FLAAR
MESOAMÉRICA

WETLANDS #4

EDIBLE PLANTS OF WETLANDS

CATTAIL, TULE

Typha domingensis

Swamps and Marshes
of Livingston, Izabal

NICHOLAS **HELLMUTH**

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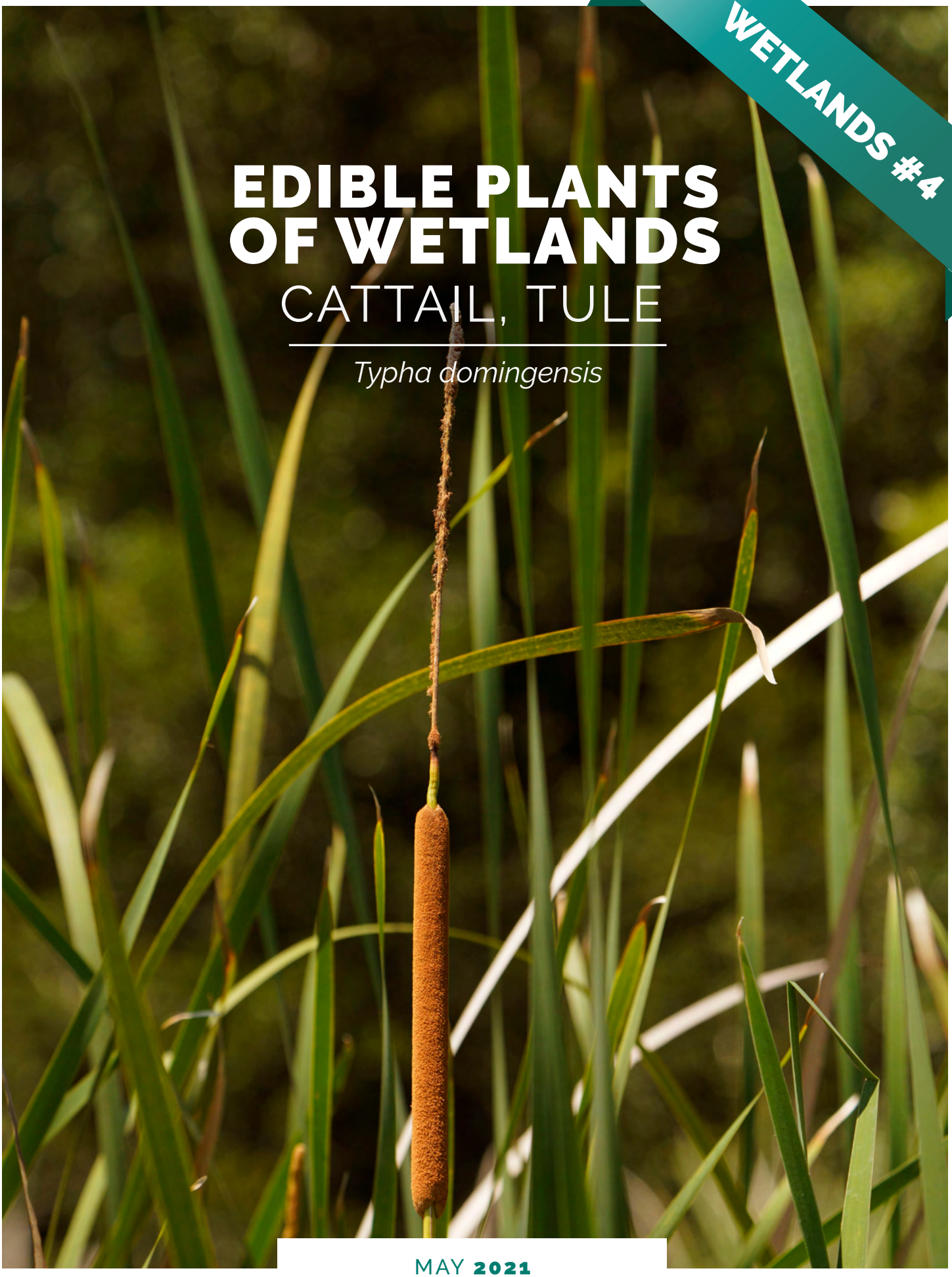

MAY **2021**

FLAAR MESOAMÉRICA

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LIVINGSTON Plants

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Typha domingensis.
Photo by: María Alejandra Gutiérrez, FLAAR Mesoamerica, Mar. 22, 2021. Livigston, Izabal
Camera: Canon 1D X Mark II. Lens: Canon EF 300mm IS II USM. Settings: 1/1,000 sec; f/8; ISO 800.

PHOTO FROM TITLE PAGE
Typha domingensis.
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Camera: Sony Alpha A7R IV. Lens: Sony FE 200-600mm G OSS. Settings: 1/1,000 sec; f/9; ISO 800.

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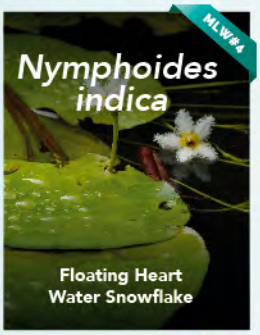

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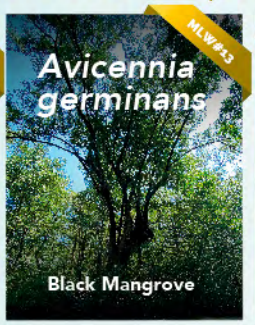

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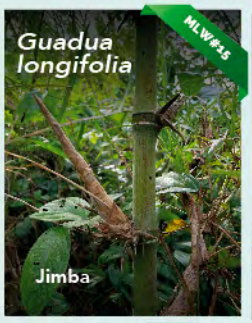

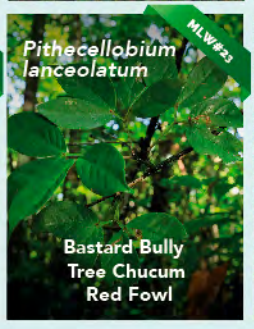

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GLOSSARY

Bog: I thought these were primarily in Ireland, but I hiked through a bog within the Savanna "of 3 Fern Species" in Parque Nacional Yaxha, Nakum y Naranjo (PNYNN), Petén. I estimate there were areas of bog within the Savanna East of Nakum as well. We (Teco, Lorena, and I) even found "bog moss" all over the ground in one area of the Savanna of 3 Fern Species, a savanna I discovered from aerial photographs of IGN.

Marsh: usually has water all year but has no total tree cover. Grasses, reeds and low plants are more common; plus, underwater plants and floating plants.

Riparian: the bank of a river or stream. In a location such as the Municipio de Livingston, it would help to have a single word for the bank of a river, stream, and lagoon. I will use shoreline or comparable.

Swamp: usually has water all year but has lots of trees. During the rainy season the water simply gets deeper. Petén has more marshes than swamps; Izabal has both. You get mangrove swamps all around the Caribbean coast and parallel to the Pacific Ocean coast (several impressive mangrove swamp areas inland from the Pacific coast of Guatemala).

