

# RAPID SCREENING BY FLUORESCENCE OF FINISHED WOOD PRODUCTS FOR TARGETED SAMPLING

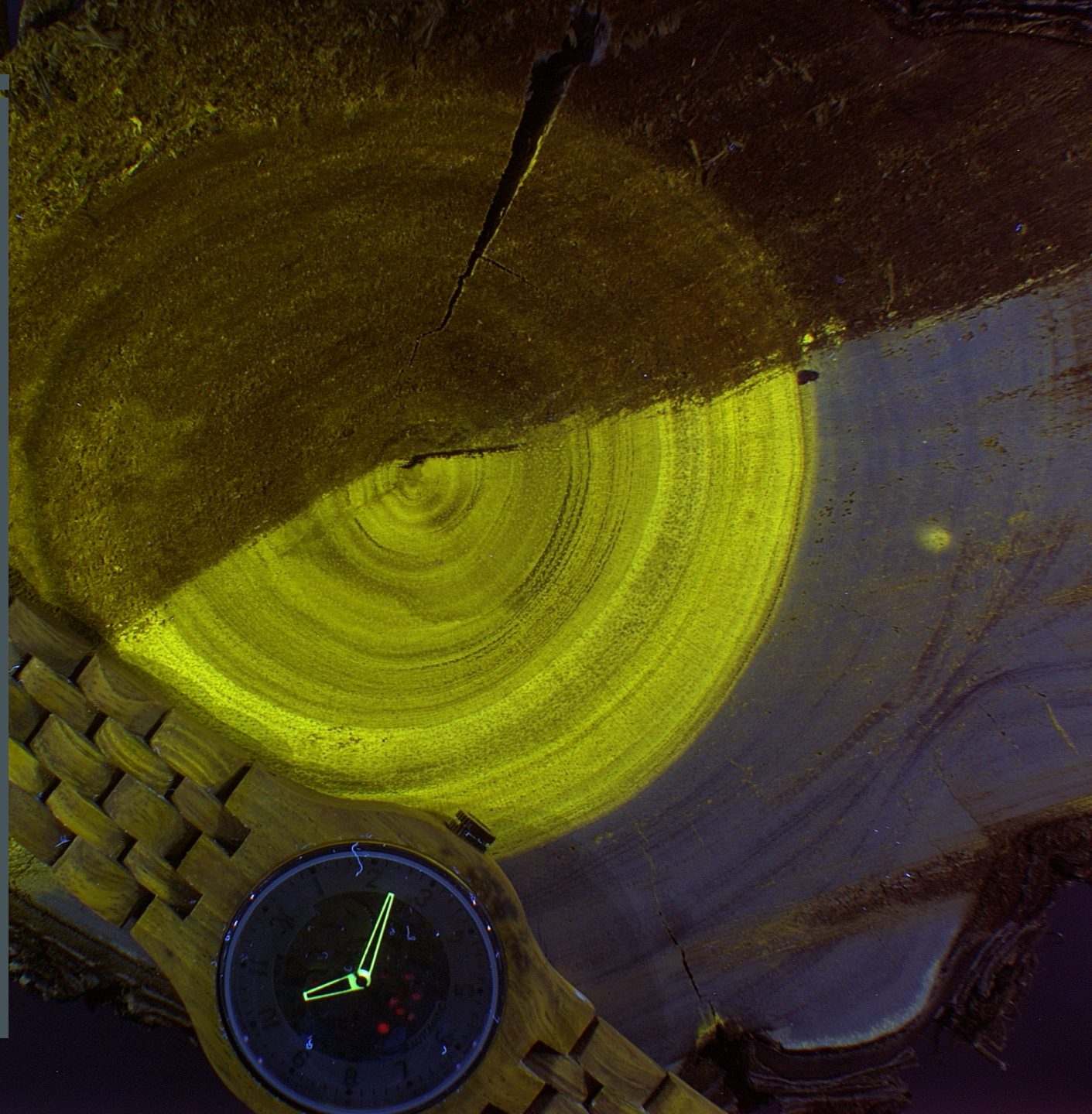
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WOOD IDENTIFICATION AND SCREENING  
CENTER

USFS INTERNATIONAL PROGRAMS

IUFRO OCT 1, 2019

SESSION C3D



# INCREASING DEMAND, INCREASING TRADE

- **Pulp and paper** consumption will increase by more than 100 percent.
- **Solid wood products** will grow at a slower rate, between 28 and 61 percent.

