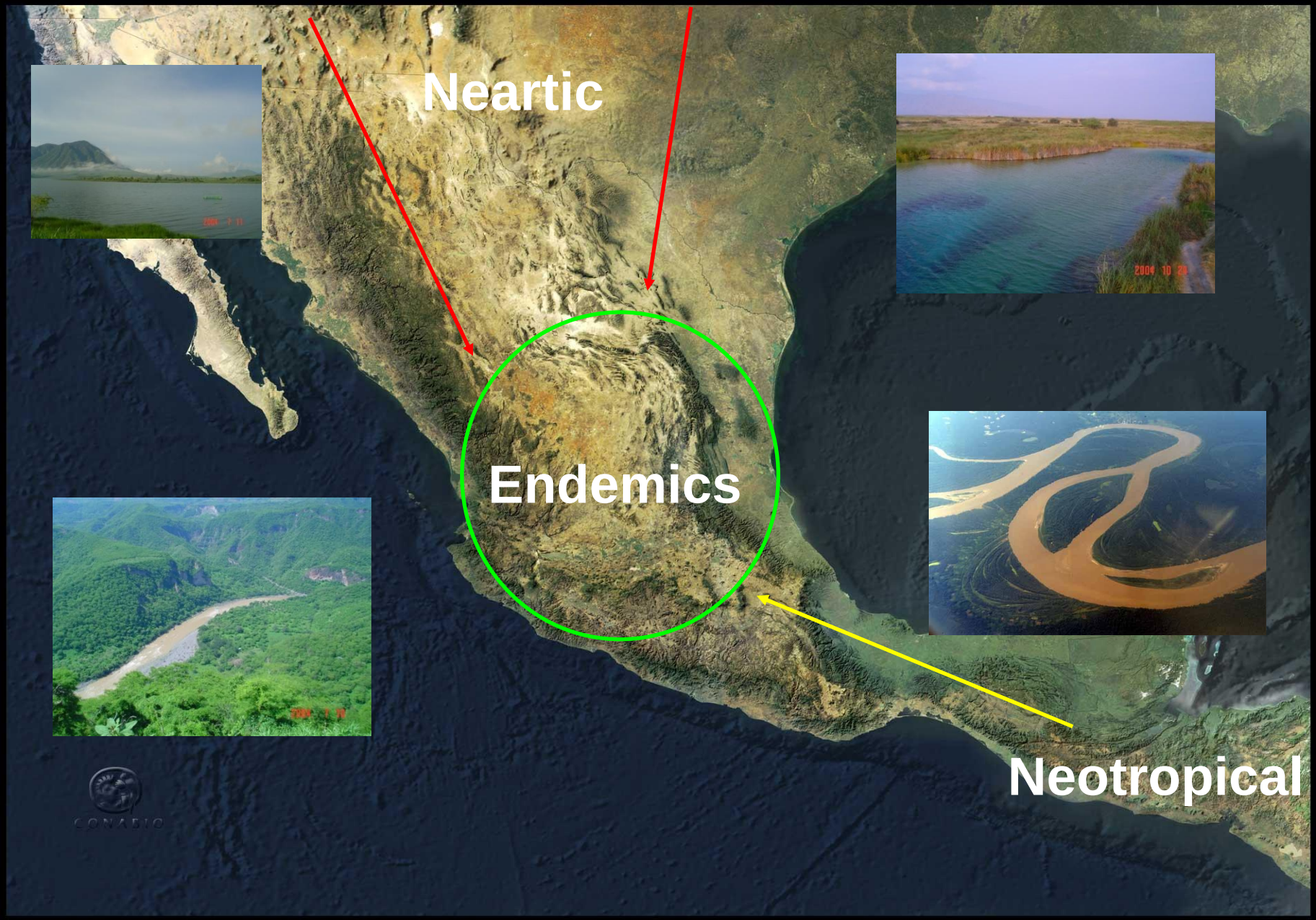
Fish Ark-México

Hobbyist Aqualab Conservation Project

México: Imagen desde el espacio
Comisión Nacional para el Conocimiento y Uso de la Biodiversidad
Mosaico 2002 de imágenes Modis sin nubes del satélite Terra,
bandas 1,4,3 (RGB), resolución espacial 250 metros,
sobre un modelo digital de terreno.



México: Imagen desde el espacio

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Mosaico 2002 de imágenes Modis sin nubes del satélite Terra,
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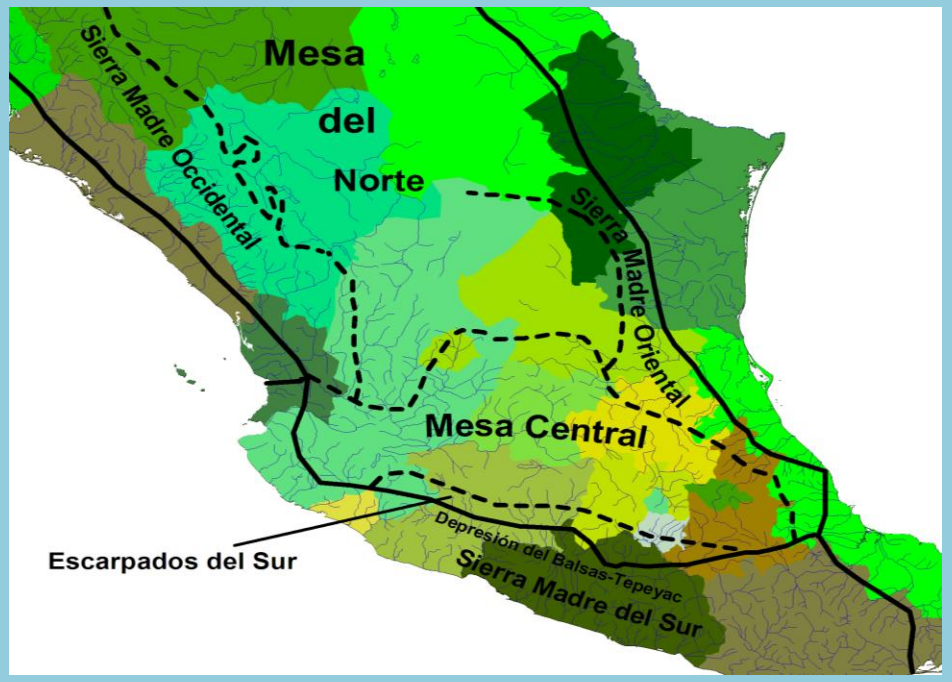
sobre un modelo digital de terreno.

