CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES
OF WILD FAUNA AND FLORA
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Twenty-third meeting of the Plants Committee
Geneva (Switzerland), 22 and 24-27 July 2017

Interpretation and implementation matters

Trade controls and traceability

TIMBER IDENTIFICATION CAPABILITIES
National Fish and Wildlife Forensic Lab, July 2017

The attached information document has been submitted by the United States of America[*] in relation to agenda item 18.

Timber Identification Capabilities
National Fish and Wildlife Forensic Lab   July 2017

The working and applied xylarium at the National Fish and Wildlife Forensic lab contains approximately 1960 species representing 630 genera. The total number of specimens in the collection exceeds 10,000 samples. Thirty-two percent (32%) of these specimens are wood blocks while the remainders are wood slivers designated for chemistry analysis. The focus of the collection is CITES listed species and their look-alikes. The lab can identify 46% of the CITES protected species listed in the Table below (identified in green rows).   Grey colored rows are tree species but not traded as timber (18%). Rows that are not colored are taxa for which we have not been able to obtain reference samples (35%). For both the *Diospyros* and *Dalbergia* taxa the reference collection does not contain all of the described species but it does include the most commonly traded species.

Family	Species	Annotation	CITES	Common name
ANACARDIACEAE	*Operculicarya decaryi*		II	Jabihy
	Operculicarya hyphaenoides		II	Jabihy
	Operculicarya pachypus		II	Tabily
ARAUCARIACEAE	*Araucaria araucana*		I	Chili pine, Monkey puzzle
BERBERIDACEAE	*Podophyllum hexandrum*	#2	II	Himalayan may-apple
CARYOCARACEAE	*Caryocar costaricense*	#4	II	Ajillo
CUPRESSACEAE	*Fitzroya cupressoides*		I	Alerce, lahuán, lahuen
	Pilgerodendron uviferum		I	Pilgerodendron, Ciprès
DICKSONIACEAE	*Dicksonia spp.*	#4	II	Tree ferns
DIDIEREACEAE	*DIDIEREACEAE spp.*	#4	II	Alluaudias, didiereas
EBENACEAE	*Diospyros spp.*	#5	II	Ebonies
FABACEAE	Guibourtia demeusei	#15	II	Bubinga
	Guibourtia pellegriniana	#15	II	Bubinga
	Guibourtia tessmannii	#15	II	Bubinga
FAGACEAE	*Quercus mongolia*	#5	III (Russian Federation)	Mongolian oak
JUGLANDACEAE	Oreomunnea pterocarpa	#4	II	Gavilan, Aniba duckei, Pau rosa
LAURACEAE	*Aniba rosaeodora*	#12	II	Brazilian rosewood
LEGUMINOSAE	*Caesalpinia echinata*	#10	II	Brazilwood, Pernambuk
	Dalbergia cochinchinensis	#5	II	Thailand rosewood
	Dalbergia darenensis	#2	III (Panama)	
	Dalbergia granadillo	#6	II	Granadillo rosewood
	Dalbergia nigra		I	Rio palisander, Brazilian rosewood
	Dalbergia retusa	#6	II	Cocobolo
	Dalbergia spp.	#5	II	Madagascar palisander, Madagascar rosewood
	Dalbergia stevensonii	#6	II	Honduras palisander, Honduras rosewood
	Dalbergia tucurensis	#6	III (Nicaraqua)	Yucatan Rosewood
	Dipteryx panamensis		III (Costa Rica/ Nicaragua)	Almendro
	Pericopsis elata	#5	II	Afrormosia
	Platymiscium pleiostachyum	#4	II	Cristóbal, ñambar
	Pterocarpus santalinus	#7	II	Red sanders, red sandalwood, agaru
MAGNOLIACEAE	*Magnolia liliifera var. Obovata*	#1	III (Nepal)	Balukhat, Branthuri, Safan