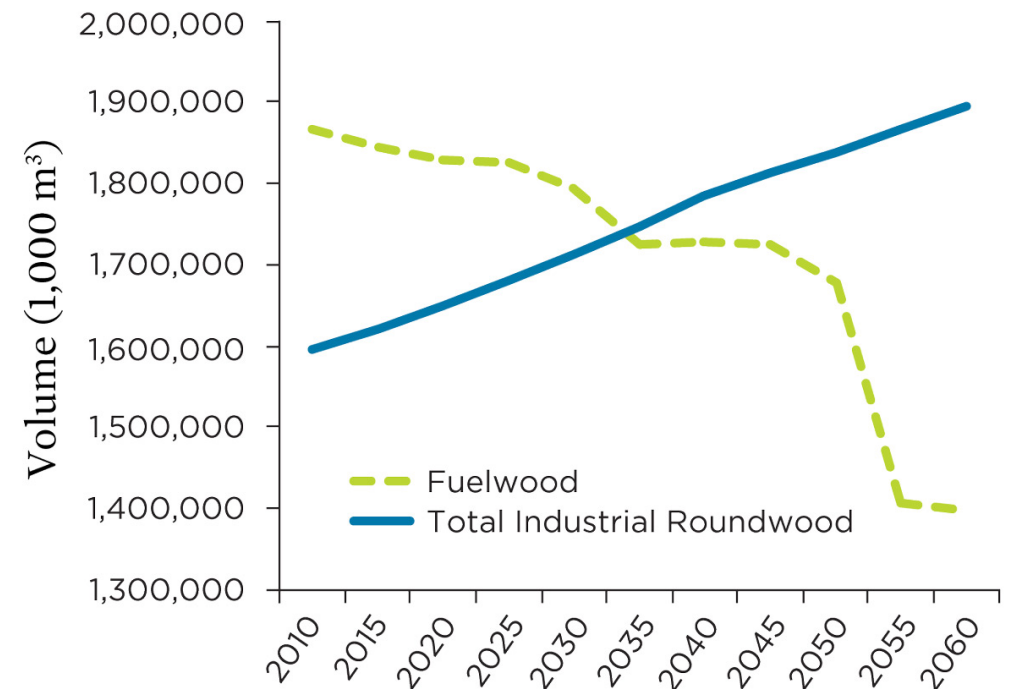



**HARMONY**<sup>TM</sup>  
Exquisite blend promotes physical and emotional well-being by bringing harmonic balance to energy centers.

**INGREDIENTS**

• Lavender	• Geranium	• Jasmine
• Sandalwood	• Hyssop	• Roman Chamomile
• Ylang Ylang	• Black Spruce	• Bergamot
• Frankincense	• Spanish Sage	• Palmarosa
• Orange	• Rosewood	• Rose
• Angelica	• Lemon	

EssentialOilSage.com

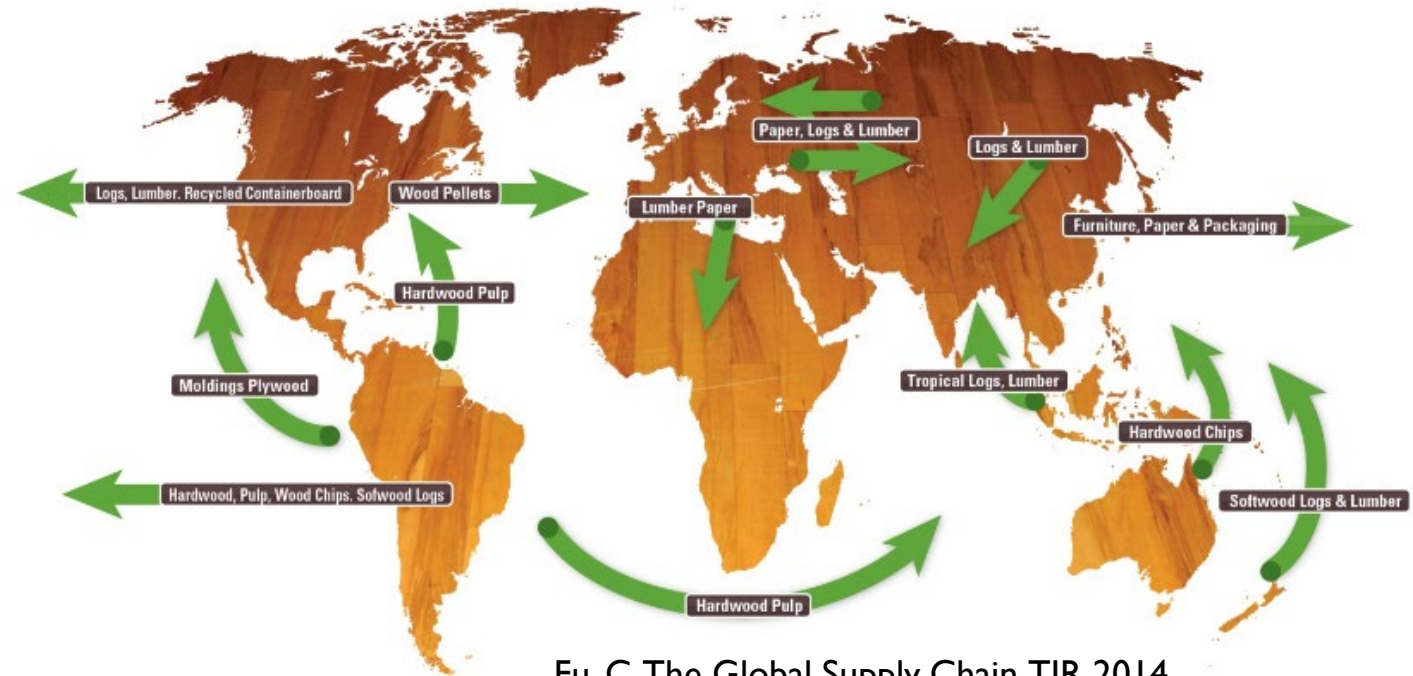


Modeling of global industrial roundwood and fuelwood consumption from 2010 to 2060 (ucsusa, 2019)

# TOOLS FOR INSPECTORS

- Train work force for anatomy
  - Time consuming
  - Labor intensive
  - Unrealistic
- New technology
  - Document scanning → target red flag
  - Tools for inspection

Highlights of Global Trade Flows of Wood Products



Fu, C. The Global Supply Chain. TIR 2014.

