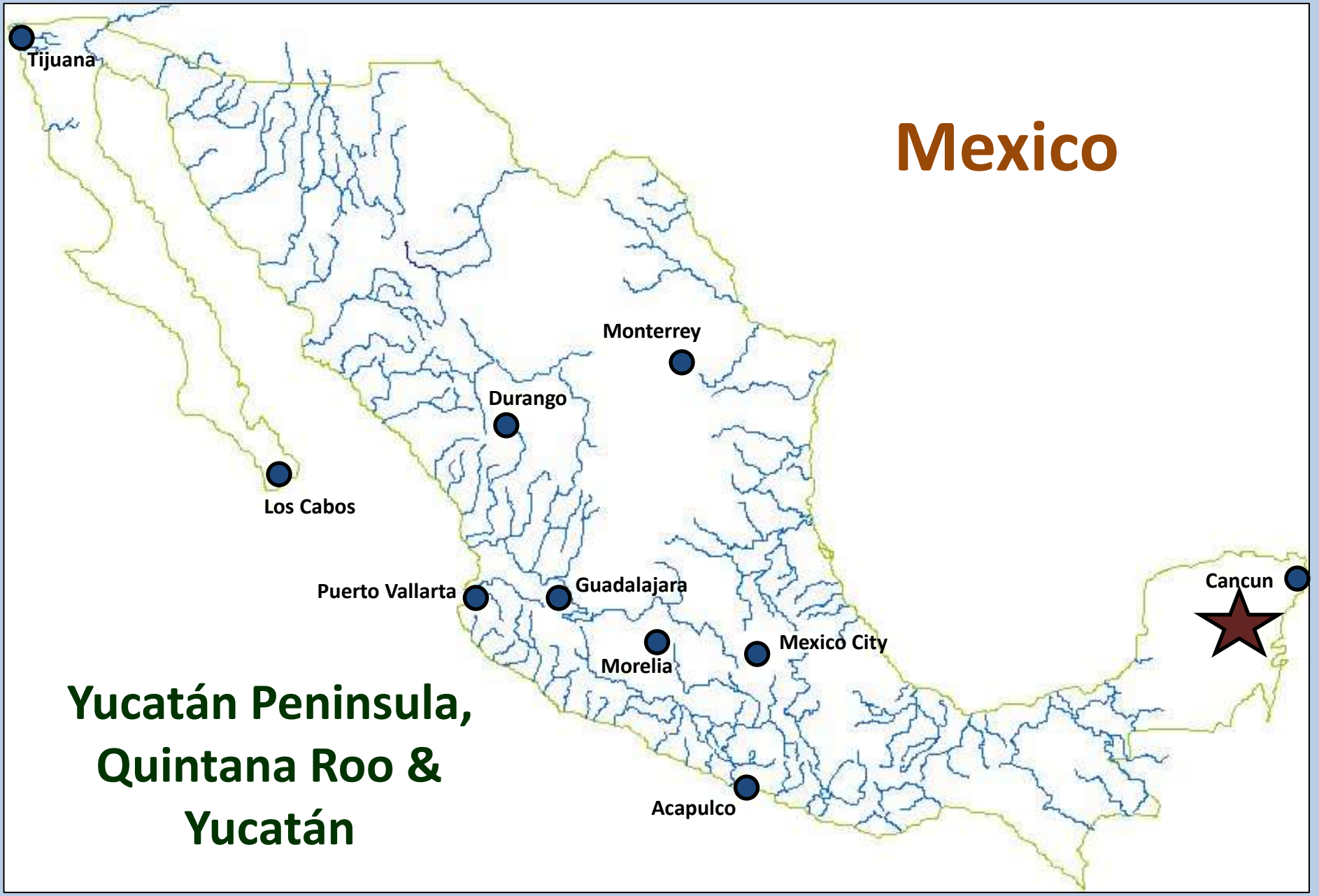
30 Years of Adventures Collecting Wild Livebearers in Mexico

John Lyons

Adjunct Curator of Fishes

University of Wisconsin Zoological Museum


Mexico
Tijuana
Monterrey
Durango
Los Cabos
Puerto Vallarta
Guadalajara
Cancun
Mexico City
Morelia
Acapulco


Mexico
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Guadalajara
Cancun
Mexico City
Morelia
Acapulco
Yucatán Peninsula, Quintana Roo & Yucatán

