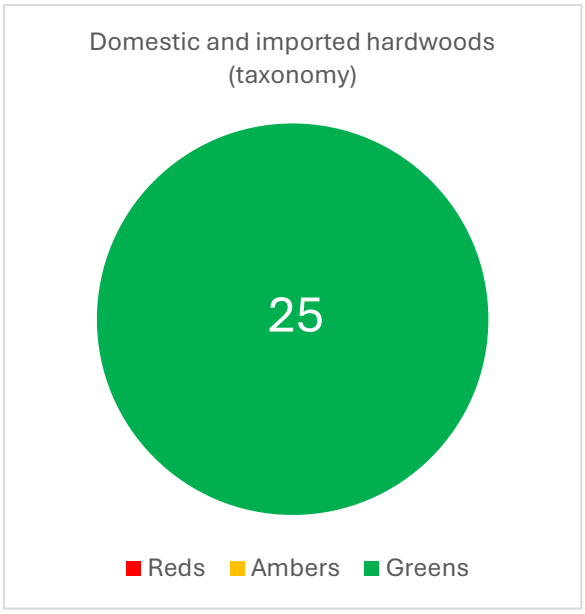

Figure 9: Summary of findings for domestic and imported hardwood products.

A summary of the findings is illustrated in Figure 9.

Summary of Findings:

- Total products with anomalies (n = 0)
- Taxonomic anomalous results (n = 0)
- Provenance tests were not performed due to lack of available reference data.

Solomon Islands teak (n=20)

This category included teak (*Tectona grandis*) sourced primarily from Kolombangara Island in the Solomon Islands.

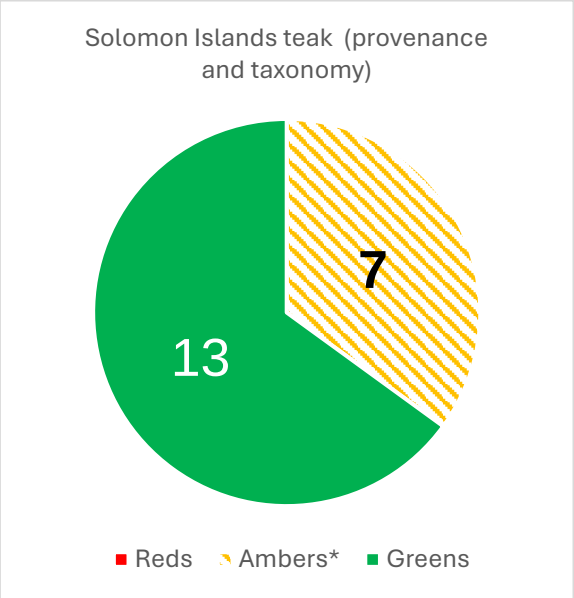

Figure 10: Summary of findings for Solomon Islands teak products.

A summary of the findings is illustrated in Figure 10.

Summary of Findings:

- Total products with anomalies (n = 0)
- Taxonomic anomalous results (n = 0)
- Provenance anomalous results (n = 7*)
    - Trace element (TSW Trace) evaluations:
        - *7 products were found to be inconsistent with teak grown on Kolombangara Island. At the time of purchase, the laboratory was informed that the group of samples may contain teak from 'out growers' in neighbouring islands in the Western province of the Solomon Islands. Reference data was only available for teak from Kolombangara Island. At the time of reporting, the teak that could not be verified to Kolombangara Island originating from out growers is the most likely explanation for the anomalous results. Due to this, these are not counted in the statistics for samples with misrepresented provenance or taxonomy.

MDF, Paper, and paperboard products (species declared) (n=24)

This category included toilet roll, tissue, printing paper, and MDF products.

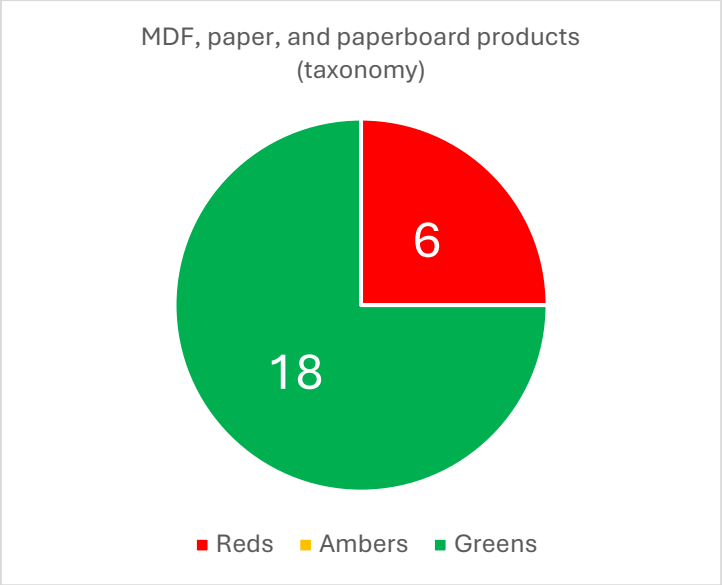

Figure 11: Summary of findings for MDF, paper and paperboard products with declared species.