# TOOLS FOR INSPECTORS

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Xylotron  
2019. Chinadialogue.net



NIRS  
2016. <https://wildtech.mongabay.com>



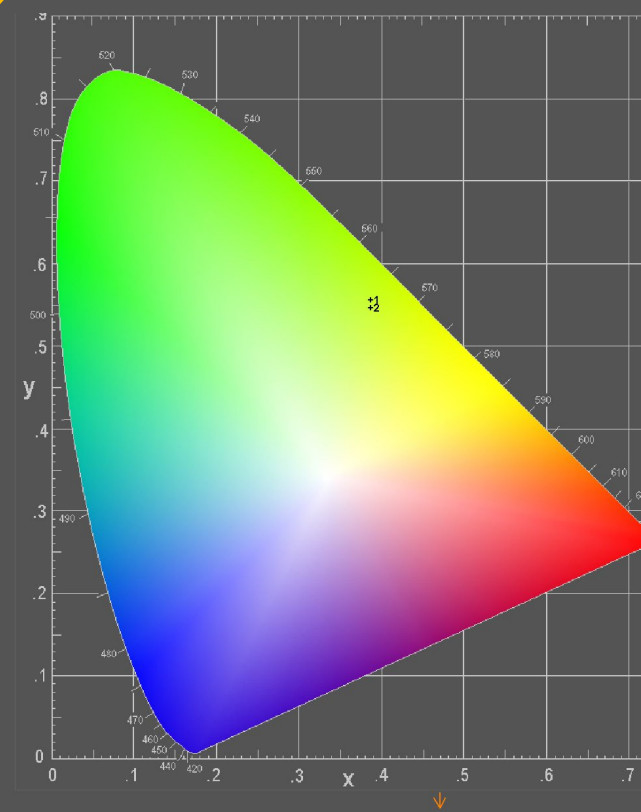
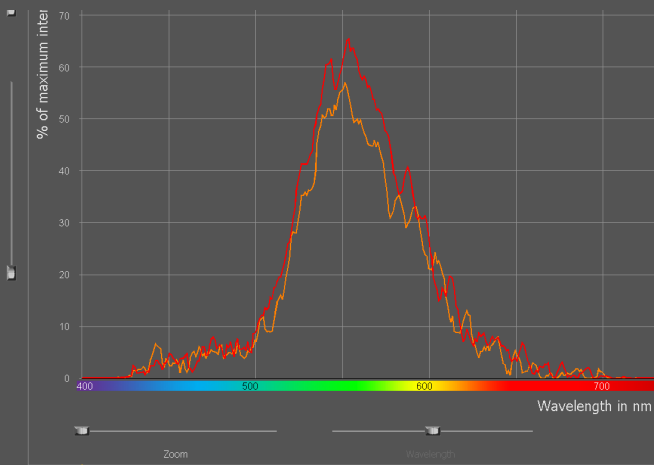
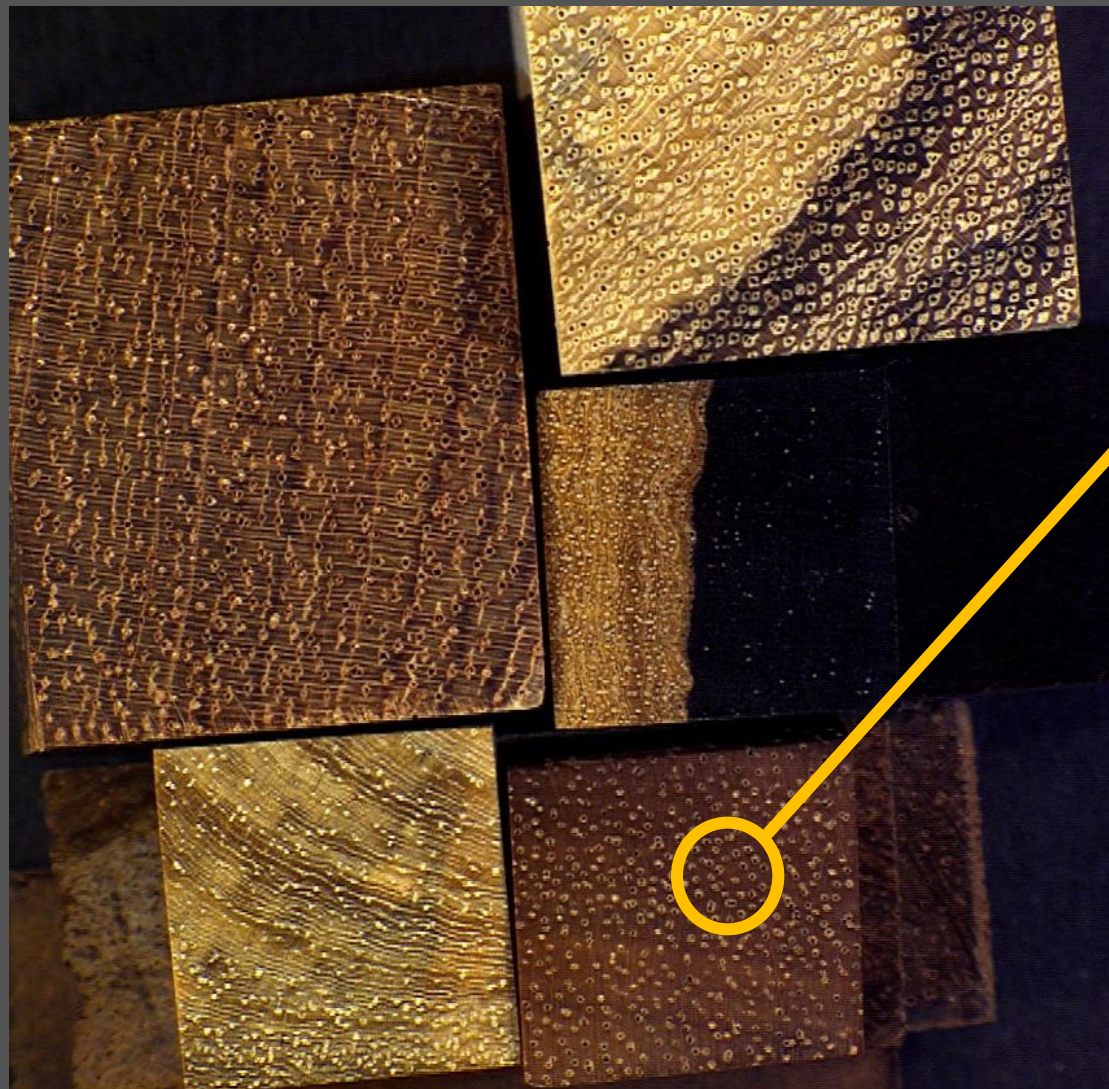
<https://www.woodworkingnetwork.com/>