Isla Mujeres

Labna

Chichen Itza


Dzibulchaltun

Cenote at Dzibulchaltun

Eduardo Santana Castellón

Rocky Mountain National Park


Sierra de Manantlán


Mexico
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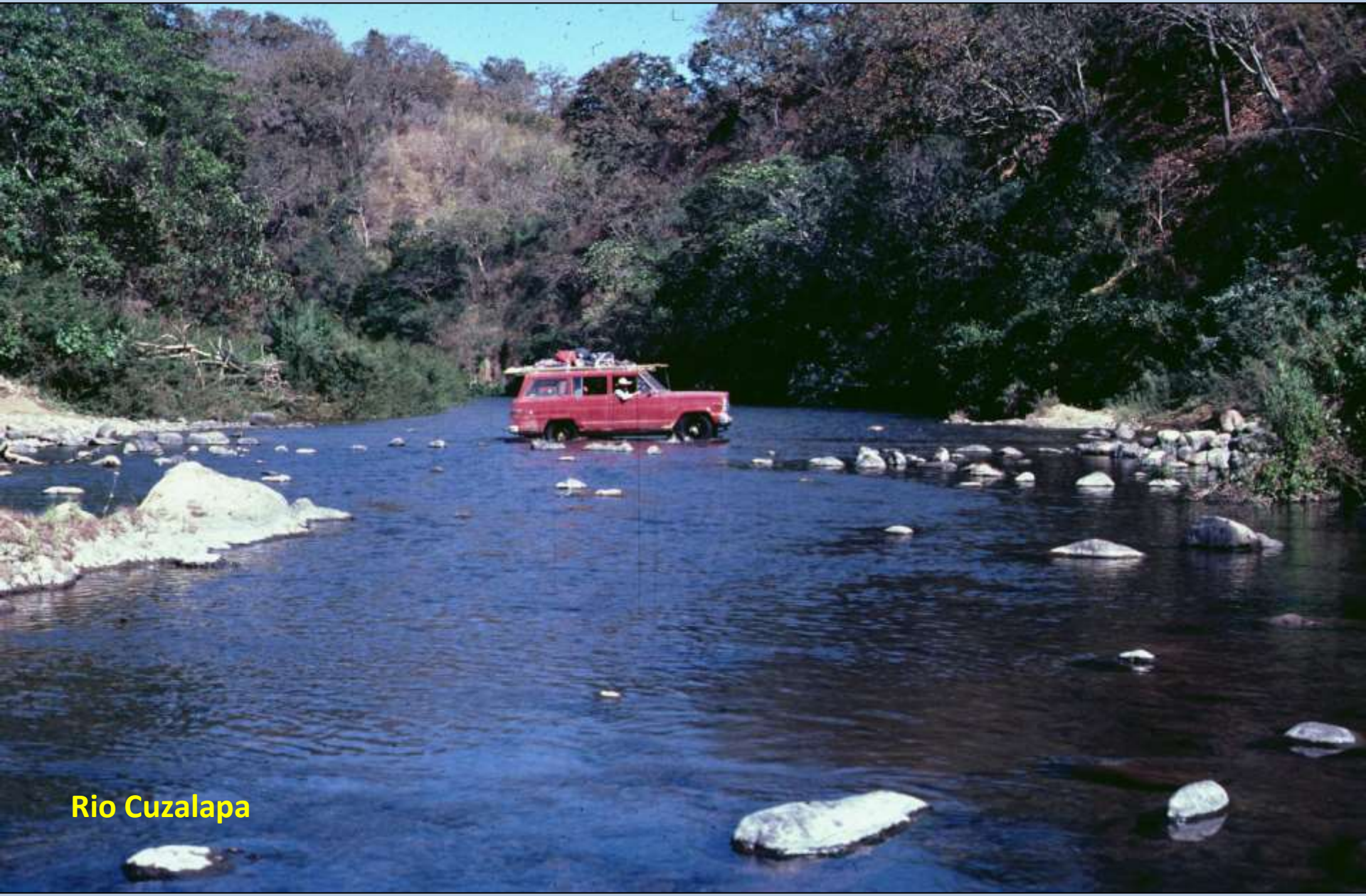