Wetland: to me is a generic word to cover swamps, marshes, and seasonally inundated areas. Each ecologist and geographer and botanist use their own academic terms. But, Holdridge (life zone systems) never hiked through the Savanna of 3 Fern Species nor the Savanna East of Nakum nor took a boat up all the rivers entering into El Golfete. And if he cruised up Arroyo Petexbatún, he (and Lundell and all other capable scholars who accomplished fieldwork in Petén) did not get out of their seats on the lancha to hike through the swamps to see what was 100 to 200 meters inland.

Life of Land: is the Sustainable Development Goal (number 15) wich claims to insure the conservation of terrestrial and freshner ecosystems. Municipio de Livingston has multiple natural areas associated to rivers and wetlands for example.

Typha domingensis in a wet ecosystem where it grows happily.

Photo by: Nicholas Hellmuth, FLAAR Mesoamerica, Mar. 22, 2021. Livingston, Izabal.
Camera: iPhone 12 Pro Max.

INTRODUCTION TO ***TYPHA DOMINGENSIS***

Typha domingensis turns out to be one of the most edible plants of the wetlands. I am frankly amazed, astonished that a native wild plant with this many uses is totally ignored, forgotten and abandoned in the Mayan areas.

- Its pollen is a superfood;
- Its unopened flowers and lower stalk are edible.
- It can be used to make baskets and table place mats (tourists love these).
- It grows WILD

This plant has huge potential to help local people. There are wetlands in many areas of Guatemala. Instead of infesting Guatemala with plants that are NOT native; let's focus on plants that have been in Guatemala for centuries, for millennia.

MY PERSONAL EXPERIENCE WITH ***TYPHA DOMINGENSIS***

My first experience in a Typha-filled wetland was crossing Lake Titicaca (partly in Peru, partly in Bolivia). This was probably late 1970's or early 1980's. Then, for the more recent 20 years, I have accomplished botanical field trips to the biodiverse wetlands inland from the Pacific Ocean coast of Guatemala, especially west of Monterrico. Lots of grasses, reeds, and comparable plants around the shores of lagoons.

Lots more grasses and reeds while I was exploring and learning about wetland plants on Rio San Pedro Martyr; once with ecologist Mirtha Cano and many times from base camp Estacion Biologica Las Guacamayas.

The wetlands of Parque Nacional Yaxha, Nakum and Naranjo are primarily cibal areas (*Cladium jamaicense*, sawgrass) but there is also a wide variety of sedges, reeds and grasses surrounding parts of Lake Yaxha and Rio Ixtinto. Lots also in the two savannas: Savanna of 3 Fern Species and the Savanna East of Nakum. So, when we return to these areas of Peten, we will search for *Typha.*

I first learned that Typha (*latifolia*) was edible on a website a decade ago; this site no longer exists. A decade ago, I did not have info yet on *Typha domingensis*. Now I realize that a third species, *Typha angustifolia*, can either also be present or can be mis-identified.

FULL BOTANICAL **NAME**

Typha domingensis Pers.	*Typha latifolia* L.	*Typha angustifolia* L.

HERE ARE SYNONYMS FOR THE **THREE KEY SPECIES OF GENUS *TYPHA***

Typha domingensis var. *australis* (Schumach.) Gèze	*Massula latifolia* (L.) Dulac	*Massula angustifolia* (L.) Dulac
Typha domingensis var. *javanica* (Schnizl. ex Rohrb.) Gèze	*Typha ambigua* Schur ex Rohrb.	*Typha angustifolia* var. *calumetensis* Peattie
Typha domingensis var. *sachetiae* Fosberg	*Typha angustifolia* var. *inaequalis* Kronf.	*Typha angustifolia* var. *elatior* (Boenn.) Nyman
Typha domingensis f. *strimonii* Cheshm. & Delip.	*Typha angustifolia* var. *media* Kronf.	*Typha angustifolia* var. *elongata* Wiegand
	Typha angustifolia var. *sonderi* Kronf.	*Typha angustifolia* f. *foveolata* (Pobed.) Mavrodiev
	Typha crassa Raf.	*Typha angustifolia* var. *longispicata* Peck
	Typha elatior Raf. [Illegitimate]	*Typha angustifolia* var. *spathacea* Borbás
	Typha elatior Boreau [Illegitimate]	*Typha angustifolia* f. *submersa* Glück
	Typha elongata Dudley	*Typha elatior* Boenn.
	Typha engelmannii A.Br. ex Rohrb.	*Typha foveolata* Pobed.
	Typha intermedia Schur	*Typha glauca* Seg.-Vianna }[Illegitimate]
	Typha latifolia var. *ambigua* Sond.	*Typha gracilis* Rchb. [Illegitimate]
	Typha latifolia var. *angustifolia* Hausskn	*Typha media* C.C.Gmel.
	Typha latifolia f.*divisa* Louis-Marie	*Typha minor* Curtis
	Typha latifolia var. *elata* Kronf.	
	Typha latifolia var. *elatior* Graebn	
	Typha latifolia var. *elongata* Dudley	
	Typha latifolia var. *gracilis* Godr.	
	Typha latifolia f. *latifolia*	
	Typha latifolia var. *remotiuscula* (Schur) Simonk.	
	Typha latifolia var. *typica* Rothm.	
	Typha major Curtis	
	Typha media Pollini [Illegitimate]	
	Typha palustris Bubani	
	Typha pendula Fisch. ex Sond.	
	Typha spathulifolia Kronf.	

LOCAL NAMES FOR ***TYPHA DOMINGENSIS***

Elephant grass, sacate ignea (Balick, Nee and Atha 2000).

Cattail is the name used in USA, but most videos don't indicate which species of *Typha* they are showing. I estimate that a lot of the videos on *Typha* of North America are showing *Typha latifolia.*

HOW MANY OTHER PLANTS OF GUATEMALA **HAVE THE SAME SPANISH NAME?**

Tul; Tule are genetic names for wetland plants of much of Mesoamerica: Martínez (1979) "includes under the term tule six species of Cyperaceae, two Typhaceae, one Poaceae and one Pontederiaceae; these species are listed below" (original text in spanish):

1. *Cyperus tenerrimus* J. Presl & C. Presl., tule
2. *Cyperus canus* J. Presl & C. Presl., tule ahuapetla
3. *Cyperus articulatus* L., tule chico
4. *Schoenoplectus (Scirpus) americanus* (Pers.) Volkart ex Schinz, tule esquinado
5. *Schoenoplectus validus* (Vahl) A. Löve & Löve (*Scirpus lacustris* L.), tule grande o tule bofo
6. *Schoenoplectus validus* (Vahl) A. Löve & Löve (Scirpus) (*Eleocharis palustris*), tule
7. *Typha domingensis* Pers., tule
8. *Typha latifolia* L., tule
9. *Paspalum* sp., tule
10. *Pontederia cordata*, Tule

(Ludlow and Diego 2002:93).

***Typha domingensis* Pers.**

Photo by: David Arrivillaga, FLAAR Mesoamerica, Mar. 22, 2021. Río Cáliz, Livingston.
Camera: Sony Alpha A7R IV. Lens: Sony FE 200-600mm G OSS. Settings: 1/1,000 sec; f/9; ISO 800.