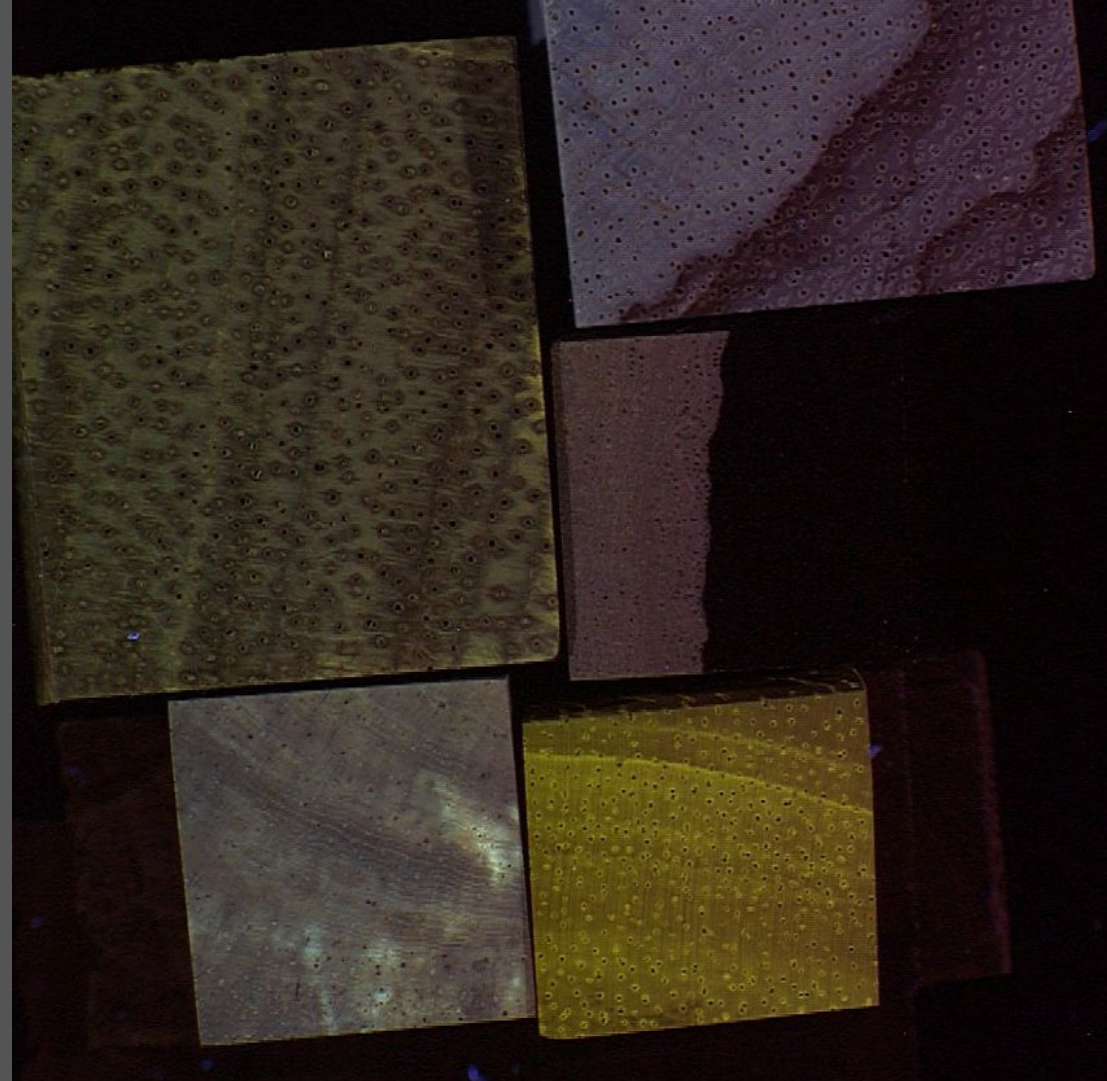
Inspections are  
time-consuming



<https://thediplomat.com/2019/>





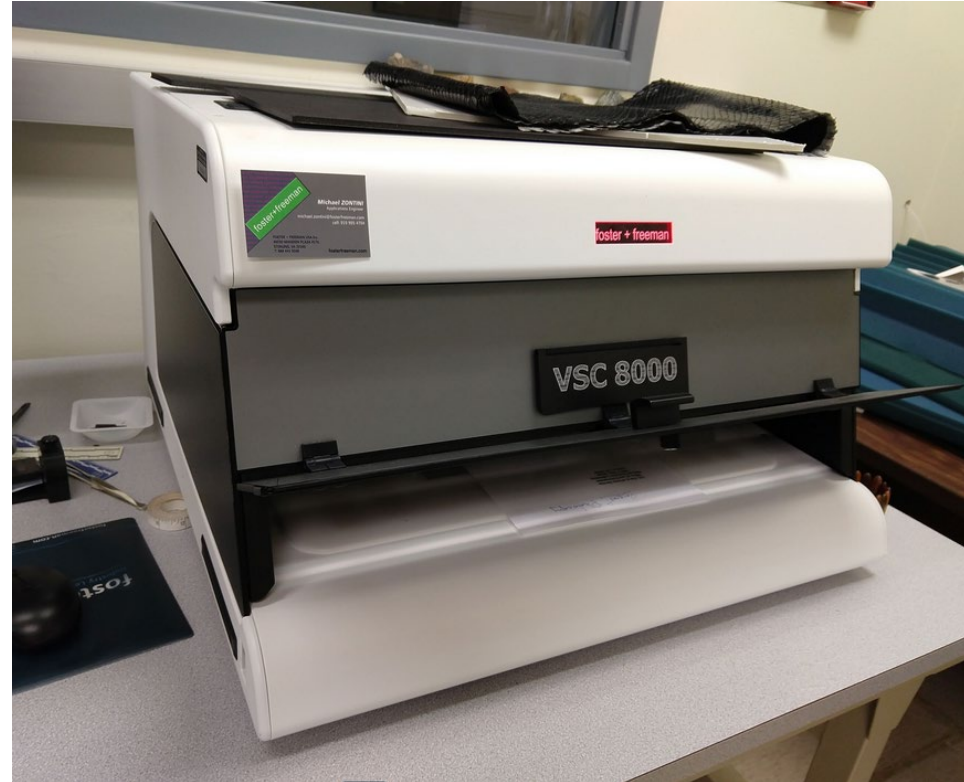


## Requirements

Dark room

365 nm flashlight

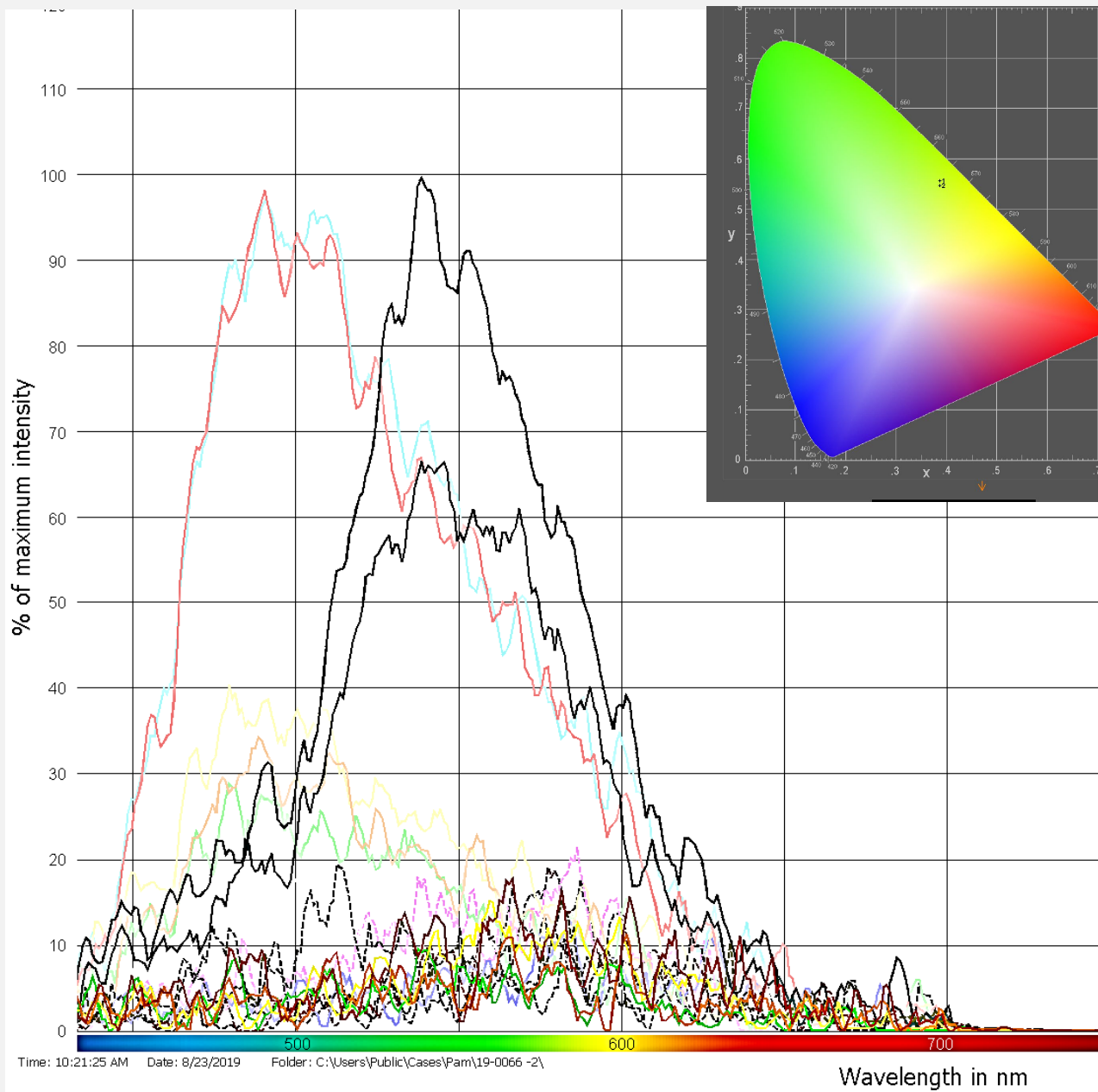
# DATABASE PROTOCOL



1. Select blocks from known curated database