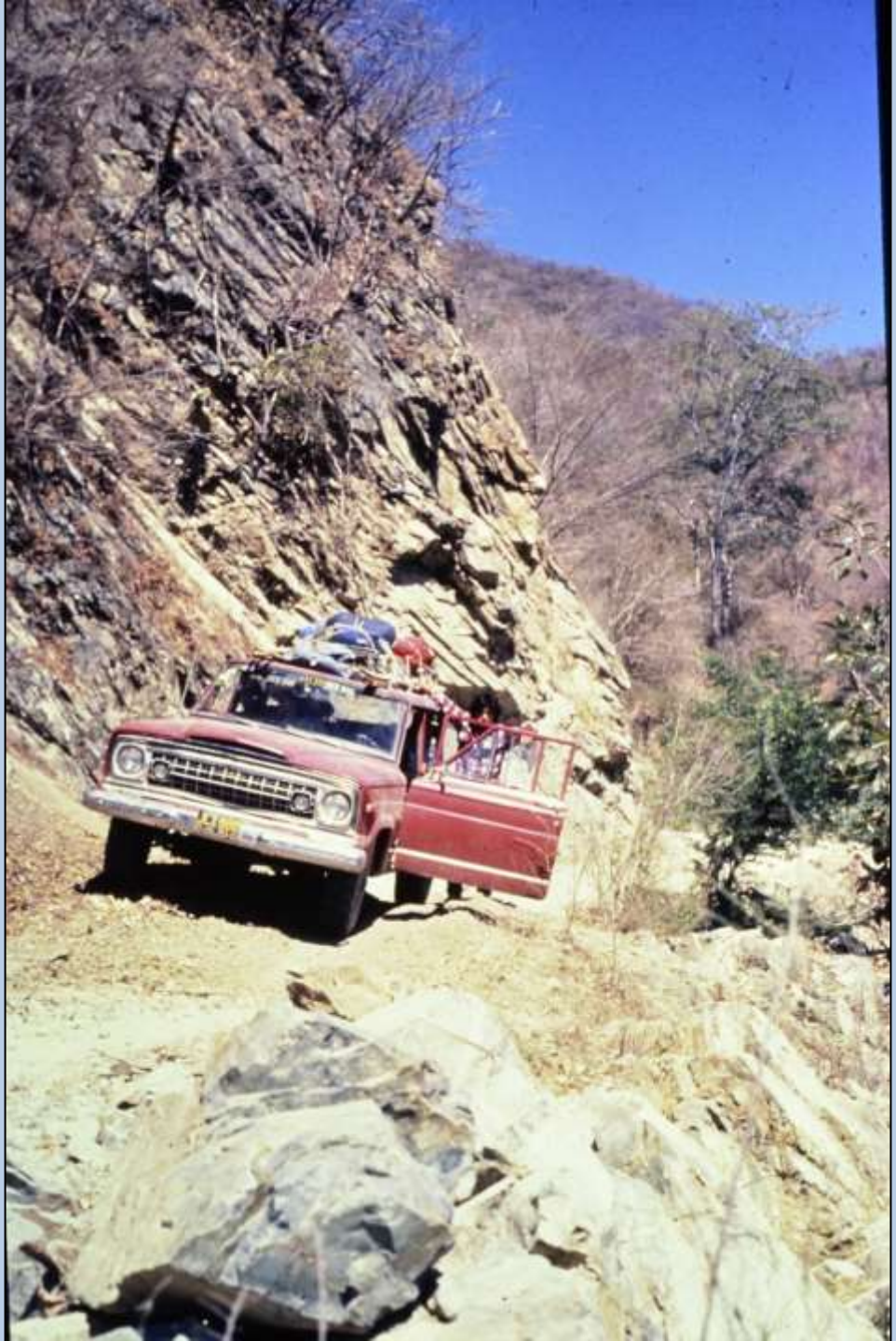
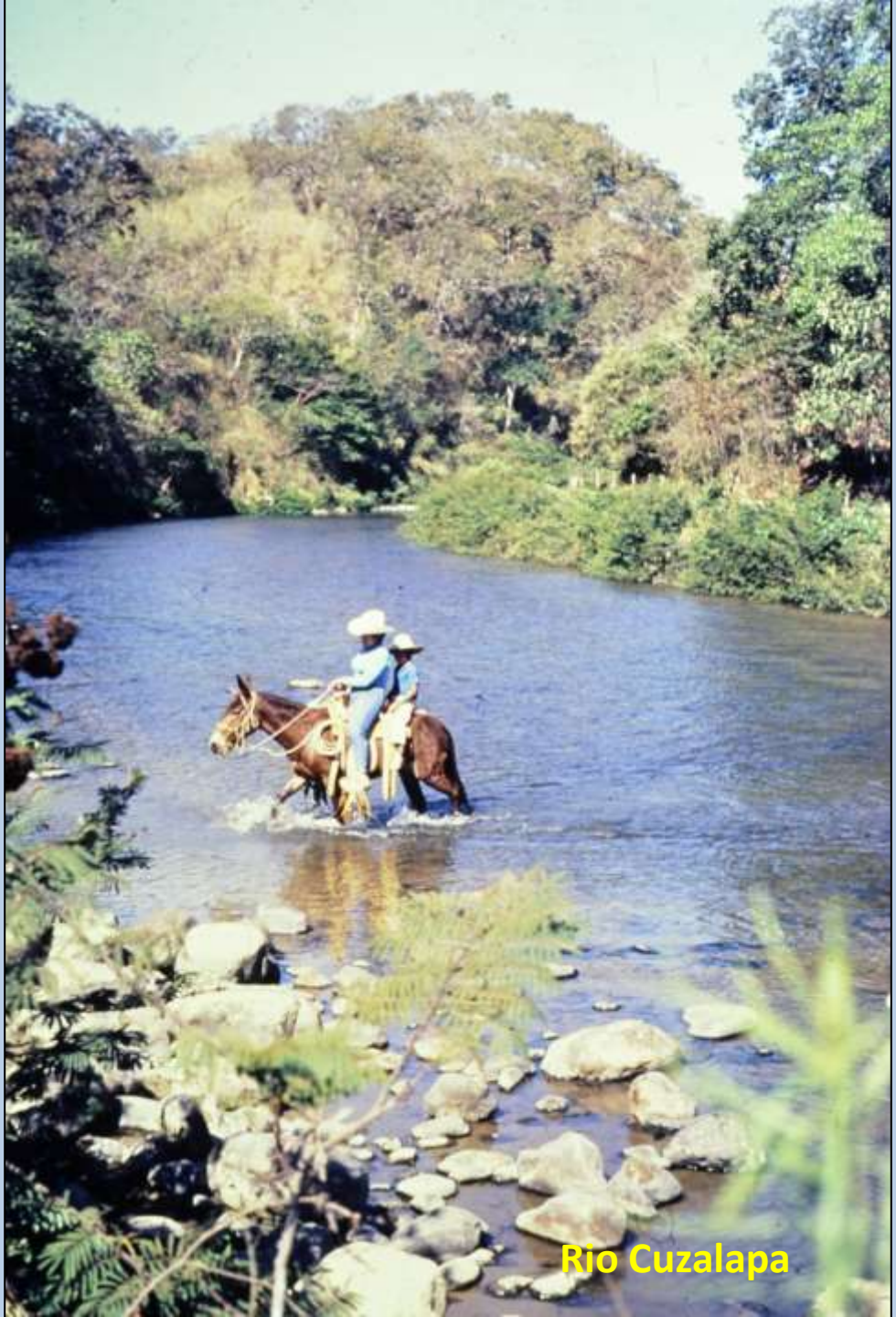
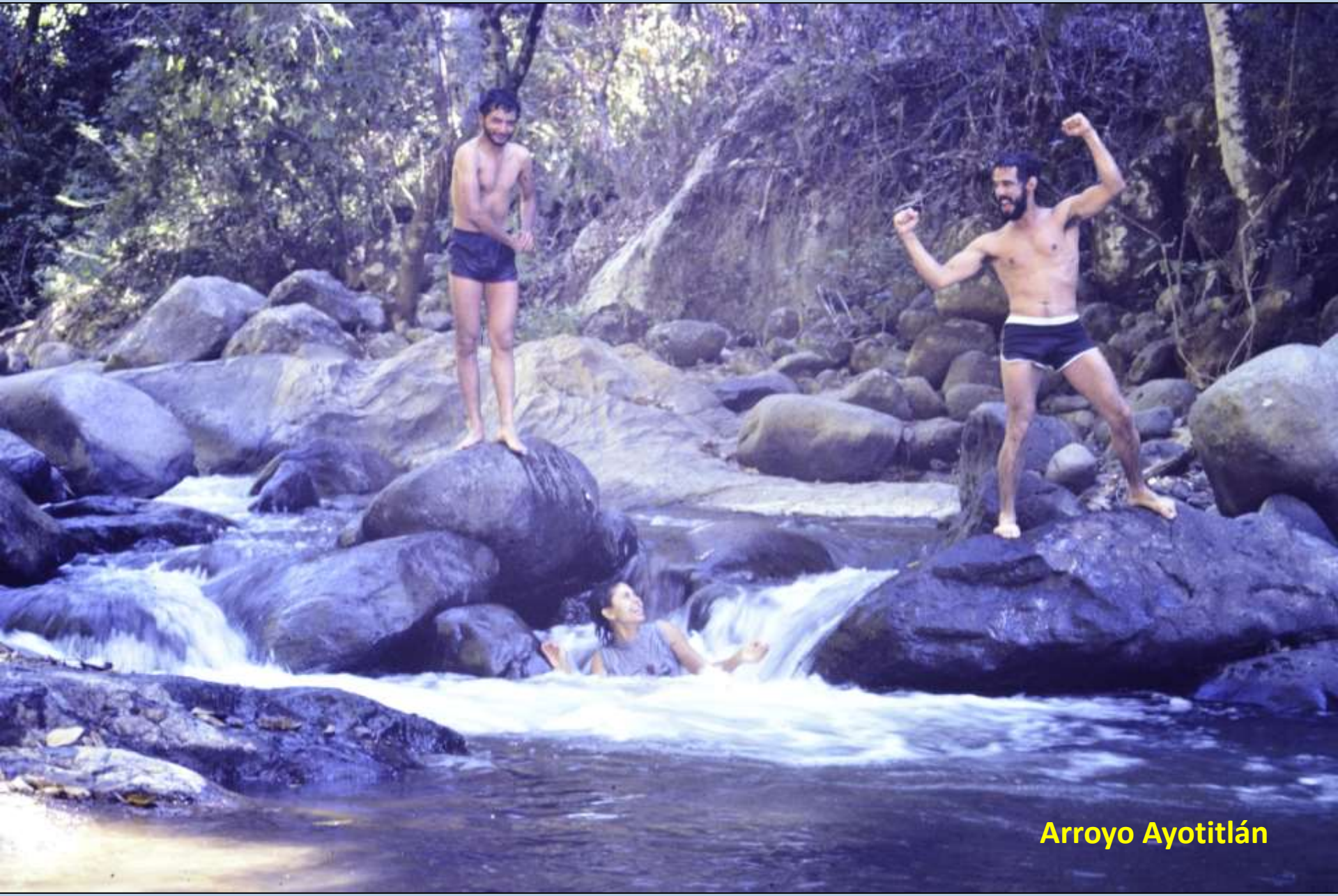
Puerto Vallarta
Guadalajara
Cancun
Mexico City
Morelia
Acapulco
Sierra de Manantlán,
Jalisco & Colima