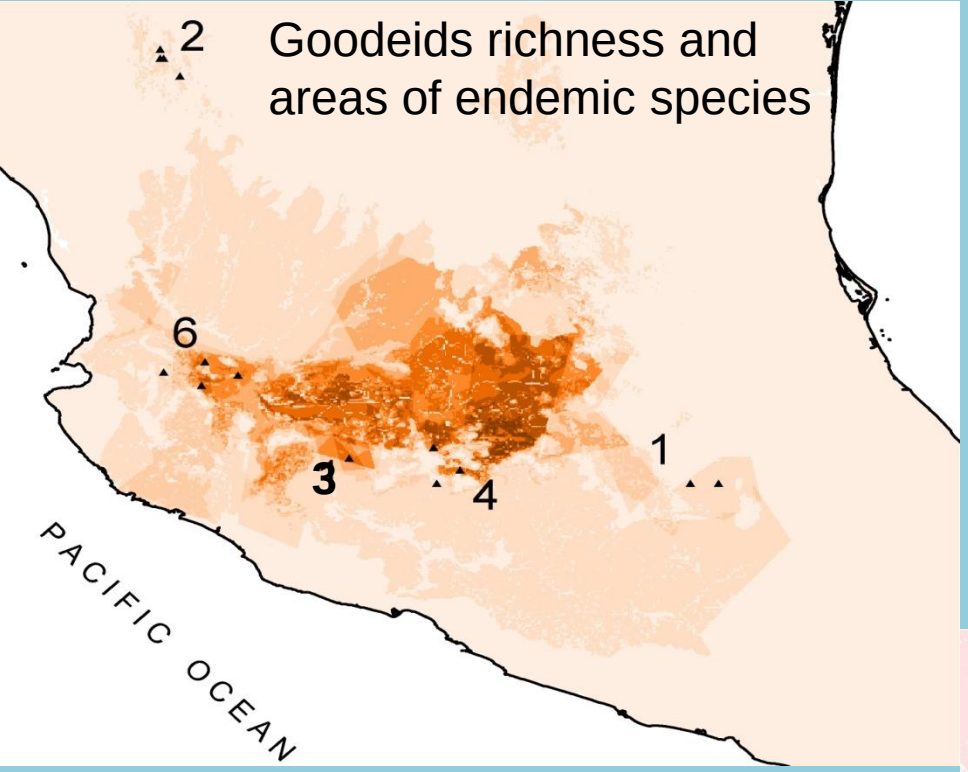
2160 species
2268 EU & Canada
20 % of the territory

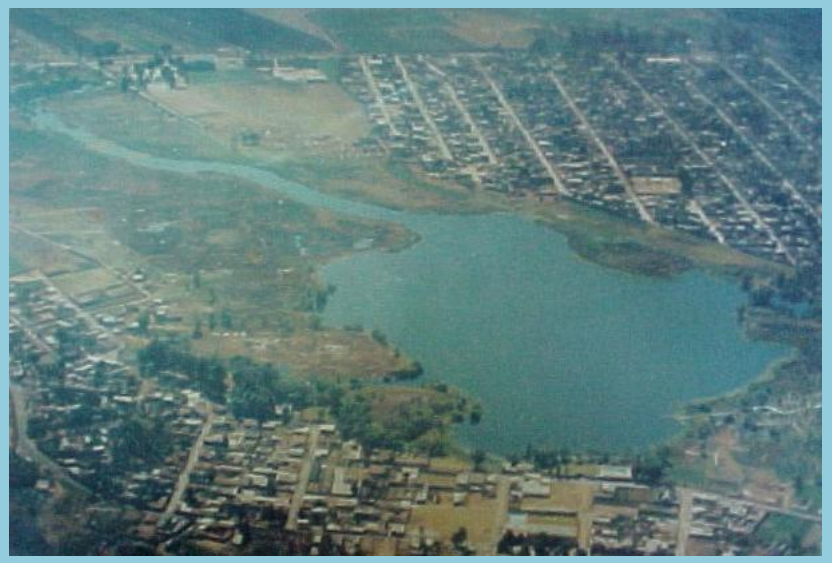
IN MÉXICO
520 freshwater fish species
163 endemics (32 %)