Typha domingensis cattail or “sacate” are its common names.

Photo by: David Arrivillaga, FLAAR Mesoamerica, Mar. 22, 2021., Río Cáliz, Livingston.
Camera: Sony Alpha A7R IV. Lens: Sony FE 200-600mm G OSS. Settings: 1/1,000 sec; f/9; ISO 800.

MAYAN NAMES FOR ***TYPHA DOMINGENSIS***

Puh (Yucatec Maya) (Standley and Record 1936: 67). Puh means reed and Tula means in nauatl "place of reeds."

HABIT FOR ***TYPHA DOMINGENSIS***

Herb, aquatic herb (some prefer that), rooted, emergent. Each publication has more or less information. But basic is "herb."

HABITAT FOR ***TYPHA DOMINGENSIS***

Prefers permanent standing water; can accept brackish water (El Golfete is brackish water especially at high tide and in some months of the year). I estimate that it prefers a muddy area. But does not need standing water all year long.

Outside funding could help our team to do a map of the entire El Golfete and all lagoons and inlets along the north and south and rivers flowing into these areas, and show where each sedge and reed is found (this may will also document where each species is not found. Because what is notable is that some marsh areas have dramatically different plants than other marsh areas less than a kilometer away.

Typha domingensis.

Photo by: María Alejandra Gutiérrez, FLAAR Mesoamerica, Mar. 22, 2021. Creek, Caliz, Livingston, Guatemala. Camera: Canon 1D X Mark II. Lens: Canon EF 300mm IS II USM. Settings: 1/640 sec; f/8; ISO 800.

Typha domingensis

Photo by: David Arrivillaga, FLAAR Mesoamerica, Mar. 22, 2021., Río Cáliz, Livingston.
Camera: Sony Alpha A7R IV. Lens: Sony FE 200-600mm G OSS. Settings: 1/160 sec; f/14; ISO 320.

WHAT OTHER PLANTS GROW **NEAR *TYPHA DOMINGENSIS***

Cyperus and *Eleocharis* are often in same area or near where *Typha domingensis* is growing.

If you take the time to look for plant lists for:

- Wetlands of Chiapas
- Wetlands of Tabasco
- Wetlands of Campeche
- Wetlands of Quintana Roo
- Wetlands of Belize

You note that the species that are together are not always identical: it depends on whether they live on fresh water, brackish water, or along a flowing river or a still-water lagoon. Let's show one list of plant associations:

Brackish marshes are scattered along the coast of Quintana Roo are small, Occur on marl, and are adjacent to mangroves. Dominant species are *Typha domingensus, Phragmites australis, C. jamaicense* and *Eleocharis cellulosa.*

Typographical error on species of *Typha*; should be *Typha domingensis.*

Phragmites australis is edible and found in Municipio de Livingston.

Typha domingensis

Photo by: David Arrivillaga, FLAAR Mesoamerica, Mar 22, 2021. Creek Caliz, Livingston.
Camera: Sony Alpha A7R IV. Lens: Sony FE 200-600mm G OSS. Settings: 1/1,000 sec; f/9; ISO 800.

BOTANICAL DESCRIPTION OF *TYPHA DOMINGENSIS* IN STANDLEY **AND CO-AUTHORS CHICAGO BOTANICAL MONOGRAPHS**

Typha domingensis Pers. Syn. Pl. 2: 532. 1807. *T. truxillensis* HBK. Nov. Gen. & Sp. 1: 82. 1815. *T. angustifolia* of many authors, not L. Tul; Tule; Espadana; Enea. Figure 16.

In wet soil or often in shallow water, in ditches or along the borders of lakes, ponds, and swamps, 1200 meters or lower; Izabal; Zacapa; Jutiapa; Guatemala; Quiche. Widely distributed in the western hemisphere.

Plants robust, 2-4 meters high; leaves flat, pale green, coriaceous, 5-20 cm. wide, usually not equaling the inflorescence; axis of the staminate inflorescence provided with reddish-brown hairs, these mostly branched, dilated at the apex, the branches curved; staminate inflorescence 0.7-2 dm. long; pistillate spikes pale brown, 10-40 cm. long, 5-22 mm. thick, increasing in thickness with approaching maturity; pedicels of the pistillate flowers up to 1 mm. long, the bractlets rhomboid-, obcordate-, obovate-, or elliptic-spatulate, about as long as the hairs; hairs simple, slightly enlarged or thickened, spatulate at the brownish apex, shorter than the stigmas; denuded rachis of the mature pistillate spike slender, 3-4.5 mm. thick, merely roughened by the short rigid pedicels.

The Maya name of Yucatan is "puh." This species has usually been confused with *T. angustifolia*, which is not known to occur in Mexico or South or Central America. True *T. angustifolia* may be distinguished by the shorter staminate spikes, the much darker, castaneous or reddish brown, usually more slender pistillate spikes, which are overtopped by the fewer darker green, more membranaceous, plano-convex leaves, and the lack of conspicuous bractlets on the surface of the pistillate inflorescence; *T. domingensis* has lighter brown pistillate spikes becoming thicker in age and surpassing in height the more numerous, paler green, coriaceous, flattened leaves, and the surface of the pistillate spikes is covered by the ovate blades of the bractlets intermixed with the stigmas.

Some authors have interpreted Persoori's original publication of the name *T. domingensis* as intended by him to represent a category below that of species. Graebner, for example, in his treatment of the Typhaceae in Das Pflanzenreich (IV. 8. 14) interprets Persoon's name as a subspecies of *T. latifolia*, although Graebner uses the name *T. domingensis* in specific rank. Urban, however, in his Symbolae Antillanae (8: 5. 1920) ascribes the first specific combination of the name *T. domingensis* to Kunth (Enum. 3: 92. 1841), interpreting Persoon's name to be published as a subspecies. If Persoon had actually published *T. domingensis* as a variety or subspecies, as might at first glance be supposed, since the name and description were inserted between his species no. 1 (*T. latifolia*) and species no. 2 (*T. media*) and marked by an asterisk, then, under the present rules of nomenclature, the name would have to be rejected as a species in favor of the next specific name, i.e. *T. truxillensis* HBK., published in 1815. However, in the preface of volume 1, Persoon states that obscure or doubtful species are marked by a cross sign or asterisk ("Speciebus obscuris, aut quoad sedem dubiis, vel accuratiori indagationi subjiciendis, signa crucis seu asteriscum apposui").

Therefore, the name *T. domingensis*, marked by an asterisk and thought by Persoon to represent a doubtful entity, was published as a binomial in specific rank, and as the first published binomial in that rank must be accepted as a validly published specific name over the later published *T. truxillensis.*

In western North America the thick rootstocks were formerly used as food by some of the Indians. In Guatemala as well as in some other parts of Central America the fluffy "wool" from the flower spikes is used for stuffing pillows and cushions. It is not very satisfactory for the purpose, since it mats into hard lumps that are most uncomfortable in the case of pillows. The spongy leaves are much used for weaving the mats called petates tules, and for making sopladores, the fans used to fan charcoal fires. The plant is especially abundant about Lago de Amatitlan, where there are wide and dense stands, of considerable economic importance locally. The cat-tail is plentiful also in the north coast. There, especially in thin forest, the plants are fully 2 meters high. In the Laguna de Ocubila near Huehuetenango a curious phenomenon was observed.