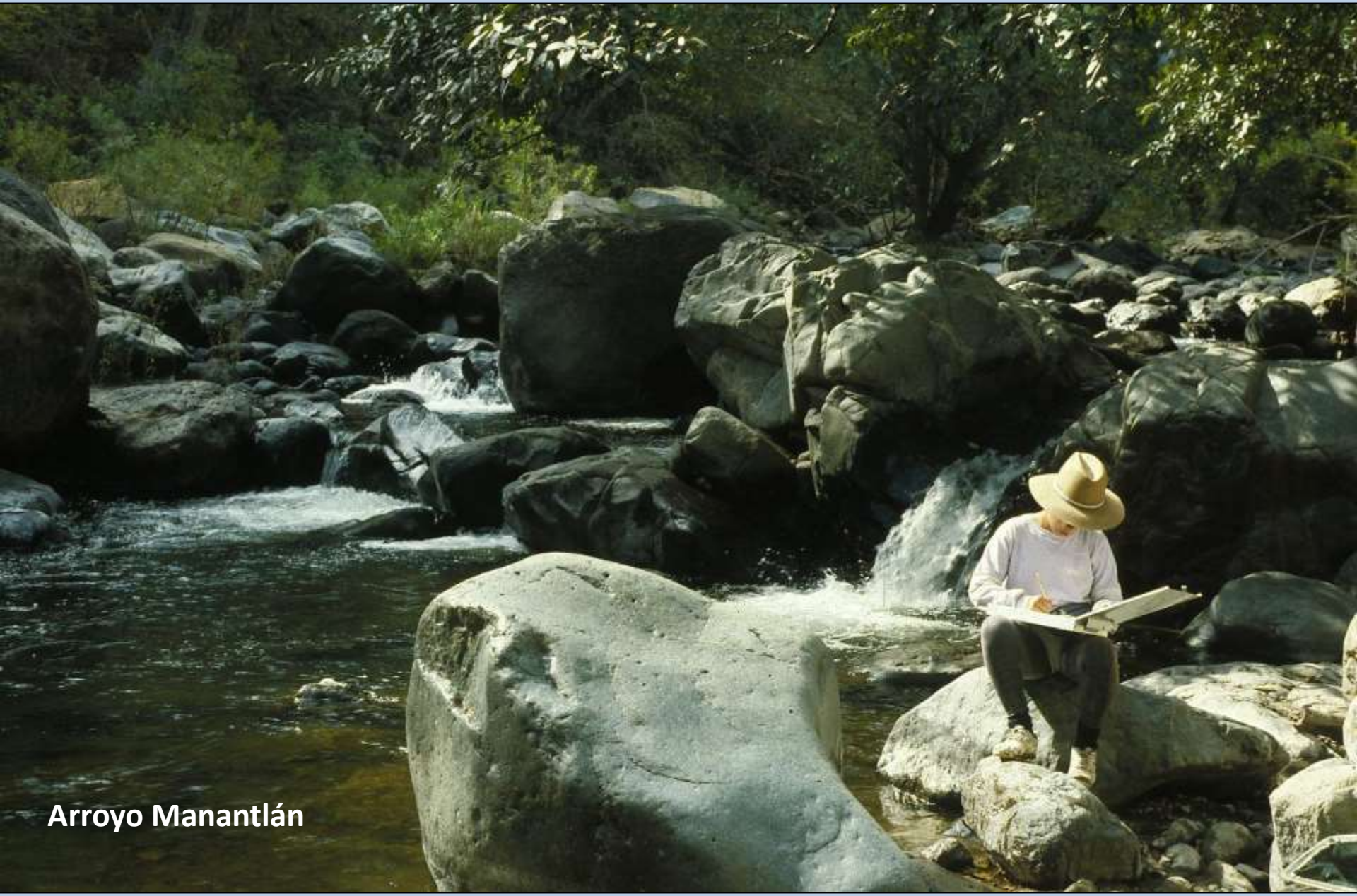

Rio Cuzalapa




Rio Cuzalapa

Rio Cuzalapa


Arroyo Ayotitlán



Arroyo Manantlán

Ilyodon furcidens

Allodontichthys zonistius

Poecilia chica

Poeciliopsis turneri


“Cichlasoma” istlanum


Rio Marabasco


LYONS MS 3.12
Lampetra aepidices
Lago de Chapala, México
3½ miles West of Ajijic
24 June 1969
UMMZ 192543
Lampetra geminis
Tenanecpuaro, Mexico
(Trib. to Río Duero)
16 April 1978
UMMZ 202421
LYONS MG 4.1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Lago Pátzcuaro


Lago de Chapala

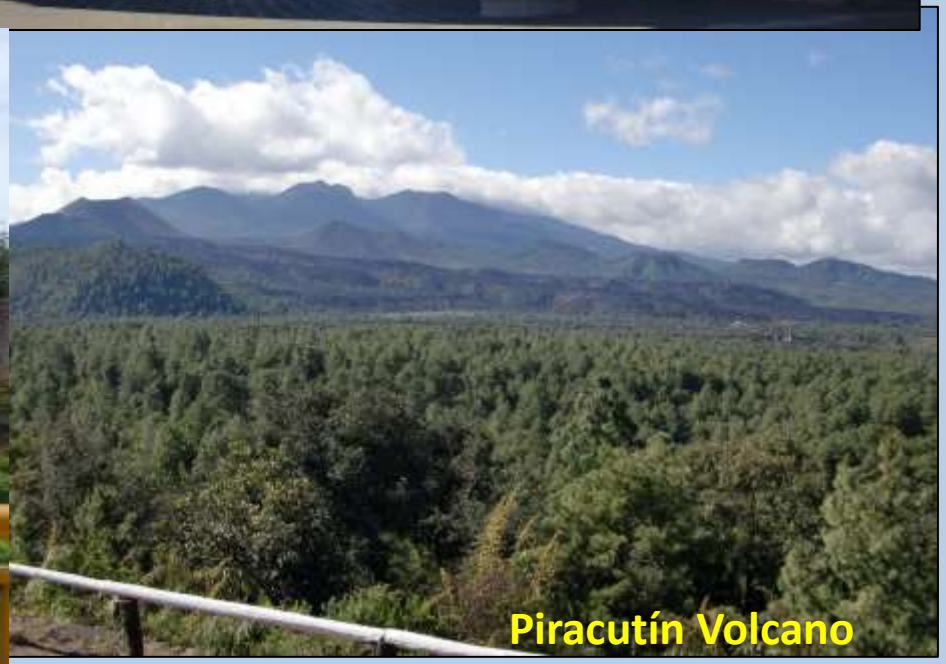

Lago Zirahuen


Lago de Cuitzeo


Arroyo Rancho
Molino Viejo


Santa Clara del Cobre


Rio Lerma, La Piedad


Piracutín Volcano

Tinganío Ruins, Tingambato


El Capulín Monarch
Butterfly Reserve


Arroyo Irapeo

Tetrapleurodon geminis


Ambystoma ordinatum
Axolotl


Arroyo Manantial
Rancho el Pedregal

Skiffia multipunctata


Zoogoneticus purepechus
Male
Female

Alloophorus robustus


Scartomyzon austrinus


Rio Tuxpan

Index of Biotic Integrity Based on Fish Assemblages for the Conservation of Streams and Rivers in West-Central Mexico