Central Mexico with 70%
of endemic species

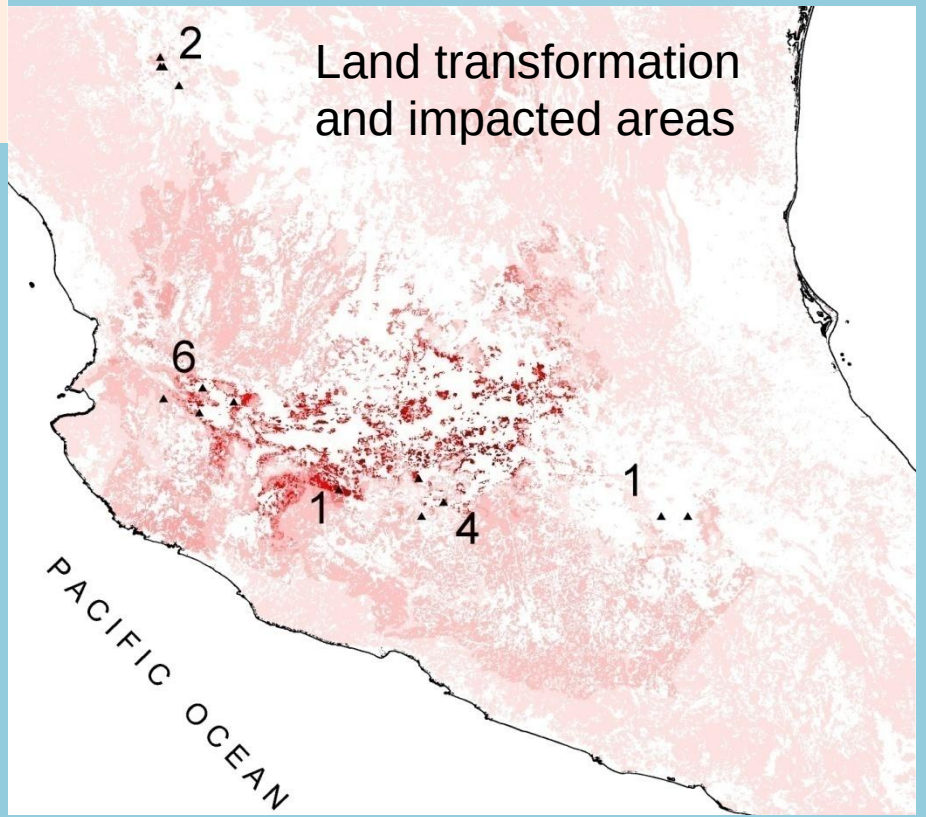
International interest for the
conservation of freshwater fishes