Most of the plants were about a meter high and all of approximately the same height. In the center of these large colonies were smaller ones of plants just twice as high and with slightly broader leaves.

No inter-mediates were to be seen. It is possible that both *T. domingensis* and *T. latifolia* were represented, but it appeared that all the plants were of the same species.

Typha glauca Godr. (Fl. Loire ed. 2: 20. 1843) has been reported from Guatemala. It is supposed to differ, like *T. angustifolia*, from *T. domingensis* in having fewer than 10 leaves, which are green and convex on the back and exceed the reddish-brown flowering spikes, in having shorter staminate inflorescences, and in the inconspicuous bractlets of the pistillate inflorescence. It is somewhat intermediate in characters between *T. domingensis* and *T. angustifolia* on the one hand, and between *T. latifolia* and *T. angustifolia* or *T. domingensis* on the other, and has been considered by many European workers to be of hybrid origin and was treated by Graebner in Das Pflanzenreich (IV. 8. 10: 16. 1900) as a hybrid between *T. angustifolia* and *T. latifolia*. Dr. Norman C. Fassett likewise is of the opinion that *T. glauca* can be considered only as of hybrid origin between *T. latifolia* and *T. domingensis*.

(Standley and Steyermark 1958: 64-67)

Typha latifolia is not listed for Belize. I would not rule it out for Izabal, but for Izabal *Typha domingensis* is the more likely species ID.

> **Typha latifolia** L. Sp. Pl. 971. 1753. Tul
> In shallow water, especially at the edges of lakes, 1000-1900 meters; Alta Verapaz; Baja Verapaz; Sacatepequez (near Antigua); Solola (Finca Moca); Huehuetenango. Widely distributed in North America and in the Old World.
>
> Plants robust, 1-2.5 meters tall; leaves broadly linear and surpassing the inflorescence, flat, 6-25 mm. wide; staminate and pistillate spikes about equal in length; staminate inflorescence mustard or brownish-yellow, 7-13 cm. long, deciduous after flowering, the hairs sordid white, linear, acute at the apex; pistillate inflorescence 0.5-3.5 cm. thick, 7-30 cm. long, at least 6-8 (up to 20) times longer than broad; stigma dark brown or black-ish, surpassing the hairs of the gynophore; denuded rachis of the mature pistillate spike stout, 8-11 mm. thick, conspicuous by the long bristle-like persistent pedicels.
>
> Recent studies reveal that the fiber of the cat-tails may be used as a substitute for cotton and linen in making articles of clothing, rugs, and many other products. The mature fruiting spikes are often used in the United States for their ornamental value, and the solid and young are pickled and served in the form of a relish or in salads.
>
> (Standley and Steyermark 1958: 64)

Standley is one of the most helpful botanists for providing local uses. But it is notable that because local people are barely using this plant any more, he missed all the uses of this plant by the original Indian people of the USA. There is nothing by any botanist that would make you go WOW, it's a S U P E R food! I had to find this information in videos by non-botanists who actually ate the plant (from learning that American Indians ate it).

Typha domingensis, its roots grow as a mass under the water.

Photo by: David Arrivillaga, FLAAR Mesoamerica, Mar. 22, 2021. Río Cáliz, Livingston.
Camera: iPhone 12 Pro Max.

TYPHA DOMINGENSIS TREES IN BELIZE: **STANDLEY AND RECORD**

TYPHACEAE. Cat-tail Family
TYPHA L. Cat-tail

> **Typha angustifolia** L. Enea (Honduras), Puh (Yucatan, Maya). The leaves sometimes are employed in Central America for weaving coarse mats, and the fluff from the fruiting spikes for stuffing pillows and cushions.

(Standley and Record 1936: 67)

Typha angustifolia is an accepted name but is not included at all for Belize by Balick, Nee and Atha 2000). They had over a half-century of additional botanical information that was not available to Standley and Record; they list only one single solitary *Typha* for Belize, *T. domingensis*.

Typha angustifolia is not included by Villaseñor (2016: 895).

TYPHA DOMINGENSIS IN BELIZE: **BALICK, NEE AND ATHA 2000**

TYPHACEAE

> **Typha domingensis** Pers.— **Loc Use**: PRD, FOOD. — **Reg Use:** PRD, FOOD. — **Nv:** elephant grass, sacate ignea. — **Habit:** Herb

(Balick, Nee and Atha 2000: 176)

Typha domingensis

Photo by: Nicholas Hellmutj, FLAAR Mesoamerica, Mar. 22, 2021., Río Cáliz, Livingston.
Camera: iPhone 12 Pro Max. .

TYPHA DOMINGENSIS PLANTS IN MEXICO

Villaseñor lists both species for Mexico (2016:895). I put in bold font the areas of the Maya Lowlands that surround Peten, Guatemala.

> *Typha domingensis* Pers. AGS, BCN, BCS, **CAM**, **CHIS**, CHIH, COAH, COL, CDMX, DGO, GTO, GRO, HGO, JAL, MEX, MICH, MOR, NAY, NLE, OAX, PUE, QRO, **QROO**, SLP, SIN, SON, **TAB**, TAMS, TLAX, VER, **YUC**, ZAC
>
> *Typha latifolia* L. AGS, BCN, BCS, **CAM**, **CHIS**, CHIH, COAH, COL, CDMX, DGO, GTO, HGO, JAL, MEX, MICH, MOR, NAY, NLE, OAX, PUE, QRO, SLP, SIN, SON, **TAB**, TAMS, TLAX, VER

Typha domingensis is in Campeche, Chiapas, Tabasco, Quintana Roo, and Yucatan (so on west and north sides of Peten).

Typha latifolia is in Campeche, Chiapas, Tabasco (the west and northwest sides of Peten). I am really surprised that *Typha latifolia* is not present in Belize.

Typha domingensis is what is mentioned for PNYNN (Plan Maestro 2015).

Fedick's helpful report lists *Typha latifolia* for "the northern Maya Lowlands" (2002). But Villaseñor does not include Quintana Roo for *Typha latifolia* and *Typha latifolia* is also not listed for adjacent Belize (Balick, Nee and Atha 2000). This raises the point of whether Fedick found a species missed by everyone else; or whether it was really *Typha domingensis*.

WHERE HAS *TYPHA DOMINGENSIS* BEEN FOUND IN THE **MUNICIPIO OF LIVINGSTON BY OTHER BOTANISTS?**

Is *Typha domingensis* listed for Biotopo Protegido Chocón Machacas, CECON/USAC?

Yes, *Typha domingensis* is considered one of the most abundant aquatic plant species in the area. (PEREZ-Consuegra, Sergio, et al 2001).