JOHN LYONS,* SONIA NAVARRO-PÉREZ,†‡ PHILIP A. COCHRAN,§ EDUARDO SANTANA C.,# AND MANUEL GUZMÁN-ARROYO¶

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§Division of Natural Sciences, St. Norbert College DePere, WI 54115, U.S.A.
#Laboratorio Natural Las Joyas,§ Universidad de Guadalajara, Apartado Postal 1-3955, Codigo Postal 44100, Guadalajara, Jalisco, Mexico
¶Instituto de Limnología, Universidad de Guadalajara, Apartado Postal 510, Codigo Postal 45900, Chapala, Jalisco, Mexico

Abstract: *The rivers and streams of west-central Mexico are becoming increasingly degraded and warrant expanded conservation efforts. We have developed an index of biotic integrity based on fish assemblage characteristics to aid in the preservation of the biological integrity and biodiversity of these waters. Our version is an adaptation of previous versions of the index of biotic integrity, which have proven effective in environmental assessment and monitoring in the United States and elsewhere. It consists of 10 fish assemblage attributes, termed metrics, that are related to environmental quality, ecosystem integrity, and biodiversity in west-central Mexican streams and rivers: number of native species, percentage of benthic species, number of water column species, number of sensitive species, percentage of tolerant species, percentage of exotic species, percentage of omnivores, percentage of native livebearing species, relative abundance, and percentage of diseased or deformed. Data on fish communities from 27 sites on streams and small rivers in the vicinity of the Sierra de Manantlán, southwestern Jalisco, and in the upper Río Duero basin, northern Michoacán, were used to develop expectations and scoring criteria for each metric. The index value for a site was the sum of the scores for the 10 metrics. Index values and associated ratings of biotic integrity for the 27 sites corresponded closely with independent ratings based on habitat and water quality. However, additional tests of the index with independent data and refinement of metrics and scoring criteria are clearly warranted. The index shows promise for identifying key watersheds for the protection of intact native biotic communities and individual endangered and threatened species and for the long-term monitoring and evaluation of biodiversity and ecosystem integrity in the streams and rivers of west-central Mexico. Our version could serve as a model for the development of similar indices for other regions and other types of aquatic ecosystems in Mesoamerica.*

Indice de integridad biótica basado en las caracteristicas de las comunidades de peces para la conservación de arroyos y rios en el centro-oeste de Mexico

Resumen: *Los ríos y arroyos del occidente de México sufren una seria degradación ecológica y requieren de la aplicación de esfuerzos conservacionistas. Hemos desarrollado un índice de integridad biótica basado en*

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§ The name of the Laboratorio Natural Las Joyas recently has been changed to the Instituto "Manantlán" de Ecología y Conservación de la Biodiversidad.
Paper submitted December 13, 1993; revised manuscript accepted June 13, 1994

Decline of Freshwater Fishes and Fisheries in Selected Drainages of West-central Mexico

By John Lyons, Georgina González-Hernández, Eduardo Soto-Galera, and Manuel Guzmán-Arroyo

ABSTRACT

The unique freshwater fishes and fisheries of west-central Mexico are sharply declining because of environmental degradation. In the Lerma River basin, half of the localities that once supported fish communities either no longer have water or are so polluted that fish cannot survive. Of 44 native fishes, 3 are now extinct, and 23 are greatly reduced in range or abundance. In Lake Chapala, total fisheries production has actually increased despite major declines in water quantity and quality, but the fisheries for several valuable native species have declined or collapsed, and exotics now constitute a substantial portion of the catch. In the Ayuquila River, several species have been locally extirpated, and major untreated industrial and municipal discharges, coupled with substantial water withdrawals for irrigation, preclude fish life during the dry season in 20 km of river that once supported an important subsistence fishery. Conservation priorities include protecting localities that still retain native fish assemblages, reducing water withdrawals and pollution discharges, and controlling fishing effort and harvest better. These efforts in west-central Mexico would benefit from increased collaboration among Mexican, U.S., and Canadian fisheries professionals.

West-central Mexico, defined here as the Pacific slope between the cities of Mazatlán and Acapulco (Fig. 1), contains a unique and fascinating collection of freshwater fishes. With approximately 180 native species, the fish fauna is not particularly diverse by tropical standards, but endemism is high, and 50% of the fishes are found nowhere else on earth (calculated from data in Miller 1986; Miller and Smith 1986). Species from the neotropical families Characidae and Cichlidae overlap with members of the nearctic families Cyprinodontidae, Cyprinidae, Catostomidae, and Ictaluridae. An unusually large number (almost 45) of fishes are viviparous, and studies of these species, particularly in the endemic family Goodeinae (family Goodeidae), have yielded important insights into fish reproduction and evolution (e.g., Turner 1933; Fitzsimons 1972; Turner 1983). Among the egg-laying species, the endemic genus Chirostoma (family Atherinidae) has radiated into a diverse species flock with a variety of habitat and trophic specializations (Barbour 1973a; Barbour and Chernoff 1984). In the lakes of the region, Chirostoma species support important commercial and subsistence fisheries that have persisted for thousands of years (Guzmán-Arroyo 1990).

Unfortunately, the fishes and fisheries of west-central México are seriously declining. During this century, particularly the last 20 years, aquatic habitats have been degraded at an unprecedented rate, and fish populations have decreased dramatically (Guzmán-Arroyo 1990; Lyons et al. 1995; Soto-Galera et al., in press).

Several fishes are now extinct, others are on the brink of extinction, and many fisheries have collapsed. Quick and decisive action is needed to conserve the remaining fishes and fisheries.

In this paper, we review the published literature and summarize our unpublished data to document declines in fishes and fisheries that have occurred in selected areas of west-central Mexico. We focus on the Lerma River basin, Lake Chapala, and the Ayuquila River watershed. Our goal is to inform U.S. and Canadian fisheries professionals of the crisis that confronts the fish fauna of west-central Mexico and to encourage involvement in conservation efforts.

Study Area

West-central Mexico is a seismically and region with a great diversity of

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AMERICAN LIVEBEARER ASSOCIATION

EST 1971

Dr. Omar Domínguez-Domínguez

Ivan Dibble (1937-2009)

Kees de Jong

Morelia Aqualab


BRULE RIVER
STEELHEAD


Mexico
Tijuana
Monterrey
Durango
Los Cabos
Puerto Vallarta
Guadalajara
Cancun
Mexico City
Morelia
Acapulco
Norte de México,
Durango, Coahuila,
Chihuahua & Nuevo León