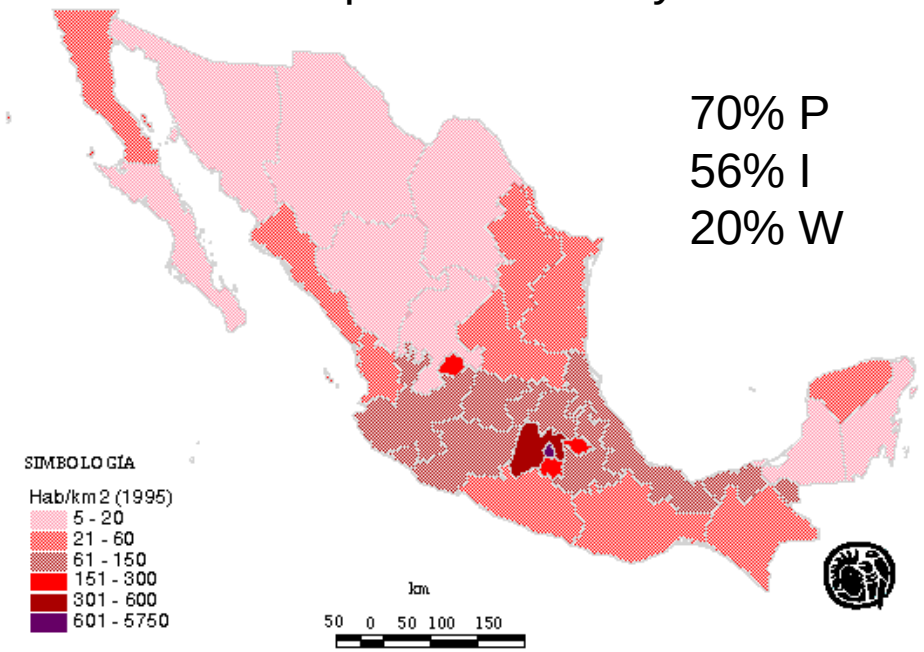

2
Goodeids richness and
areas of endemic species
6
3
4
1
PACIFIC OCEAN




2004 12 19

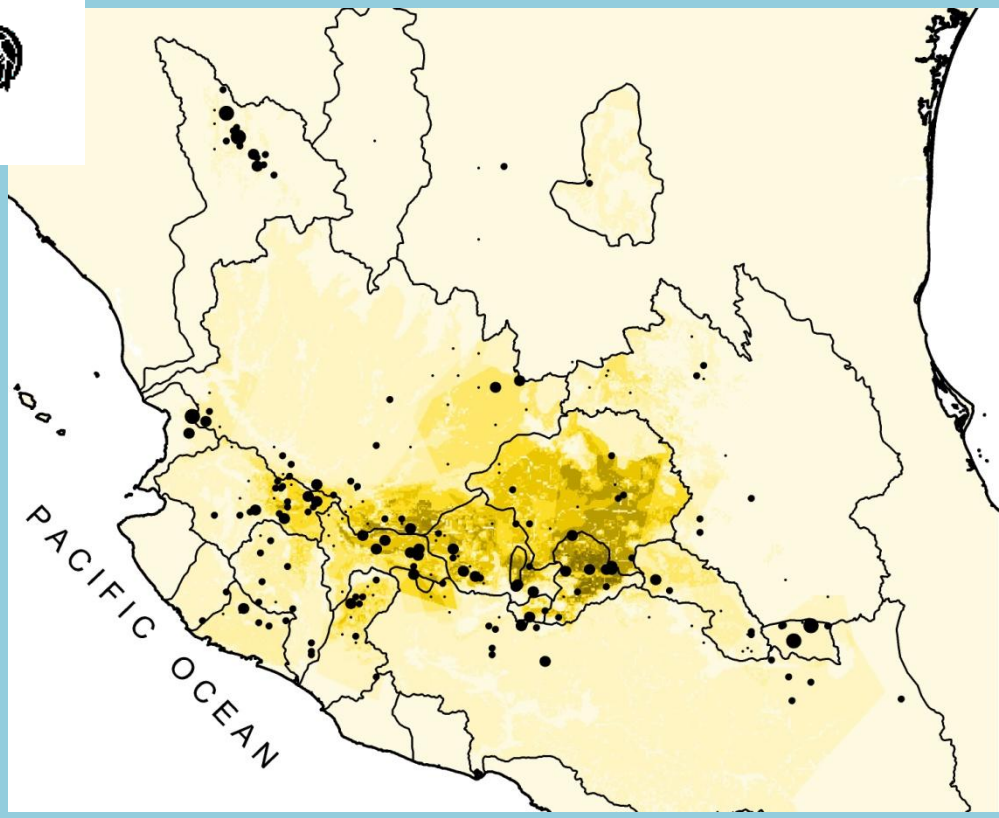

2
Land transformation
and impacted areas
6
1
4
1
PACIFIC OCEAN

Population density



70% P
56% I
20% W

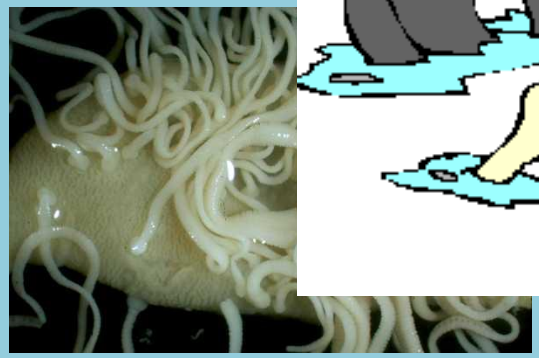