2. VSC 8000 to image and measure fluorescence
3. Generate **visual** database and CIELAB measurements



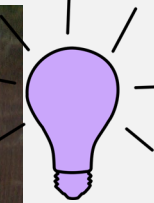
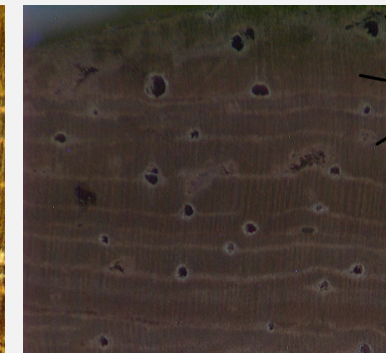
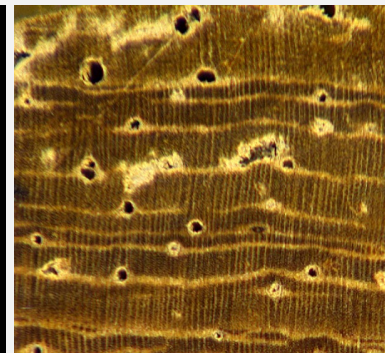




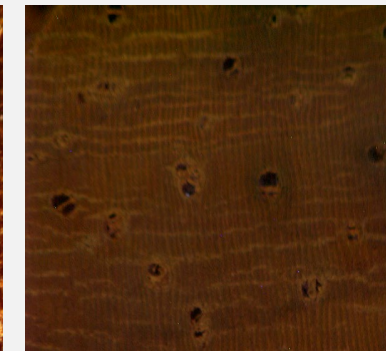