Lazaro Cardenas, Durango

Copper Canyon, Chihuahua

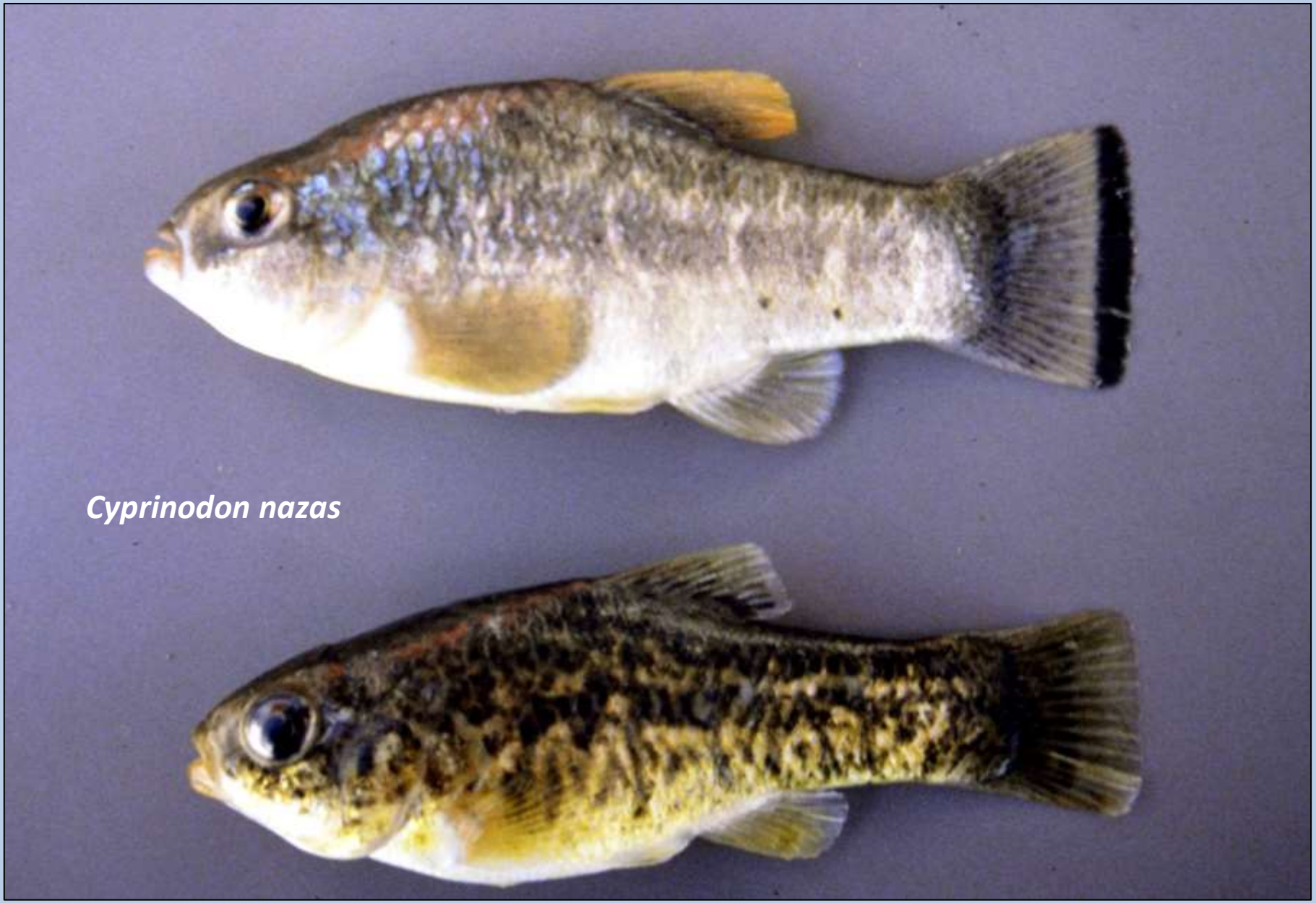

Río Mimbres, Durango

Presa Lazaro Cardenas,
Rio Nazas, Durango


Cuatro Ciénegas, Coahuila


El Toboso, Durango

Poecilia mexicana


Cyprinodon nazas


Gila conspersa


Codoma ornata


Cyprinella lutrensis


Mexico
Tijuana
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Los Cabos
Puerto Vallarta
Guadalajara
Cancun
Mexico City
Morelia
Acapulco
Rio Pánuco Basin,
San Luis Potosí


Rascón


Rio Santa Maria


Rio Otates, Tamasopo


Rio Otates, Tamasopo


Rio Ojo Caliente


Xiphophorus montezumae


Xiphophorus nezhuacoyotl

Xiphophorus cortezi

Astyanax mexicanus


Nosferatu (Herichthys) steindachneri


Herichthys cf. *labridens*


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Los Cabos
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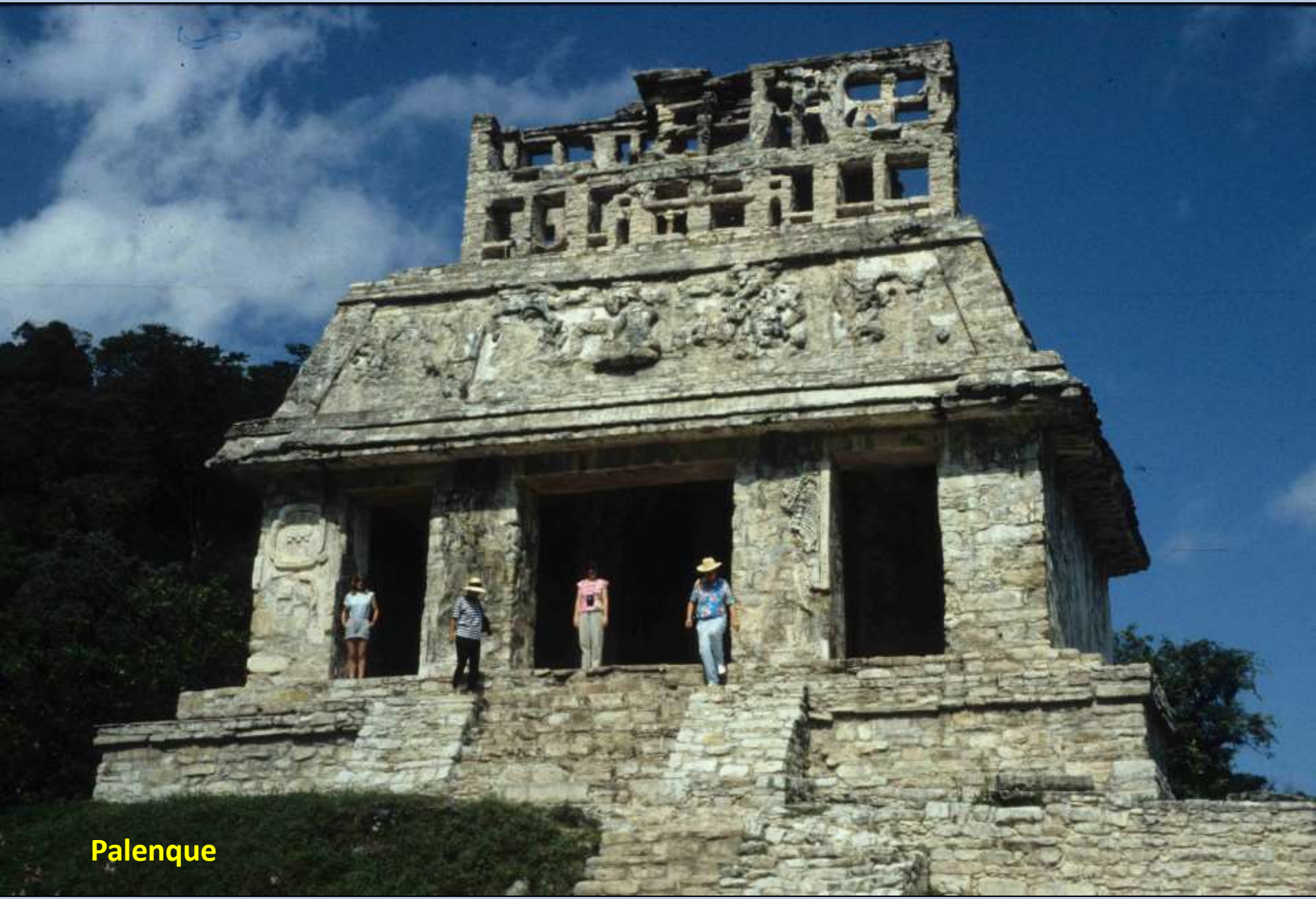
Mexico City
Morelia
Chiapas
Acapulco