A summary of the findings is illustrated in Figure 11.

Summary of Findings:

- Total products with anomalies (n=6)
- Taxonomic anomalous results (n=6)

Notes:

- One of the participating laboratories only identified two products with types of wood that should not be present in the product. The second participating laboratory identified a further four products with species that were not expected in the products.
- This suggests that the second laboratory may have a more thorough approach to identifying species present in fibre-based products.

MDF, Paper, and paperboard products (species not declared) (n= 11)

Aside from identifying types of wood fibre that were present in the products, without the context of the list of species that is meant to be present in the product, identifying the wood fibre provides relatively little context about whether an importer has or hasn't performed their due diligence unless the results can be cross-referenced with some mandatory declaration of contained species of wood fibre.

However, species were identified in the products that were tested that can present risks, such as in rubberwood. Sourcing rubberwood fibre from Thailand can present legal risks with respect to land tenure and management rights, which lead to issues around management, harvesting and planning, and harvesting permits. According to the Preferred by Nature sourcing hub[23], and WWF's wood risk portal[24], mitigating these risks would involve obtaining:

- A copy of the official land title document.
- Copy of the sales agreement (of the land).
- Map location: Check if your timber comes indeed from within the borders as specified in the land title document.
- Copy of the ID card of the owner to check if they are indeed the owner.

[23] https://sourcinghub.preferredbynature.org/

[24] https://www.woodrisk.org/assess-risk/countries/thailand

Summary of findings for all samples tested

Category	Short description	Third party certification?	Overall Grading
Oak, teak, and birch products	Teak	Yes	Green
Oak, teak, and birch products	Teak	Yes	Green
Oak, teak, and birch products	Teak		Red
Oak, teak, and birch products	Birch	Yes	Green
Oak, teak, and birch products	Teak	Yes	Red
Oak, teak, and birch products	Teak	Yes	Green
Oak, teak, and birch products	Teak	Yes	Amber
Oak, teak, and birch products	Teak	Yes	Green
Oak, teak, and birch products	Teak	Yes	Red
Oak, teak, and birch products	Birch		Green
Oak, teak, and birch products	Teak		Green
Oak, teak, and birch products	Teak		Red
Oak, teak, and birch products	Teak		Green
Oak, teak, and birch products	Teak	Yes	Amber
Oak, teak, and birch products	Teak	Yes	Green
Oak, teak, and birch products	Teak	Yes	Amber
Oak, teak, and birch products	Oak		Amber
Oak, teak, and birch products	Teak		Amber
Oak, teak, and birch products	Teak		Amber
Oak, teak, and birch products	Teak		Red
Oak, teak, and birch products	Oak		Red
Oak, teak, and birch products	Oak		Red
Oak, teak, and birch products	Oak		Green
Oak, teak, and birch products	Ash		Green
Softwoods	Fir, larch, spruce, or pine	Yes	Amber
Softwoods	Fir, larch, spruce, or pine	Yes	Amber
Softwoods	Birch*	Yes	Green
Softwoods	Birch*	Yes	Green
Softwoods	Spruce, larch, or pine	Yes	Red
Softwoods	Spruce, larch, or pine	Yes	Red
Softwoods	Spruce or pine		Green
Softwoods	Spruce or pine		Green
Softwoods	Larch or pine	Yes	Red
Softwoods	Larch or pine	Yes	Green
Softwoods	Larch or pine	Yes	Green
Softwoods	Spruce	Yes	Red
Softwoods	Spruce	Yes	Red
Softwoods	Birch*	Yes	Green
Softwoods	Pine	Yes	Green
Softwoods	Pine	Yes	Green
Softwoods	Spruce or pine	Yes	Amber
Softwoods	Spruce or pine	Yes	Amber
Softwoods	Pine		Green
Softwoods	Pine		Green
Softwoods	Pine		Green
Softwoods	Spruce		Amber
Softwoods	Spruce		Green
Softwoods	Pine	Yes	Red
Softwoods	Pine	Yes	Red