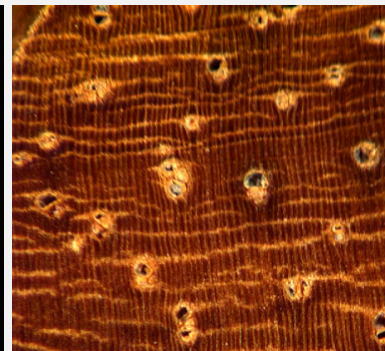
Goal: Visual and technical database of fluorescence



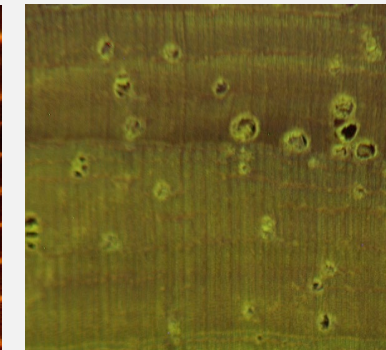
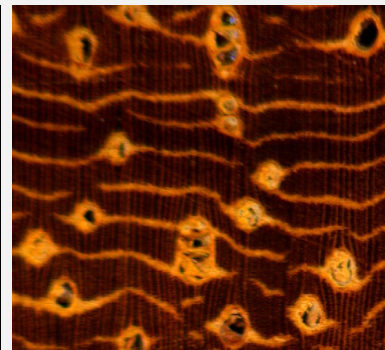
*P. angolensis*



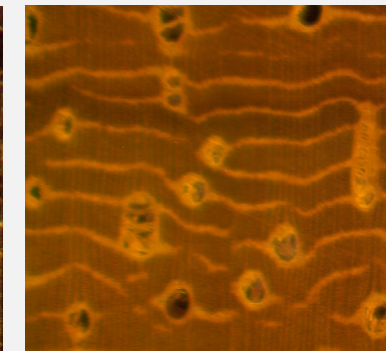
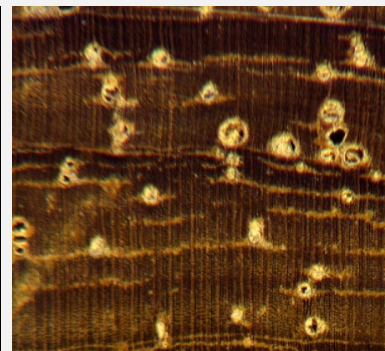
*P. dalbergioides*