Palenque


Palenque

Rio Grijalva, Canon Sumidero


Rio Aqua Azul

Rio Agua Claro


Rio Agua Claro


Laguna Lacanjá

Trail into Lacantún Rainforest


Botrhops viper on trail


Rio Lacanjá


Xiphophorus helleri


Belonesox belizeanus

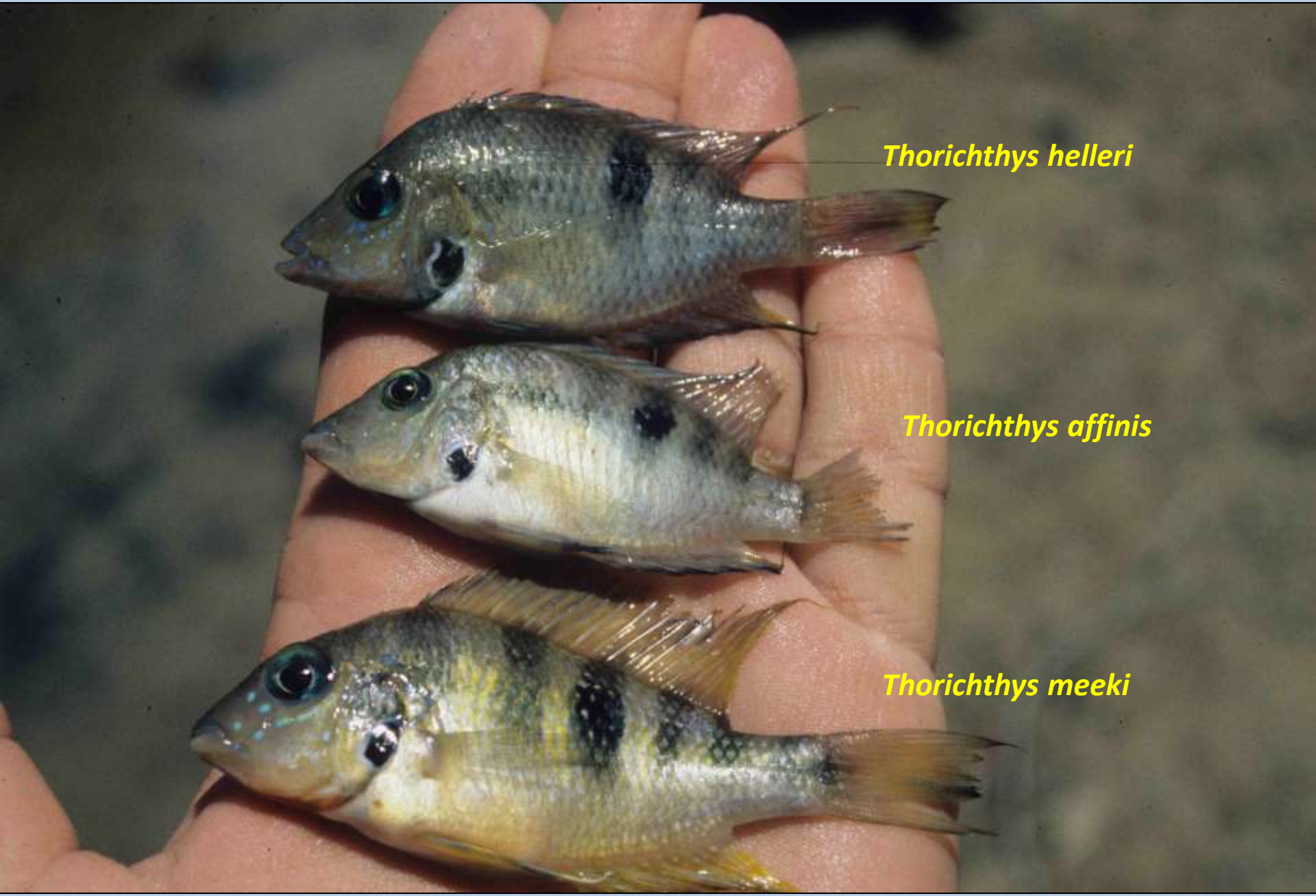

RAIDERS
Centropomus undecimilis


Potamarius nelsoni
Arius aguadulce


Atractosteus tropicus


Atractosteus tropicus


Rio Tzendales


Thorichthys helleri
Thorichthys affinis
Thorichthys meeki