Category	Short description	Third party certification?	Overall Grading
Veneers, engineered wood products, and plywood	Okoume straws	Yes	Red
Veneers, engineered wood products, and plywood	Okoume straws	Yes	Red
Veneers, engineered wood products, and plywood	Oak flooring		Green
Veneers, engineered wood products, and plywood	Oak flooring		Green
Veneers, engineered wood products, and plywood	Oak flooring		Green
Veneers, engineered wood products, and plywood	Oak flooring		Green
Veneers, engineered wood products, and plywood	Oak flooring		Green
Veneers, engineered wood products, and plywood	Oak flooring		Green
Veneers, engineered wood products, and plywood	Larch and pine LVL		Red
Veneers, engineered wood products, and plywood	Larch and pine LVL		Red
Veneers, engineered wood products, and plywood	Larch and pine LVL		Red
Veneers, engineered wood products, and plywood	Okoume	Yes	Green
Veneers, engineered wood products, and plywood	Okoume	Yes	Green
Veneers, engineered wood products, and plywood	Birch plywood	Yes	Amber
Veneers, engineered wood products, and plywood	Birch plywood	Yes	Red
Veneers, engineered wood products, and plywood	Birch plywood	Yes	Amber
Veneers, engineered wood products, and plywood	Birch plywood		Amber
Veneers, engineered wood products, and plywood	Birch plywood		Green
Veneers, engineered wood products, and plywood	Birch plywood		Red
Veneers, engineered wood products, and plywood	Oak veneer		Green
Veneers, engineered wood products, and plywood	Oak veneer		Amber
Veneers, engineered wood products, and plywood	Oak veneer		Green
Veneers, engineered wood products, and plywood	Ash veneer		Amber
Veneers, engineered wood products, and plywood	Birch plywood		Green
Veneers, engineered wood products, and plywood	Birch plywood		Green
Domestic timber	Merbau		Green
Domestic timber	Tasmanian oak		Green
Domestic timber	Cypress pine		Green
Domestic timber	Blackbutt		Green
Domestic timber	Sandalwood		Green
Domestic timber	Sandalwood		Green
Domestic timber	Agarwood		Green
Domestic timber	Sandalwood		Green
Domestic timber	Sandalwood		Green
Domestic timber	Pine		Green
Domestic timber	Pine		Green
Domestic timber	Messmate		Green
Domestic timber	Messmate		Green
Domestic timber	Messmate		Green
Domestic timber	Blackwood		Green
Domestic timber	Sassafras		Green
Domestic timber	Silver Wattle		Green
Domestic timber	Messmate		Green
Domestic timber	Silvertop ash		Green
Domestic timber	Spotted gum		Green
Domestic and imported hardwoods	Merbau		Green
Domestic and imported hardwoods	Beech	Yes	Green
Domestic and imported hardwoods	Acacia	Yes	Green
Domestic and imported hardwoods	Acacia	Yes	Green
Domestic and imported hardwoods	Cumaru	Yes	Green
Domestic and imported hardwoods	Hickory	Yes	Green

Category	Short description	Third party certification?	Overall Grading
Domestic and imported hardwoods	Rubberwood		Green
Domestic and imported hardwoods	Merbau		Green
Domestic and imported hardwoods	Mango wood		Green
Domestic and imported hardwoods	Acacia	Yes	Green
Domestic and imported hardwoods	Meranti		Green
Domestic and imported hardwoods	Jarrah		Green
Domestic and imported hardwoods	Spotted gum		Green
Domestic and imported hardwoods	Spotted gum		Green
Domestic and imported hardwoods	Blackbutt		Green
Domestic and imported hardwoods	Jarrah		Green
Domestic and imported hardwoods	Merbau		Green
Domestic and imported hardwoods	Spotted gum		Green
Domestic and imported hardwoods	Stringybark		Green
Domestic and imported hardwoods	Spotted gum		Green
Domestic and imported hardwoods	Ironbark		Green
Domestic and imported hardwoods	Merbau		Green
Domestic and imported hardwoods	Merbau		Green
Domestic and imported hardwoods	Merbau		Green
Domestic and imported hardwoods	Western red cedar	Yes	Green
Teak	Teak		Green
Teak	Teak		Amber
Teak	Teak		Green
Teak	Teak		Amber
Teak	Teak		Amber
Teak	Teak		Green
Teak	Teak		Green
Teak	Teak		Green
Teak	Teak		Green
Teak	Teak		Amber
Teak	Teak		Green
Teak	Teak		Green
Teak	Teak		Amber
Teak	Teak		Amber
Teak	Teak		Green
Teak	Teak		Green
Teak	Teak		Green
Teak	Teak		Green
Teak	Teak		Amber
Teak	Teak		Green
MDF and paper products (species declared)	MDF	Yes	Red
MDF and paper products (species declared)	MDF	Yes	Green
MDF and paper products (species declared)	MDF	Yes	Green
MDF and paper products (species declared)	Paper	Yes	Green
MDF and paper products (species declared)	Paper	Yes	Red
MDF and paper products (species declared)	Paper	Yes	Green
MDF and paper products (species declared)	Paper	Yes	Green
MDF and paper products (species declared)	Paper	Yes	Green
MDF and paper products (species declared)	Paper tissues	Yes	Green
MDF and paper products (species declared)	Paper tissues	Yes	Green
MDF and paper products (species declared)	Toilet Paper	Yes	Red
MDF and paper products (species declared)	Toilet Paper	Yes	Red