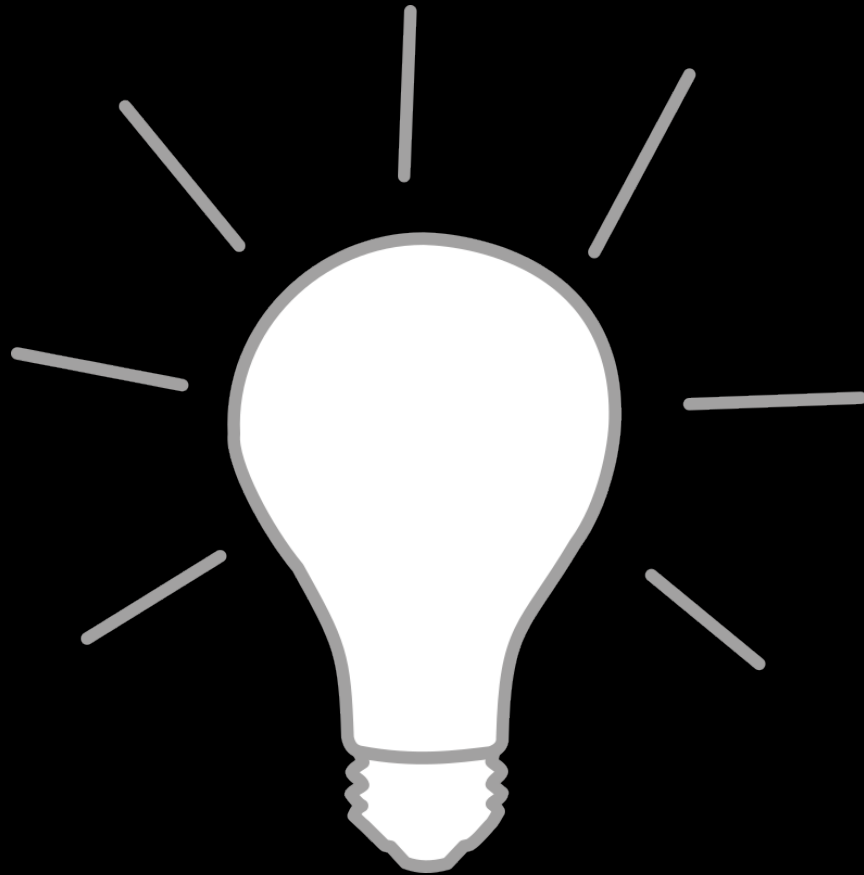
*P. indicus*



*P. soyauxii*



# Inspector: Consistency in a shipment



White light



Inspectors don't *always* need to know species, they might just need to know inconsistency from a shipping manifest

# Forensic Scientist: Consistency in an object

365 nm (fluorescence)

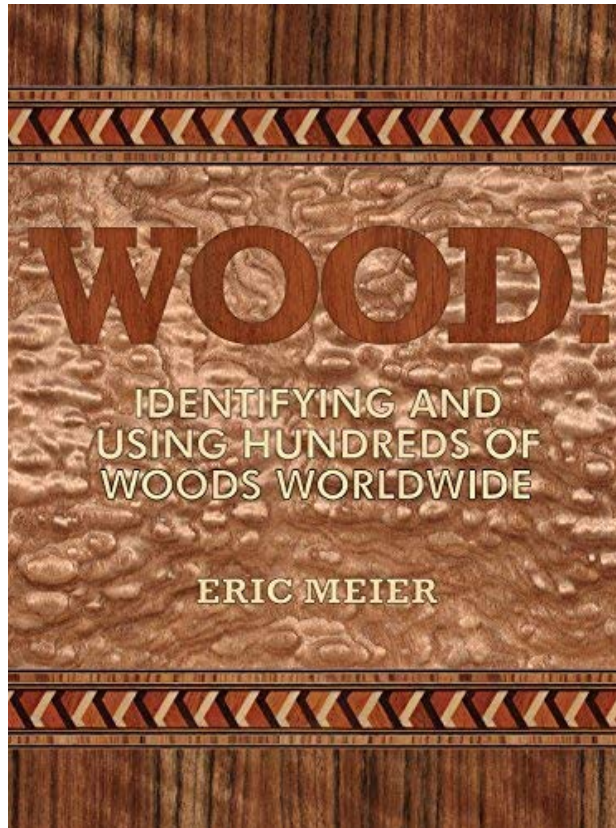


White light



- Sample most accessible regions of complex evidence items
- Improve efficiency in selecting samples for intensive (expensive) analytical techniques

# FLUORESCENCE RESOURCES



- Wood cell walls are naturally fluorescent due to the presence of lignin and vary based on heterogeneity of chemicals



INSIDE WOOD	
204	Heartwood fluorescent
205	Water extract fluorescent
210	Ethanol extract fluorescent

Krishna, Chowdhury, 1935.