Local extinctions



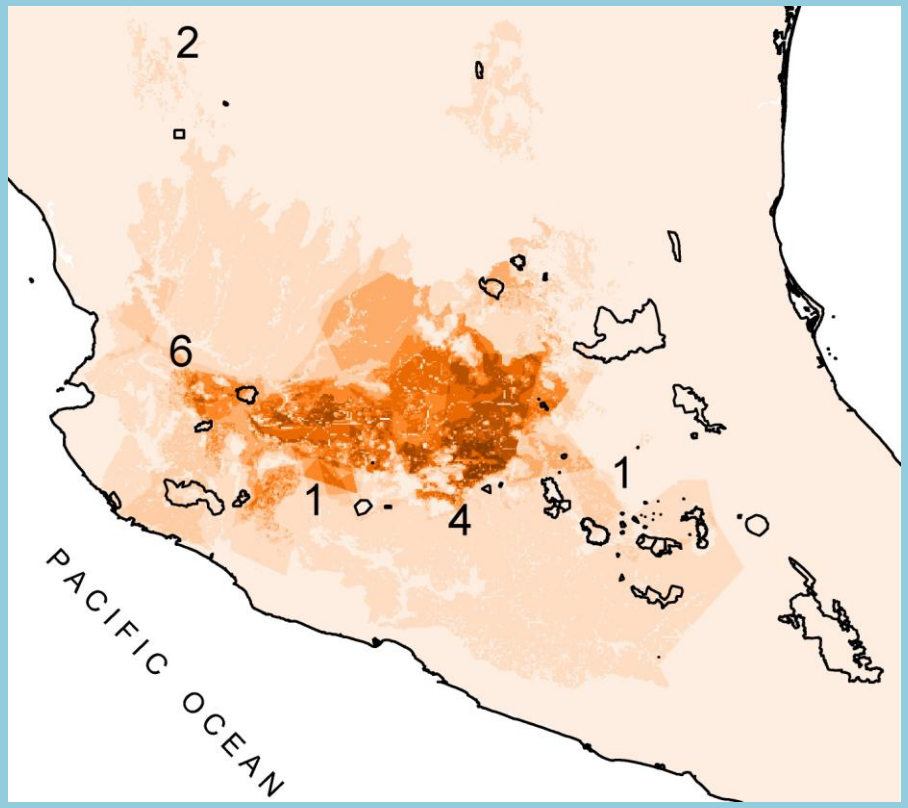




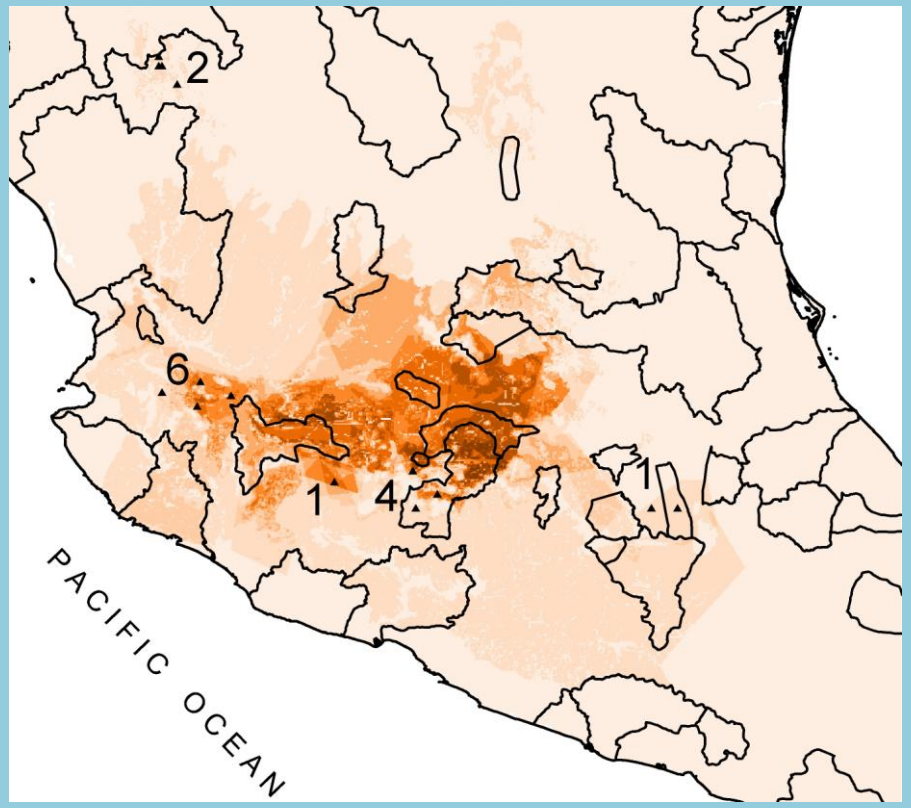




ANP



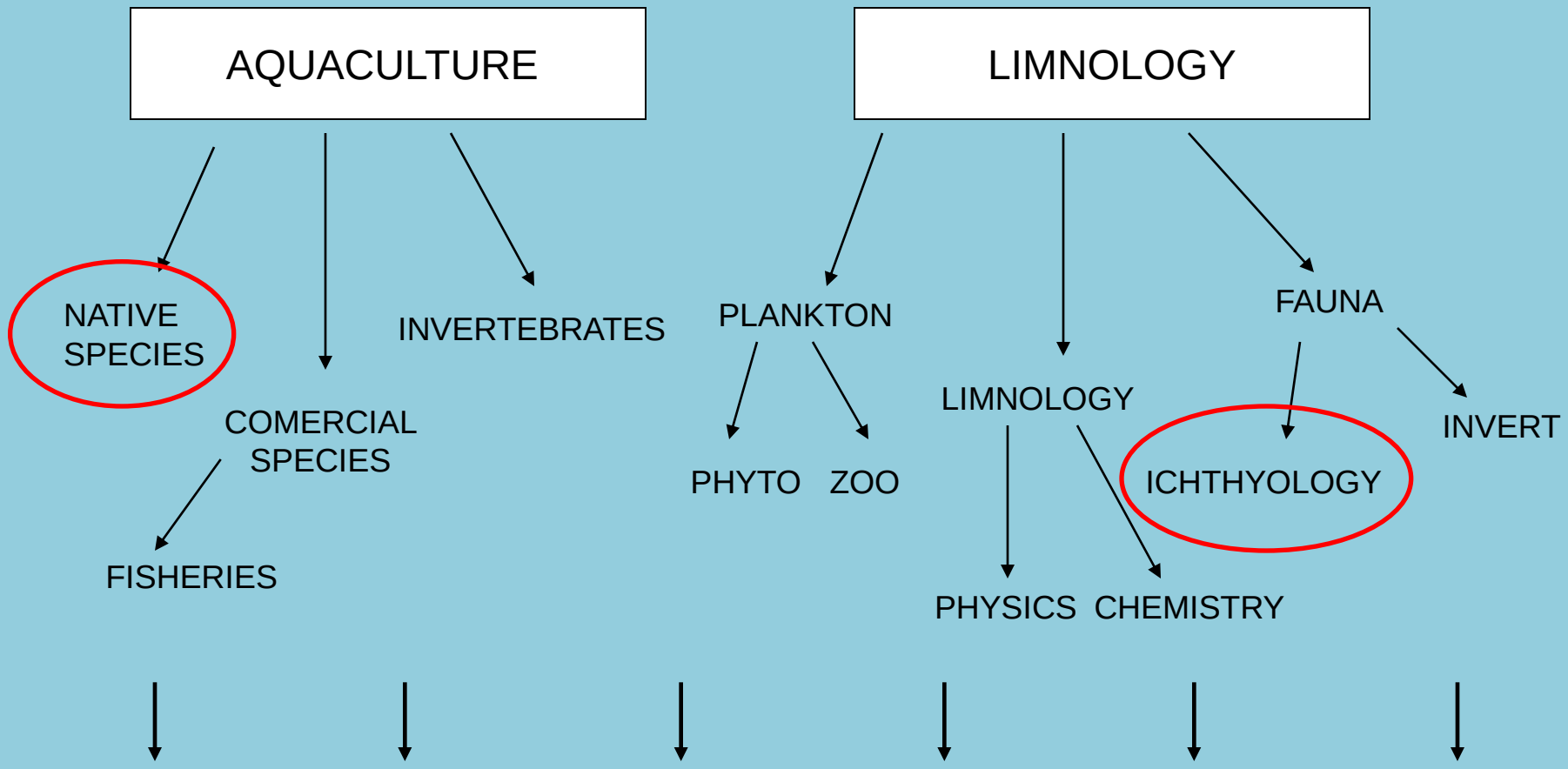
RHP



General objective of the aqualab

Contribution to the conservation and sustainable management of epicontinental aquatic resources in Mexico