Category	Short description	Third party certification?	Overall Grading
MDF and paper products (species declared)	Toilet Paper	Yes	Green
MDF and paper products (species declared)	Toilet Paper	Yes	Green
MDF and paper products (species declared)	Paper	Yes	Green
MDF and paper products (species declared)	Paper	Yes	Green
MDF and paper products (species declared)	Paper	Yes	Green
MDF and paper products (species declared)	Toilet Paper	Yes	Green
MDF and paper products (species declared)	Toilet Paper	Yes	Green
MDF and paper products (species declared)	Toilet Paper	Yes	Green
MDF and paper products (species declared)	Paper	Yes	Green
MDF and paper products (species declared)	Paper	Yes	Red
MDF and paper products (species declared)	Paper	Yes	Green
MDF and paper products (species declared)	Paper	Yes	Red
MDF and paper products (species not declared)	MDF		N/A
MDF and paper products (species not declared)	MDF	Yes	N/A
MDF and paper products (species not declared)	MDF		N/A
MDF and paper products (species not declared)	MDF		N/A
MDF and paper products (species not declared)	MDF		N/A
MDF and paper products (species not declared)	MDF	Yes	N/A
MDF and paper products (species not declared)	MDF		N/A
MDF and paper products (species not declared)	MDF		N/A
MDF and paper products (species not declared)	MDF		N/A
MDF and paper products (species not declared)	MDF		N/A

*The product was included in the category to support sampling quotas and because the risk profile made it relevant, though it may not have been a perfect fit for the category description.

Discussion of findings from surveillance and testing

Results show that there were significant proportions of timber and forest products sampled and tested had results indicating inconsistency with declared provenance, taxonomy, or both. In certain categories, such as those corresponding to imported timber, the frequency of inconsistencies encountered were as high as 50%.

27 of the 69 products (approximately 40%) asserting a claim of independent third-party certification (such as FSC of PEFC) were identified as inconsistent (red/amber product grading) with declared provenance, taxonomy, or both. Both schemes are not currently doing enough to support authenticity, transparency, or that their brands are not being infringed upon. In the research phase of the project, 120 products were identified with third-party certification, only 50 of these 120 (~42%) products provided any information about the species or type of wood that they contain when their licence numbers were investigated. In several cases, products were identified with current claims of third-party certification when a simple license check uncovered that the supplier, or product was no longer certified, or was terminated years prior. Given the history of the use of third-party certification as a means of providing assurance products could be considered “deemed to comply” with Australia’s Illegal Logging Prohibition Act requirements, both findings indicate strong reforms are needed.

The changes Source Certain recommends are intended to enhance public trust and preserve the integrity of timber and forest products on sale in Australia. As some of the illegal activity and sourcing practices can be highly organised it is often e s 47E(d); s 47G(1)(a) note that regardless of the final approach settled on, more transparency within incoming timber supply chains cannot be achieved without investment in activity within the supply chain and time to execute on this activity.

It needs to be recognised that the most effective approach will be a systems approach, involving both the Government and the private sector. Governments do not have the resources to tackle a challenge as substantive as illegal logging alone, and the private sector cannot be expected to address illegal logging on a non-standardised and voluntary basis; the most effective solution will be both working together in concert.

Source Certain extends our congratulations to the Federal Government for not only proactively engaging with experts in the scientific community globally on timber verification, but for taking a leading stance internationally on the use of testing as an investigatory and intelligence tool in support of legal sourcing compliance. This shows a strong and proactive commitment to finding ways to tackle illegal logging beyond conventional voluntary approaches or simply reviewing paper or digitised systems. Historic solutions, such as voluntary traceability and disclosure are well-known to be co-opted by bad actors in order to perpetrate the scale of the global illegal logging problem, which costs the global community up to $240 billion each year. By value, this is the largest environmental crime.

Nonetheless, we recognise that tests should always be directed toward a specific purpose and that testing alone cannot address the problem, directly indicate illegal logging, or be used as the sole evidence used to reach a conclusion on a matter. Context matters above all; therefore, our recommendations are intended to support the vital work of enforcement officers either as tools to assist with investigation, or as a means to initiate a dialogue with an importer or trader.

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