Pandey et al. 1998.

## SUMMARY: NEVER FORGET THE SIMPLE STUFF

- By utilizing simple tools we can **improve the efficiency of agents *and* scientists**
- Improved efficiency = increased compliance by enforcement/regulators
- High rates of compliance = more inspections and increased enforcement

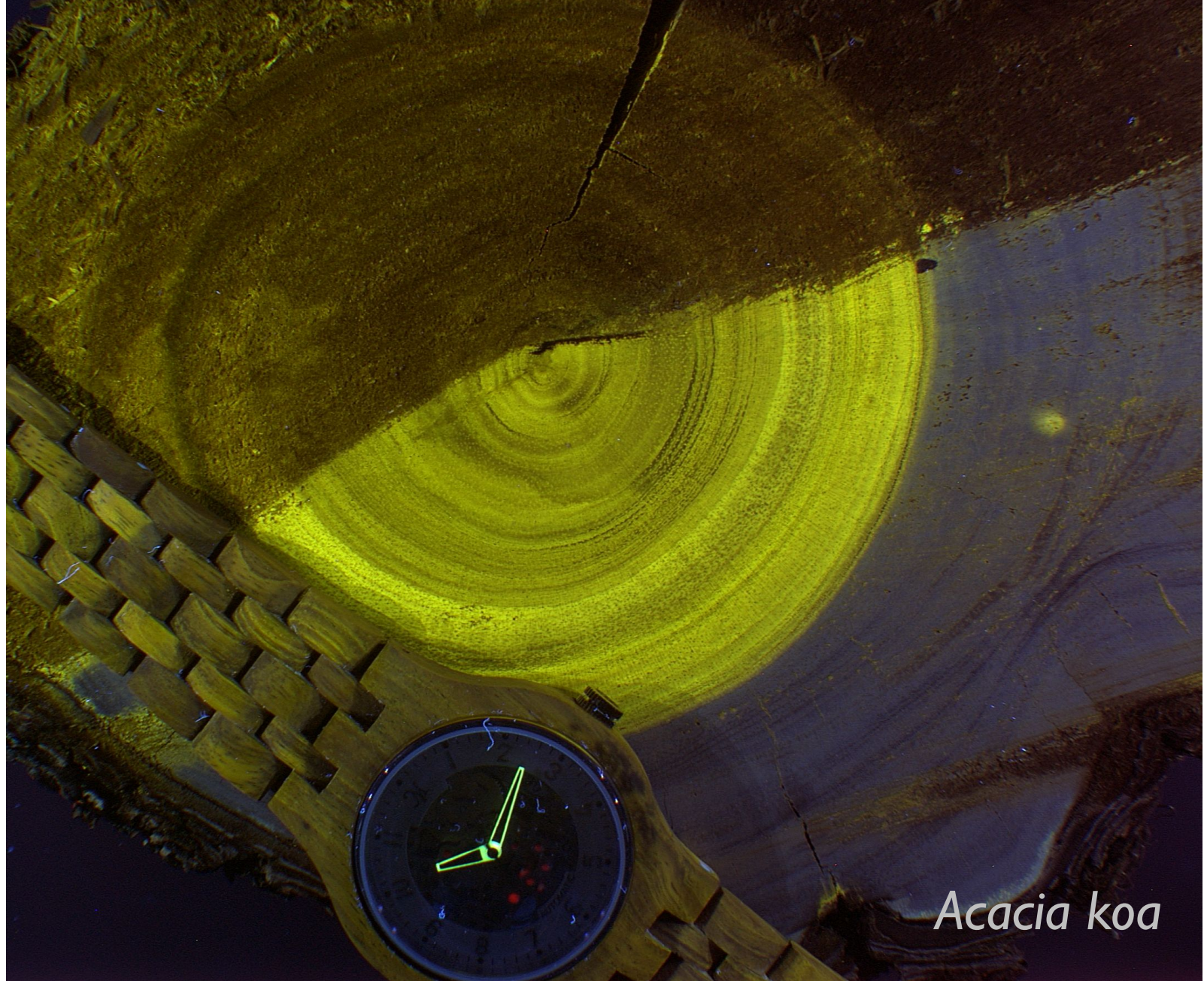
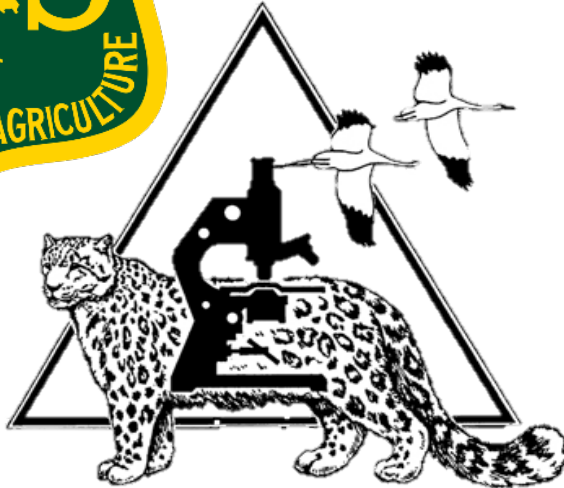


Start simple, find variation, *then* invest

# Thank you for your attention

Acknowledgements:

Karrine Gilbert  
NFWFL



*Acacia koa*