Theraps lentiginosus


Vieja synspila

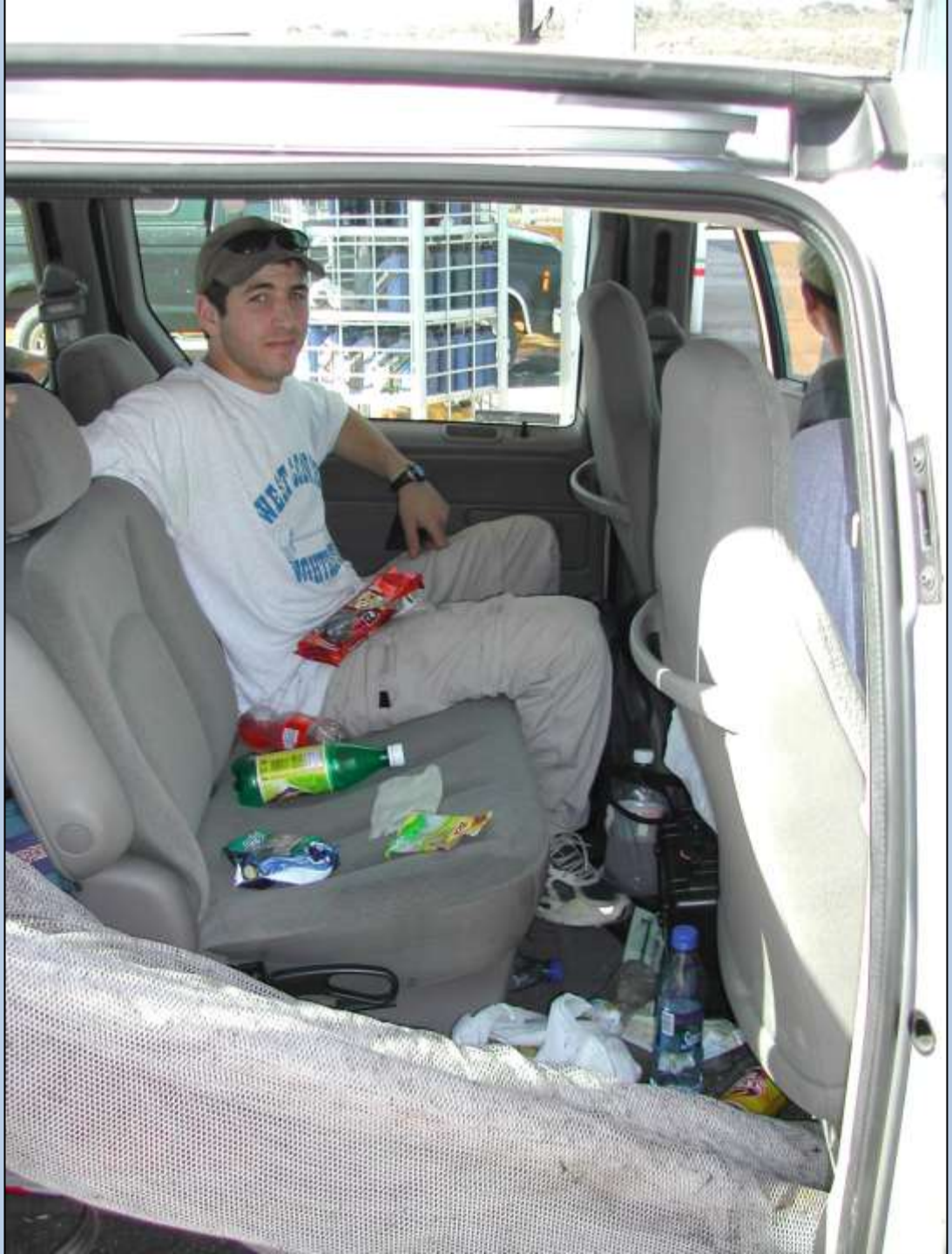

Petenia splendida

Field Work in Mexico – Conclusions

Cuatro Ciénegas, Coahuila

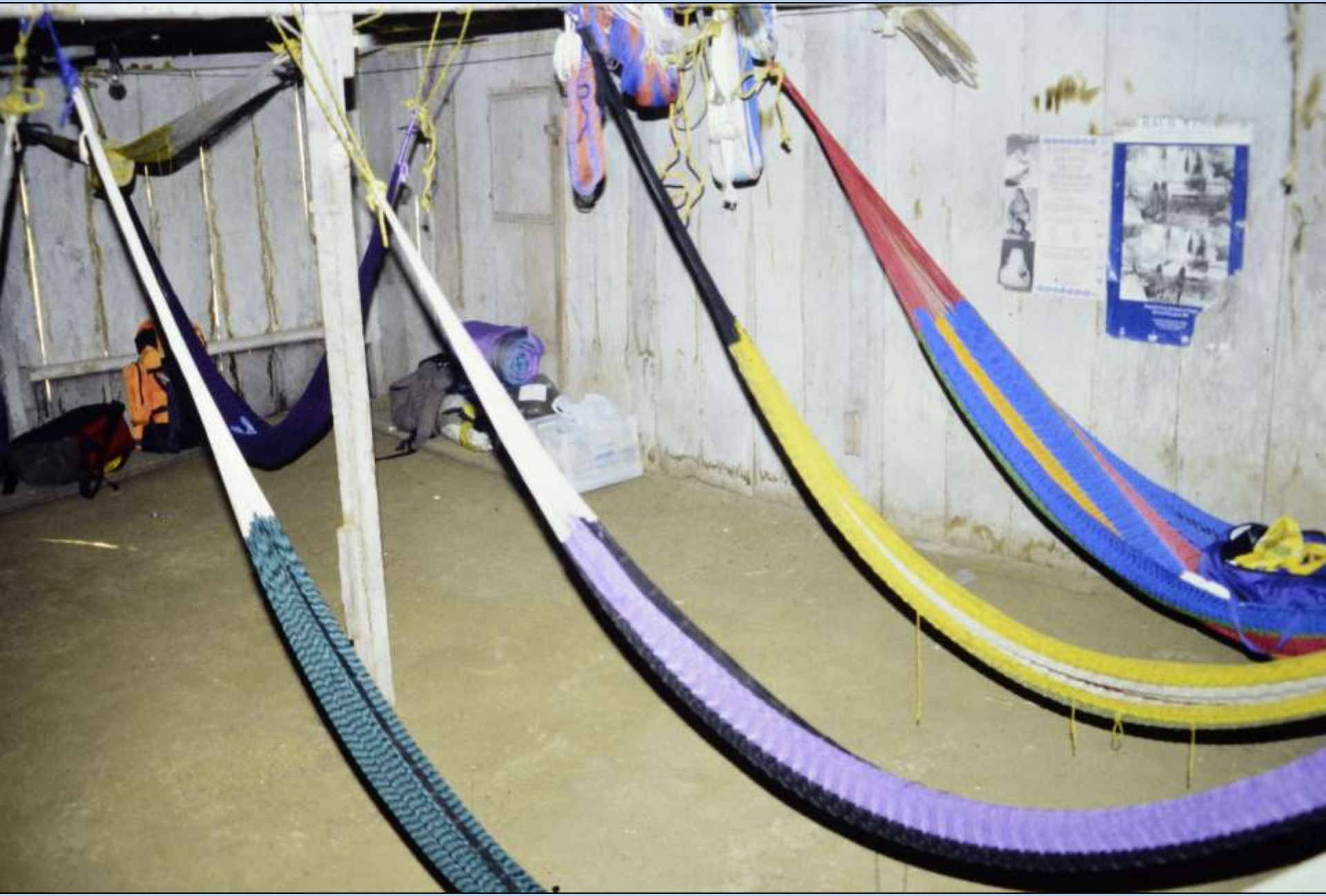
Anableps dowei Río Tehuantepec, Oaxaca


CATERPILLAR




CERVEZA


WONDER
Integral
Totados



Swamp in Si'an Kaan Reserve,
Quintana Roo


Rio Cedros, Chiapas

Heterandria bimaculata

"Cichlasoma" **cf.** ***salvini***


Montejo

Questions?

Sian Ka’an Biosphere Reserve, Quintana Roo