Is *Typha domingensis* listed for Tapón Creek Nature Reserve (including Taponcito Creek), FUNDAECO?

Not mentioned, but this does not mean it's not present.

Is *Typha domingensis* listed for Buena Vista Tapón Creek Nature Reserve?

Not mentioned, but this does not mean it's not present.

Is *Typha domingensis* listed for Cerro San Gil (south side of Río Dulce)?

Not mentioned, but this does not mean it's not present.

Is *Typha domingensis* listed for El Refugio de Vida Silvestre Punta de Manabique?

Yes, *Typha domingensis* is part of complementary natural systems called reed beds. Also found in the flora inventory, the species *Typha angustifolia* (CONAP 2001).

Is *Typha domingensis* listed for Sarstoon-Temash National Park (northern side of Río Sarstún)?

Not mentioned, but this does not mean it's not present.

Is *Typha domingensis* listed for Bocas de Polochic?

Yes, *Typha domingensis* is considered one of the most abundant aquatic plant species in the area (Perez-Consuegra 2006). Reeds and tule (*Typha dominguensis*) communities. This is an herbaceous association of the normal size that grows only in shallow water where it can attach roots (RAMSAR 1996).

Is *Typha domingensis* from the Highlands or from the Lowlands (or both)?

Both, 0-2000m. (CONABIO).

WORLD RANGE FOR ***TYPHA DOMINGENSIS***

Ala., Ariz., Ark., Calif., Colo., Del., Fla., Ga., Ill., Kansas, Ky., La., Md., Miss., Miss., Missouri, Nebr., Nev., N.Mex., NC, Oklahoma, SC, Tex., Utah, Va., Wyoming; México; Indias Occidentales; Centroamérica; Sudamerica; Indias Occidentales; Eurasia; África; Islas del Pacífico (Nueva Zelanda); Australia.

http://www.efloras.org/florataxon.aspx?flora_id=1&taxon_id=222000445

USES OF ***TYPHA DOMINGENSIS***

"Every part of the cattail plant has multiple uses." (Morton 1975: 15-20)

Tule can produce a string-like material (Chizmar 2009: 114).

The edible aspects are covered by several pages by Morton (1975: 20-21, 23). Just be careful the water in which they are growing is not contaminated with pesticides or other agricultural chemicals. The *Typha* absorbs these chemicals and you would be eating these chemicals if the water is contaminated. The Classic Maya 2,000 years ago would not have had that problem.

DOES *TYPHA DOMINGENSIS* **ALSO GROW IN HOME GARDENS?**

In the USA, yes; in Mayan home gardens not likely.

IS THERE POTENTIAL MEDICINAL USAGE OF ***TYPHA DOMINGENSIS*** **BY LOCAL PEOPLE?**

Yes, that would be an entire chapter until itself.

Typha domingensis.

Photo by: María Alejandra Gutiérrez, FLAAR Mesoamerica, Mar. 22, 2021. Creek, Caliz, Livingston, Guatemala.
Camera: Canon 1D X Mark II. Lens: Canon EF 300mm IS II USM. Settings: 1/640 sec; f/8; ISO 800.

Typha domingensis

Photo by: María Alejandra Gutiérrez, FLAAR Mesoamerica, Mar. 22, 2021., Río Cáliz, Livingston.
Camera: Canon 1D X Mark II. Lens: Canon EF 300mm IS II USM. Settings: 1/800 sec; f/8; ISO 800.

ARE ANY PARTS OF ***TYPHA DOMINGENSIS*** **EATEN BY ANIMALS?**

Yes, depends what bird species and water animals are nearby.

WHAT ARE THE PRIMARY POLLINATORS OF ***TYPHA DOMINGENSIS*** **FLOWERS?**

No information was found on *Typha* pollinator species, Alcaraz in 2013 mentions that *Typha* is pollinated mainly in the anemophily way.

Typha domingensis

Photo by: María Alejandra Gutiérrez, FLAAR Mesoamerica, Mar. 22, 2021. Río Cáliz, Livingston. Camera: Canon 1D X Mark II. Lens: Canon EF 300mm IS II USM. Settings: 1/1,000 sec; f/8; ISO 800.

Typha domingensis, its inflorescence attracts the bees, which carry the pollen from one flower to the others.

Photo by: María Alejandra Gutiérrez, FLAAR Mesoamerica, Mar. 22, 2021., Río Cáliz, Livingston, Izabal, Guatemala. Camera: Canon 1D X Mark II. Lens: Canon EF 300mm IS II USM. Settings: 1/1000 sec; f/8; ISO 800.

CONCLUDING DISCUSSION AND **SUMMARY ON *TYPHA DOMINGENSIS***

Our dedication to finding and identifying the genus and species of every reed and sedge in the wetlands of Rio Dulce, El Golfete, and coast of Amatique Bay is in order to learn what edible plants were available to the ancient Maya (besides the obvious maize, beans, and squash). But tule also has a lot of linguistic history in Mesoamerica:

> Mayan writing includes the glyph sounded as pu(j) or puh (Boot 2002, Mathews & Bíró 2006). Their classical name for Teotihuacan was Puh ("Place of Cat-tails"), and the word continues today (cf. Appendix). Sachse & Christenson (2005) suggest that Tulan ("Place of Cat-tails") possibly dates to Olmec times (1200–600 BCE) and that the name is a metaphorical reference to a place of origin. For example, the Popul Vuh asserted that individual lineages of Mayans began at Tulan (Akkeren 2003). The K'iche' named their capital Q'umarkaj ("Place of Ancient Cat-tails"). Tollan means the same in unrelated Náhuatl. Indeed, the name of the Toltecs who gave rise to the Aztecs is based on tollin (cat-tail) and teca (to exist, to be with) (Siméon 1885).
>
> (Austin 2007: 278-279)

Since there are several plants with the common "generic" name of tul or tule, would be helpful to learn whether pu(j) or puh is a Mayan word for more than just *Typha domingensis*: remember, there are three different species in the Lowlands and probably lots more elsewhere. But Vazquez et al. (2014: 574) suggest that the two potential species at Teotihuacan are not that different than the species in wetlands of Maya Lowlands:

- *Typha latifolia* L.
- *Typha domingensis* Pers.

The uses of *Typha* for basketry is well known (there are dozens, scores of plants in most areas of Mesoamerica that can be used for basketry, for making string or rope, etc. But our goal is to suggest that for the earlier inhabitants of Mesoamerica, before maize was as popular as later, that *Typha* and other wetland sedges and other wetland plants were edible and required no raised fields, no chinampas, and for sure no slash-and-burn milpa agriculture. Once populations grew, obviously agricultural engineering developed. But today, if you wish for a fresh healthy meal, the wetlands provide lots of food for you.

Now that I am aware of the edible aspects of *Typha*, I am inspired to find more in Peten lakes and in marshes parallel to Rio San Pedro. The marshes inland parallel to the Pacific Ocean coast are another area that students and botanists can find lots of pertinent reeds and sedges (*Typha latifolia* is the species in RNUMM (Monterrico areas). We are also working on *Cyperus* species as well.