LABORATORY FRAME



History of the Fish Ark

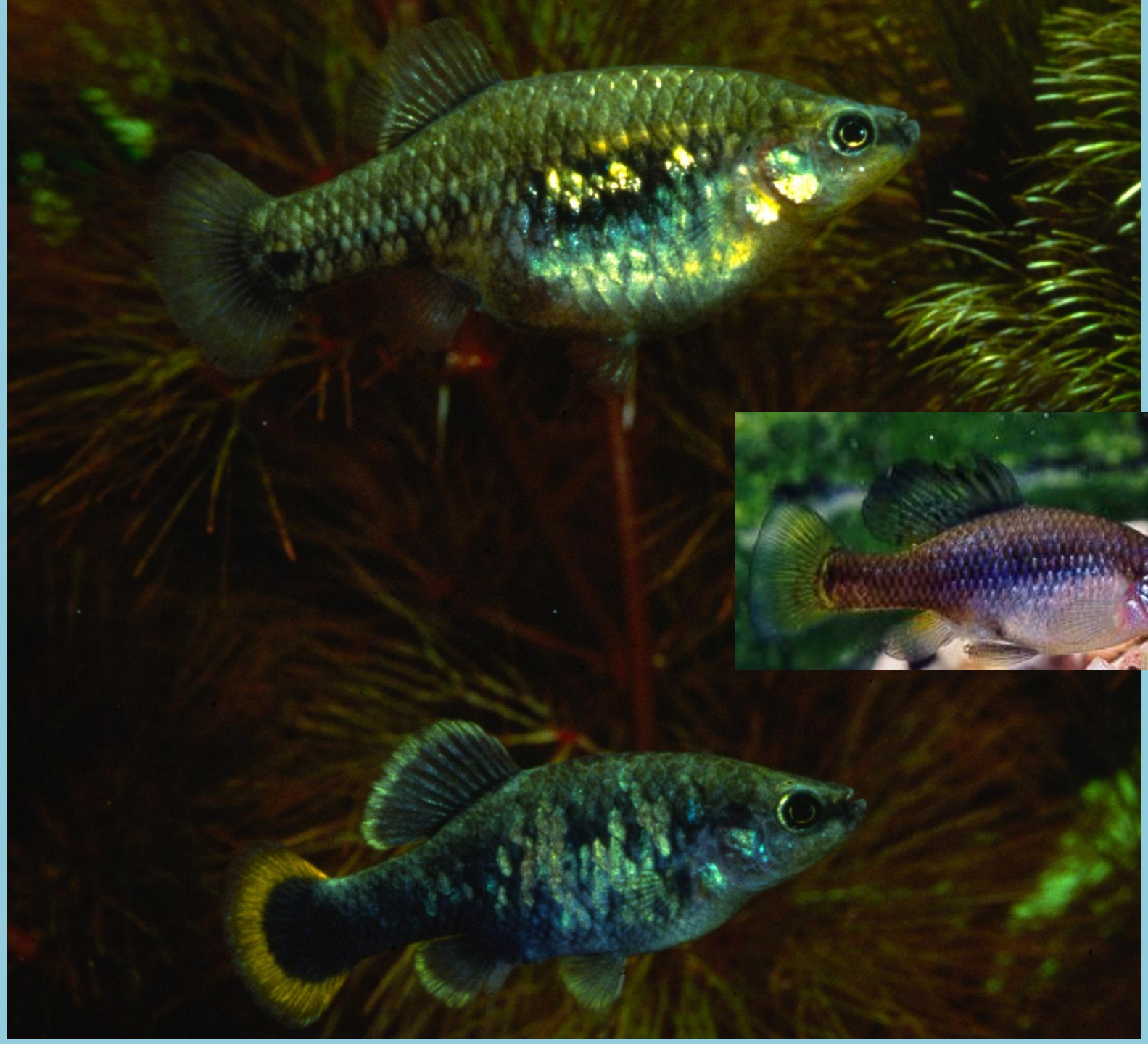
Main scope

Maintain a bank of germoplasm in ex-situ and controller condition to prevent the extinction of the species and promote their conservation

The lab start in 1997

In 1998 it was full with Tilapia and ornamental fish


The Fish Ark project
Officially start at 1999



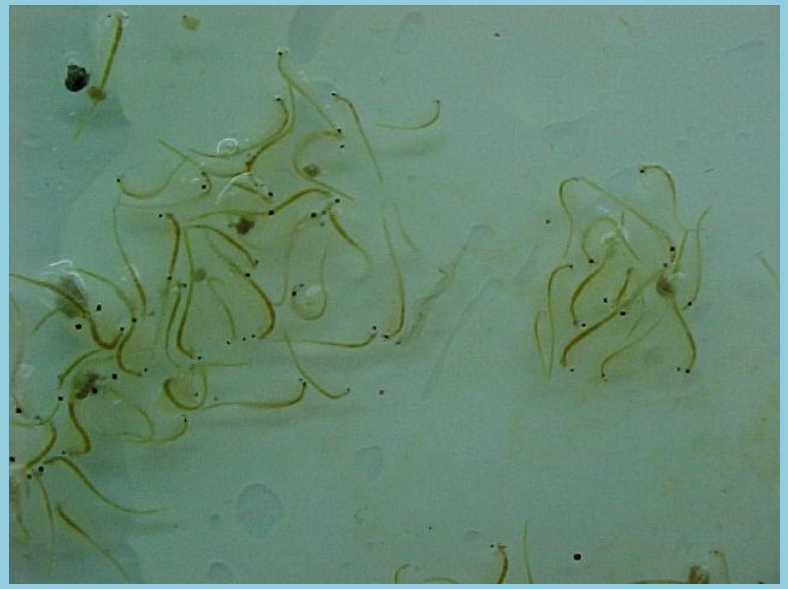
First field trip “start the fish collection”

80 aquariums, filter and aeration system for all the the tanks (80,000 l) and aquariums

We sold ornamental fish and Artemia to support part of the Fish Ark until 2001

2002 the field trips continue


FACULTAD DE BIOLOGIA
PHW 5487




The 2003 field trip gang in Compostela Mexico.
Photo by Ivan Dibble


Copyright I.H.Dibble.


Copyright I.H.Dibble.