MELIACEAE	*Cedrela fissilis*	#5	III (Bolivia)	Cedar, cedrela, cédrat, etc.
	Cedrela lilloi	#5	III (Bolivia)	Cedar, cedrela, cédrat, etc.
	Cedrela odorata	#5	III (Bolivia, Brazil, Columbia, Guatamala, Peru)	Spanish cedar, cedar, cedrela, etc.
	Swietenia humilis	#4	II	Honduras mahogany
	Swietenia macrophylla	#6	II	Brazilian mahogany, Bigleaf mahogany
	Swietenia mahagoni	#5	II	Cuban mahogany
OLEACEAE	*Fraxinus mandshurica*	#5	III (Russian Federation)	Manchurian ash
PALMAE	*Beccariophoenix madagascariensis*	#4	II	Manarano
	Chrysalidocarpus decipiens		**I**	Butterfly palm
	Lemurophoenix halleuxii		II	Hovitra varimena
	Marojejya darianii		II	Ravimbe
	Neodypsis decaryi	#4	II	Triangle palm
	Ravenea louvelii		II	Lakamarefo
	Ravenia rivularis		II	Gora
	Satranala decussilvae		II	Satranabe
	Voanioala gerardii		II	Voanioala
PINACEAE	*Abies quatemalensis*		**I**	Guatemalan fir
	Pinus koraiensis	#5	III (Russian Federation)	Korean nutpine
PODOCARPACEAE	*Podocarpus neriifolius*	#1	III (Nepal)	Yellow wood
	Podocarpus parlatorei		**I**	Parlatore's podocarp
ROSACEAE	*Prunus africana*	#4	II	African cherry
RUBIACEAE	*Balmea stormiae*		**I**	Ayugue, Balmea stormae Martínez
SANTALACEAE	*Osyris lanceolata*	#2	II (Burundi, Ethiopia Kenya, Rwanda, Uganda, Tanzania	East African sandalwood
TAXACEAE	*Taxus chinensis*	#2	II	Chinese yew
	Taxus cuspidata	#2	II	Japanese yew
	Taxus fuana	#2	II	Tibetan yew
	Taxus sumatrana	#2	II	Sumatran yew
	Taxus wallichiana	#2	II	Hymalayan yew
THYMELAEACEAE	*Aquilaria spp.*	#14	II	Agarwood, gaharu
	Gonystyllus spp.	#4	II	Ramin
	Gyrinops spp.	#14	II	Agarwood
TROCHODENDRACEAE	*Tetracentron sinense*	#1	III (Nepal)	
ZYGOPHYLLACEAE	*Bulnesia sarmientoi*	#11	II	Gayak, Holy wood
	Guaiacum spp.	#2	II	Lignum-vitae

For a comparison, there are two wood anatomy databases for reference and identification: InsideWood (which follows IAWA nomenclature) which has a description of 9,033 species, and CITESWood which describes 56 species.

The identification process at the National Fish and Wildlife Forensic Lab involves two steps 1) anatomic characterization for determining genera, followed by 2) chemistry analysis using DART TOFMS for determining the specimens chemotype.

The identification of wood using chemical profiles by DART TOFMS was novel in 2012 but now it has become accepted to have great advantages over traditional DNA analysis because of cost and high throughput (for comparison a DNA sequencer costs roughly the same as a mass spectrometer, but the cost of analysis using DART TOFMS is about 5 cents per sample).

To date we have analyzed timber evidence in over 100 criminal cases (~500 items) involving USFWS, CBP, APHIS and Law Enforcement colleagues from the UK and Mexico.

Our publication's collaborators include scientists from England, Belgium, The Netherlands, Germany, Spain, Australia, Canada, Mexico, Argentina, Chile as well as academic and governmental institutions from the US.   A list of reference publications is below.

REFRERNCES
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5) Rabi A. Musah, Edgard O. Espinoza, Robert B. Cody, Ashton D. Lesiak, Earl D. Christenen, Hannah Moore, Simin Maleknia, 2015. A High Throughput Ambient Mass Spectrometric Approach to Species Identification and Classification from Chemical Fingerprint Signatures. Scientific Reports. 5:11520

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10) Michael Wiemann and Edgard Espinoza. 2017. Species verification of the *Dalbergia nigra* and *Dalbergia spruceana* samples in the Wood Collection of the Forest Products Laboratory in Madison, Wisconsin. Research

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11) Kristen Finch, Edgard Espinoza, F. Andrew Jones, Richard Cronn 2017. Navigating a random forest with wood chemistry: source identification of Western Oregon Douglas-fir wood cores using mass spectrometry. Applications in Plant Sciences 5(5):1600158.

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