The edible aspects of *Typha* species are well documented: go to our list of videos that show cattails in USA being harvested for eating:

- Pollen of *Typha* is not only edible, it's a SUPER food and easy to harvest.
- lower area of *Typha* is edible.
- upper area with all the long stack unopened flower is edible as "corn on the cob".

¡!

Here are videos on edible aspects of cattail. Since several species of *Typha* have the same common name cattail, it is not always clear which species the person is harvesting and eating.

www.youtube.com/watch?v=ZiXMGni8XVY

Cherokee elder Richard Lonewolf teaching many uses for Cattails, Chufa Nutgrass, & Bulrush plants in the Kern River Valley.

Also mentions chufa nut grass (which grows adjacent to the *Typha*). Also mentions bullrush.

www.youtube.com/watch?v=8S7AB9okbEE

Collecting Wild Food – Cattail Part I, Bushcraft Survival Skills, Cattail on the Cob and Cattail Pollen Wild Food. "can be eaten raw, or pickled…spike can be cooked like corn-on-the-cob. Pollen is also edible! At 2:54 (two minutes, 54 seconds) you can learn how to harvest the pollen. Cattail on the cob (3:12).

https://www.youtube.com/watch?v=oocdMMgZoHk

Collecting cattail pollen. Then he makes cattail pancakes.

www.youtube.com/watch?v=S_LHhwl-0nE

Six parts on harvesting and preparing cattails.

Yet, how many reports on the Peten Itza, Q'eqchi' or Lacandon Maya mention them eating wetlands plants? Yes, most of us view these "grasses" as weeds (so we focus on trees, vines, and other kinds of plants). Yes, junk food has replaced natural native wild plants. But now that we know *Typha* is edible, and the pollen is a SUPERfood, let's go back and learn more about how these plants are viewed by all Mayan cultures (since these reeds are in many locations of different Mayan regional language groups). So this is a good thesis or PhD dissertation topic.

Ludlow and Diego acknowledge and mention the edible nature of Cyperaceae wetlands plants (2002:96). Lets expand coverage and show the wetlands with drone photos, panoramas, and close-ups.

Based on the weeks of library research for this report, and all the chapters in botanical monographs and all the articles I have read and all the videos, I will never ignore the sedges, reeds, and grasses of the wetlands of the Maya Lowlands

Typha domingensis.

Photo by: David Arrivillaga, FLAAR Mesoamerica, Mar. 22, 2021. Río Caliz, Livingston, Izabal, Guatemala.
Camera: Sony Alpha A7R IV. Lens: Sony FE 200-600mm G OSS. Settings: 1/1250 sec; f/9; ISO 800.

Typha domingensis

Photo by: María Alejandra Gutiérrez, FLAAR Mesoamerica, Mar. 22, 2022. Creek Caliz, Livingston. Camera: Canon 1D X Mark II. Lens: Canon EF 300mm IS II USM. Settings: 1/400 sec; f/8; ISO 800.

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No consistent date. But has all necessary basic information and bibliography. But only one solitary photograph.

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FLAAR Reports, FLAAR (USA) and FLAAR Mesoamerica (Guatemala). 106 pages.

The 13th edition that followed is an update but the 12th edition has tons of material to get you started.

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2014 Maya Ethnobotany, Complete Inventory, Fruits, nuts, root crops, grains, construction } materials, utilitarian uses, sacred plants, sacred flowers 13th edition.
FLAAR Reports, FLAAR (USA) and FLAAR Mesoamerica (Guatemala). 111 pages.

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Available but not from its main links; they link to year 2020; the article is year 2002. After 42 minutes I found it elsewhere:

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In this one monograph the species are not listed in alphabetical order, so it's a mental adventure finding the species you are looking for.

All monographs by Standley and co-authors can be easily found and downloaded. I would recommend finding the .pdf versions as they are easier to store, easier to copy, and easier to share with students and colleagues.

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HELPFUL WEB SITES FOR **ANY AND ALL PLANTS**

There are several web sites that are helpful even though not of a university or botanical garden or government institute.

However, most popular web sites are copy-and-paste (a polite way of saying that their authors do not work out in the field, or even in a botanical garden). Many of these web sites are click bait (they make money when you buy stuff in the advertisements that are all along the sides and in wide banners also. So we prefer to focus on web sites that have reliable information).

https://serv.biokic.asu.edu/neotrop/plantae/
Neotropical Flora data base. To start your search click on this page: https://serv.biokic.asu.edu/neotrop/plantae/collections/harvestparams.php

http://legacy.tropicos.org/NameSearch.aspx?projectid=3
This is the main SEARCH page.

https://plantidtools.fieldmuseum.org/pt/rrc/5582
SEARCH page, but only for collection of the Field Museum herbarium, Chicago.

https://fieldguides.fieldmuseum.org/guides?category=37
These field guides are very helpful. Put in the Country (Guatemala) and you get eight photo albums.

http://enciclovida.mx
CONABIO. The video they show on their home page shows a wide range of flowers pollinators, a snake and animals. The videos of the insects are great.

www.kew.org/science/tropamerica/imagedatabase/index.html
Kew gardens in the UK is one of several botanical gardens that I have visited (also New York Botanical Gardens and Missouri Botanical Gardens (MOBOT), in St Louis. Also the botanical garden in Singapore and El Jardín Botánico, the open forest botanical garden in Guatemala City).

www.ThePlantList.org
This is the most reliable botanical web site to find synonyms. In the recent year, only one plant had more synonyms on another botanical web site.

USEFUL WEBSITES ON ***TYPHA DOMINGENSIS* SEDGES**

www.cabi.org/isc/datasheet/54296
Lots of basic information from an experienced botanical source.

VIDEOS SPECIFICALLY ON ***TYPHA DOMINGENSIS***

www.cabi.org/isc/datasheet/54296
Lots of basic information from an experienced botanical source.

www.facebook.com/santaclarariver/videos/slow-mo-video-look-familiar-the-southern-cattail-typha-domingensis-can-be-common/4009547615736087/
Shows the seeds EXPLODING out, when you bend the seed area to 90 degrees.

www.facebook.com/oplanetainfinito/videos/typha-domingensis/1046737328808635/
This video is better than the one above.

www.youtube.com/watch?v=q1xLUxcEWZA
29 seconds, but worth every second; in this video the pod is not broken in half, it is rubbed horizontally, so the seeds come out in a different pattern.

www.youtube.com/watch?v=gU6yo48Y3Sw
One of the few videos that shows an actual marsh (here in a dry phase, so the people are not in a boat or hiking through water). In Portuguese languae; but again, shows an actual marsh. Also mentions that you can eat the lower stalk.

https://www.youtube.com/watch?v=Ox__UPU6cGQ
Good close up; and in an actual marsh (dry at this time of year; otherwise the video team could not be walking up to photograph in close-up). But the video repeats itself, so you only need to watch the first minute.

www.youtube.com/watch?v=kt0xBkAJNVI
Not sure it always grows to 10 feet tall, but if the plant is happy, perhaps they might grow to that height. Seed pod is opened gradually so you can see the seeds more easily.