2006

Quarantine area

2008 and 2010


2008


www.Goodelden.de

2010

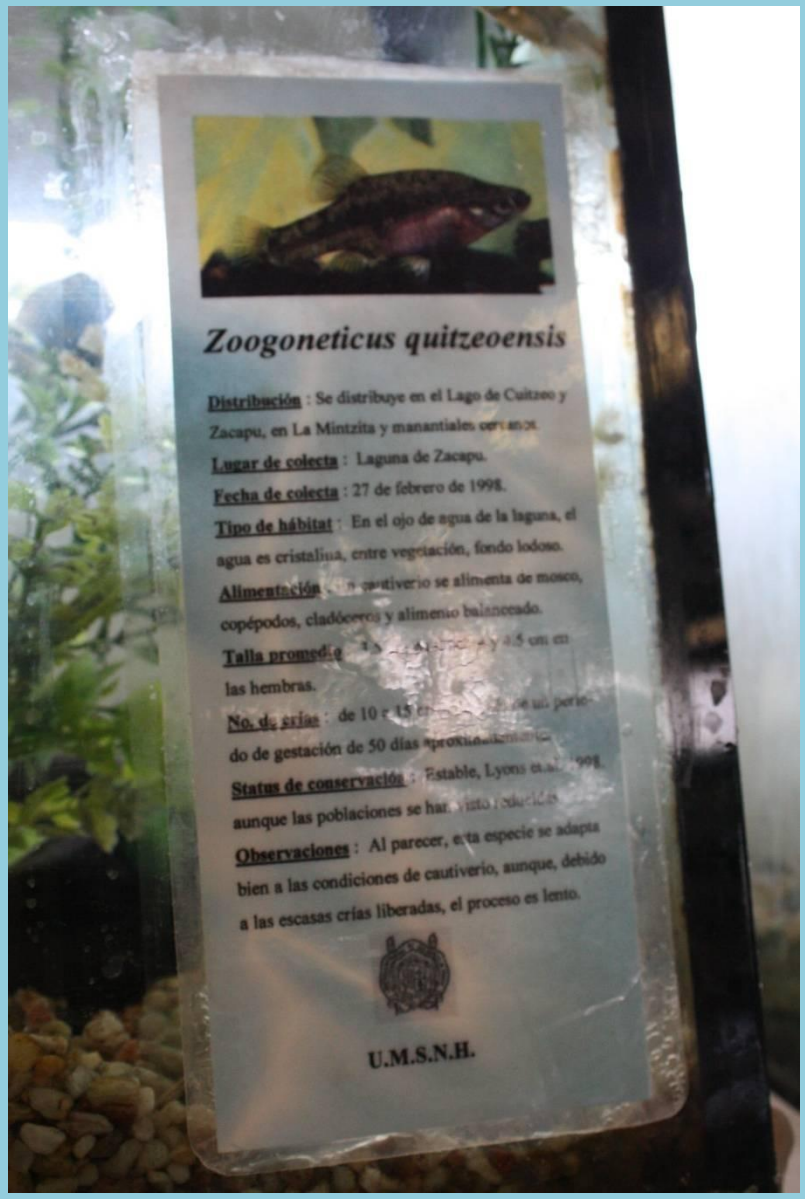

2011


2010
CASE
Super K
580


SE RENTA


pepsi

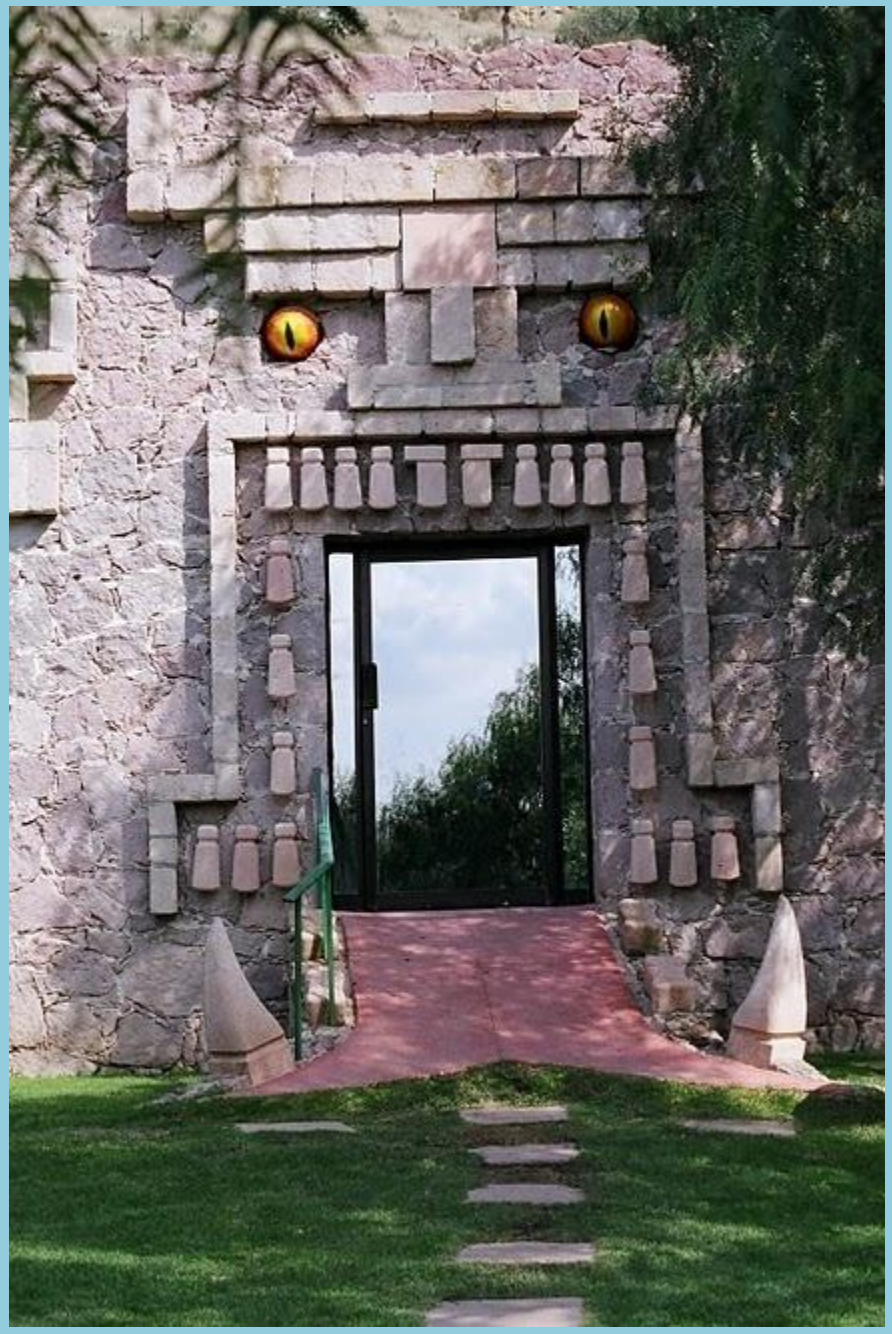

2011


Zoogoneticus quitzeoensis
Distribución : Se distribuye en el Lago de Cuitzeo y
Zacapu, en La Mintzita y manantiales cercanos.
Lugar de colecta : Laguna de Zacapu.
Fecha de colecta : 27 de febrero de 1998.
Tipo de hábitat : En el ojo de agua de la laguna, el
agua es cristalina, entre vegetación, fondo lodoso.
Alimentación : En cautiverio se alimenta de moscas,
copépodos, cladóceros y alimento balanceado.
Talla promedio
las hembras.
No. de crías :
do de gestación de 50 días