How to make a cattail mat
www.youtube.com/watch?v=JmBQNGHZQAk
How to Make a Woven Cattail Mat.
Realize that some of these videos may be on Typha latifolia. 90% of the videos don't tell you the genus or species name at all.
www.youtube.com/watch?v=ZiXMGni8XVY
Cherokee elder Richard Lonewolf teaching many uses for Cattails, Chufa Nutgrass, & Bulrush plants in the Kern River Valley.

Replacement for goosedown

Also mentions chufa nut grass (which grows adjacent to the *Typha*). Also mentions bullrush.

www.youtube.com/watch?v=8S7AB9okbEE
Collecting Wild Food – Cattail Part I, Bushcraft Survival Skills, Cattail on the Cob and Cattail Pollen Wild Food. "can be eaten raw, or pickled…spike can be cooked like corn-on-the-cob. Pollen is also edible! At 2:54 (two minutes, 54 seconds) you can learn how to harvest the pollen. Cattail on the cob (3:12).

www.youtube.com/watch?v=oocdMMgZoHk
Collecting cattail pollen. Then he makes cattail pancakes.

ACKNOWLEDGEMENTS TO FLAAR MESOAMÉRICA

The reports are a joint production between the field trip team and the in-house office team. So here we wish to cite the full team:

Flor de María Setina is the office manager, overseeing all the diverse projects around the world (including FLAAR-REPORTS research on advanced wide-format digital inkjet printers, a worldwide project for over 20 years). We also utilize the inkjet prints to produce educational banners to donate to schools.

Vivian Díaz environmental engineer, is project manager for flora, fauna projects (field work and resulting reports at a level helpful for botanists, zoologists and ecologists, and for university students). Also coordinates activities at MayanToons, division where educational material for kids is prepared.

Victor Mendoza identifies plants, mushrooms, lichen, insects, and arachnids. When his university schedule allows, he also likes to participate in field trips on flora and fauna research.

Vivian Hurtado prepares the bibliography for each subject and downloads pertinent research material for our e-library on flora and fauna. All of us use both these downloads plus our in-house library on flora and fauna of Mesoamerica (Mexico through Guatemala into Costa Rica).

Andrea de la Paz is a designer who helps prepare the master-plan for aspects of our publications. She is our editorial art director

Senaida Ba is photography assistant for many years. She knows the Canon, Nikon and is learning the two new Sony mirrorless cameras. She prepares, packs, sets-up, and helps the photographers before, during, and after each day's field trip.

Jaqueline González is a designer who puts together the text and photographs to create the actual report (we have several designers at work since we have multiple reports to produce).

Roxana Leal is Social Media Manager for flora and fauna research and publications, and MayanToons educational book projects

María Alejandra Gutiérrez is an experienced photographer, especially with the Canon EOS 1D X Mark II camera and 5x macro lens for photographing tiny insects, tiny flowers, and tiny mushrooms. Work during and after a field trip also includes sorting, naming, and processing. And then preparing reports in PDF format.

David Arrivillaga is an experienced photographer and is able to handle both Nikon and the newest Sony digital cameras. Work during and after a field trip also includes sorting, naming, and processing.

Juan Carlos Hernández takes the material that we write and places it into the pertinent modern Internet software to produce our web pages (total network is read by over half a million people around the world).

Paulo Núñez is a webmaster, overlooking the multitude of web sites. Internet SEO changes every year, so we work together to evolve the format of our web sites.

Valeria Áviles is an illustrator for MayanToons, the division in charge of educational materials for schools, especially the Q'eqchi' Mayan schools in Alta Verapaz, Q'eqchi' and Petén Itzá Maya in Petén, and the Q'eqchi' Mayan and Garifuna schools in the municipality of Livingston, Izabal.

Josefina Sequén is illustrator for MayanToons and also helps prepare illustrations for Social Media posts and for animated videos.

Rosa Sequén is also an illustrator for MayanToons and also helps prepare illustrations for Social Media posts and for animated videos.

Laura Morales is preparing animated videos in MayanToons style since animated videos are the best way to help school children how to protect the fragile ecosystems and endangered species

Heidy Alejandra Galindo Setina joined our design team in August 2020. She likes photography, drawing, painting, and design.

Maria José Rabanales sheis part of the team for editing photographic reports and educational material of Flora and Fauna since September 2020. She works together with others of the team to prepare the finished pdf editions of the material of the Yaxha, Nakum and Naranjo Project.

Alejandra Valenzuela, biology student is now part of Flora y Fauna's photographic report and educational material editing team since September 2020.

Alexander Gudiel designer who join the editorial design team on December 2020. He will combine the text, pictures and maps into the FLAAR Mesoamerica editorial criteria.

Cristina Ríos designer student who join the editorial design team on December 2020. He will combine the text, pictures and maps into the FLAAR Mesoamerica editorial criteria.

Carlos Marroquín is a USAC graphic design student who volunteered to do his professional practice with the Editorial Design Team. We are very grateful with people like him who join our team and bring his knowledge and work.

Izabal

1. Área sin protección
2. Parque Nacional Río Dulce
3. El Higuerito
4. Área de Usos Múltiples Río Sarstún
5. Sierra de Santa Cruz
6. Biotopo Protegido Chocón Machacas
7. Reserva Protectora de Manantiales Cerro San Gil

Elaborado por: Andrea de la Paz; Amanda Estrada Rodas. FLAAR Mesoamerica 2020


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Tatín, Livingston
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Río Cocolí
Siete Altares
Playa Quehueche
Reserva Natural
Tapón Creek
Taponcito
Creek
Río Tapon Creek
Gangadiwali
Río Quehueche
Vuelve Mujer
Finca Paradise
Pirate Hidden
Casco
Urbano
Livingston
Plan Grande
Quehueche
Plan Grande Tatín
Tampico
Río Creek Salvador
2.
Cueva del
Tigre
4.
Piscina natural
Cayo Grande
Isla de Pájaros
Río Tatín
Canón Río Dulce
3.
El
Golfete
Quebrada
La Pintada
Río Lámpara
Cayo Quemado
Río Tamejá
1.
Izabal
1. Reserva Protectora de
Manantiales Cerro San Gil
2. Biotopo Protegido
Chocón Machacas
3. Área sin protección
4. Parque Nacional
Río Dulce
5. Área de Usos Múltiples
Río Sarstún
Acceso terrestre
Acceso de tierra
FLAAR
MESOAMÉRICA
Información de referencia:
· Limites departamentales de Guatemala. (IGN)
· Instituto Geográfico Nacional (IGN)
(Hojas 2463 IV y 2463 III)
· Google Map data 2020. Shapes:
Sistema Guatemalteco de Áreas Protegidas 2017.
· Cuerpos de agua. Ministerio de Agricultura Ganadería y
Alimentación (MAGA)
· Dirección de Análisis Geoespacial del (CONAP), Marzo/2017.
Elaborado por: Andrea de la Paz; Amanda Estrada Rodas. FLAAR Mesoamerica 2020

FLAAR MESOAMÉRICA

WETLANDS

Edible Wetlands Plants of Municipio de Livingston, Izabal

Wetland Series 1: from Swamps, Marshes and Seasonally Inundated Flatlands of Izabal

Cyperus esculentus Chufa, Yellow Nutsedge, Earth Almond MLW#1	*Eleocharis geniculata* *Eleocharis caribaea* Caribbean Spike-Rush MLW#2	*Montrichardia arborescens* Camotillo Water Chestnut MLW#3	*Nymphoides indica* Floating Heart Water Snowflake MLW#4
Pachira aquatica Zapoton MLW#5	*Pontederia cordata* Pickerel Weed MLW#6	*Sagittaria latifolia* Water Potatoes MLW#7	*Typha dominguensis* Cattail MLW#8

Wetland Series 2: plants that grow along the beach shore of Amatique Bay

Amphitecna latifolia Black calabash MLW#9	*Coccoloba uvifera* Uva del mar MLW#10	*Manicaria saccifera* Confra, Manaca MLW#11	*Chrysobalanus icaco* Coco Plum MLW#12	*Avicennia germinans* Black Mangrove MLW#13	*Rhizophora mangle* Red Mangrove MLW#14

Wetland Series 3: plants that grow alongside water: rivers, lagoons, swamps, or ocean

Guadua longifolia Jimba MLW#15	*Acoelorrhaphe wrightii* Pimientillo, Tasiste, Palmetto Palm MLW#16	*Acrostichum aureum* Mangrove Fern MLW#17	*Annona glabra* Alligator Apple MLW#18	*Bactris major* Huiscoyol Palm MLW#19	*Diospyros nigra* Zapote negro MLW#20
Grias cauliflora Palo de Jawuilla MLW#21	*Inga vera* *Inga multijuga* *Inga thibaudiana* River Koko MLW#22	*Pithecellobium lanceolatum* Bastard Bully Tree Chucum Red Fowl MLW#23	*Coccoloba belizensis* Papaturro MLW#24	*Symphonia globulifera* Barillo MLW#25	*Lacmellea standleyi* Lechemiel MLW#26

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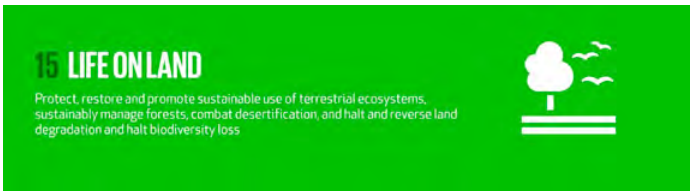

The current Alcalde of Livingston, Mr. Daniel Pinto, together with his team of International Cooperation division, have set the goal of achieving the municipality development in the years 2020-2024 based on the goals and indicators proposed by the 2030 Agenda for Sustainable Development. From this agenda, FLAAR (USA) and FLAAR Mesoamerica (Guatemala) will collaborate to achieve Sustainable Development Goal (SDG), number 15 "Life on Land".

Throughout this cooperation project, different materials have been prepared, like this Photo Essay, that helps to collect information on species, different ecosystems: terrestrial, wetlands and fresh water biodiversity. This information would also be useful as part of a strategy to protect threatened species and prevent their extinction. The municipality's goals include to promote the sustainable use, conservation and research of the species of flora and fauna of the terrestrial, wetlands and aquatic shore and coastal ecosystems of the Guatemalan Caribbean. Learn more about this project and the SDG indicators at:

https://flaar-mesoamerica.org/rain-forests-rivers-lakes-bays-ocean-caves-canyons-livingston-the-caribbean-biodiversity-wonderland-of-guatemala/

SERIES OF MUNICIPIO OF LIVINGSTON

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Hellmuth, N. (2021)
Wetland Series MLW1: Edible Plants of Municipio de Livingston from Swamps, Marshes and Seasonally Inundated Flatlands of Izabal. Plants that Provided Food for the Classic Maya, *Typha dominguensis.* Wetlands Report #4, MLW1 Number 3. FLAAR (USA), FLAAR Mesoamerica (Guatemala).

BACK COVER PHOTO
Typha dominguensis.

Photo by: David Arrivillaga, FLAAR Mesoamerica, Dec. 18, 2020. Livingston, Izabal.
Camera: Sony Alpha A7C. Lens: Sony FE 90mm Macro G OSS.
Settings: 1/160 sec; f/4; ISO 1,250.

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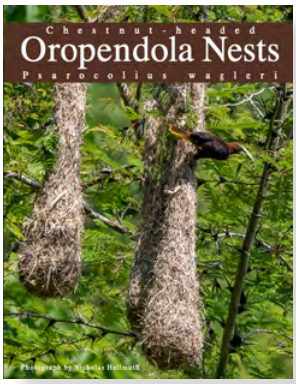

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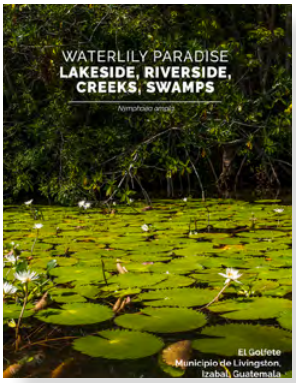

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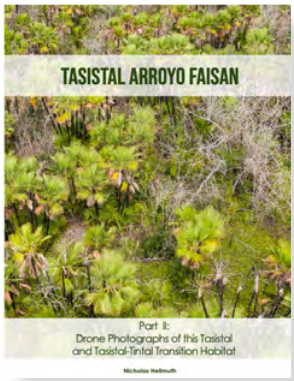

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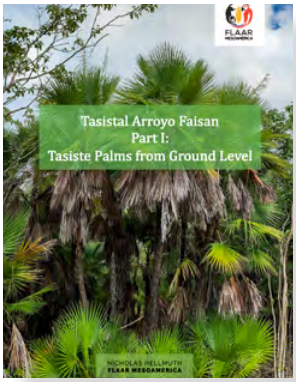

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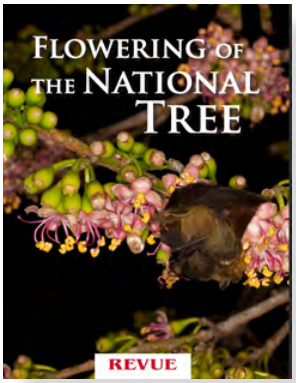

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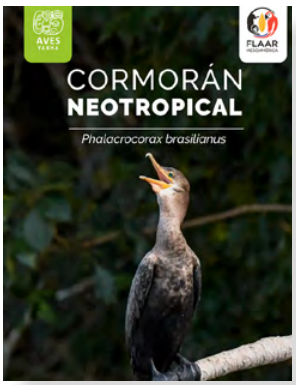

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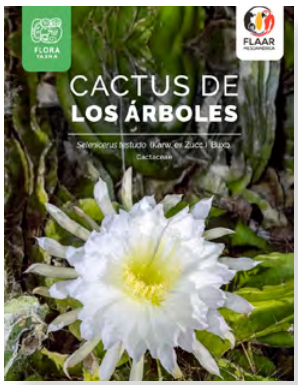

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