Status de conservación :
aunque las poblaciones se
Observaciones : Al parecer, esta especie se adapta
bien a las condiciones de cautiverio, aunque, debido
a las escasas crías liberadas, el proceso es lento.
U.M.S.N.H.


Projects outside the Aqualab

2001

2010



PARQUE ZOOLOGICO DE SAN LUIS POTOSI

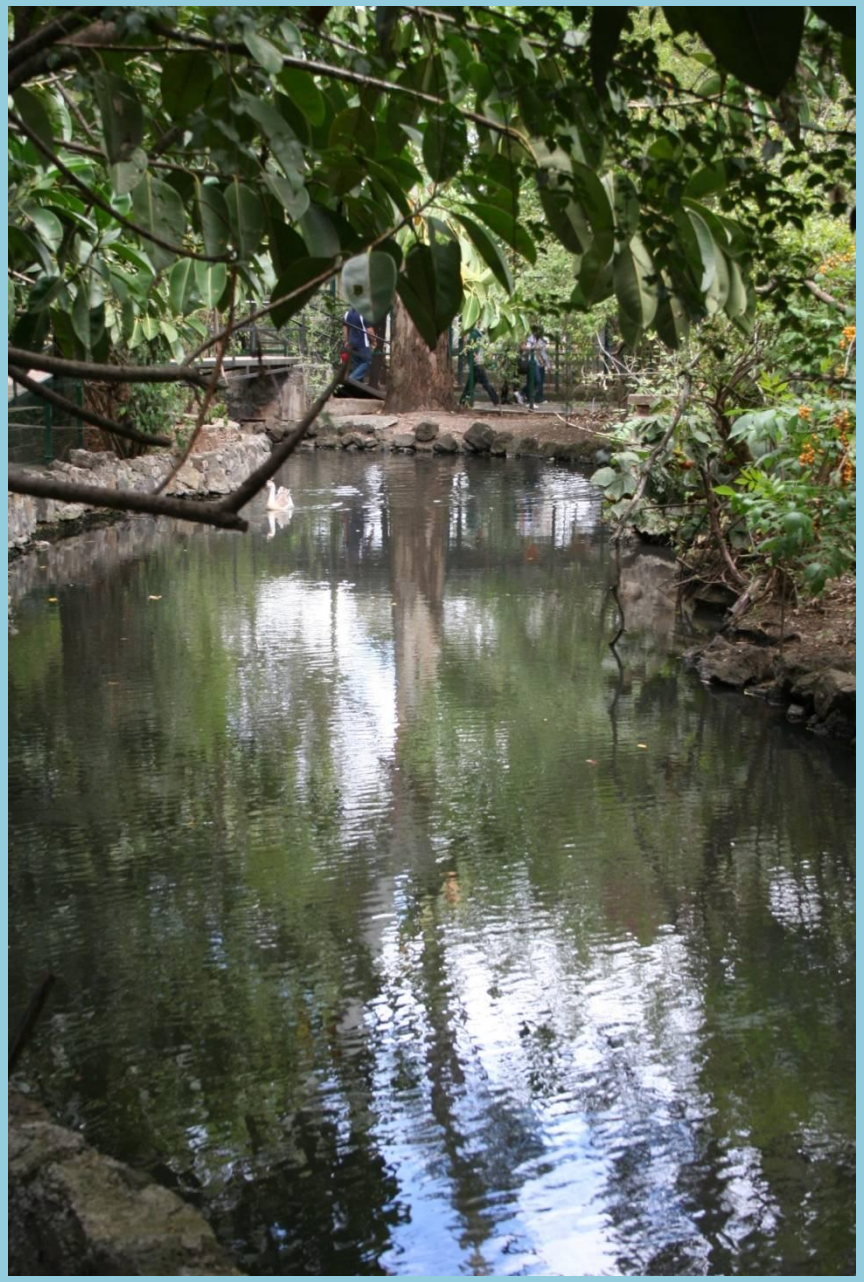
UN ZOOLOGICO INCRIBLE!!! CON UN MUSEO DE HISTORIA NATURAL, JARDIN BOTANICO, ACUARIO, HERPETARIO, ZOOLOGICO, CAMPAMENTO DE VERANO PARA NIÑOS, AREAS DE RECREACION, UNA EXPERIENCIA EN EL SEMIDESIERTO INOLVIDABLE, CON UNA ARQUITECTURA EN SU CONSTRUCCION ESTILO MEXICO PREHISPANICO, UN RECORRIDO DIVERTIDO, EDUCATIVO Y CULTURAL. INFORMES: MARUVILET@HOTMAIL.COM

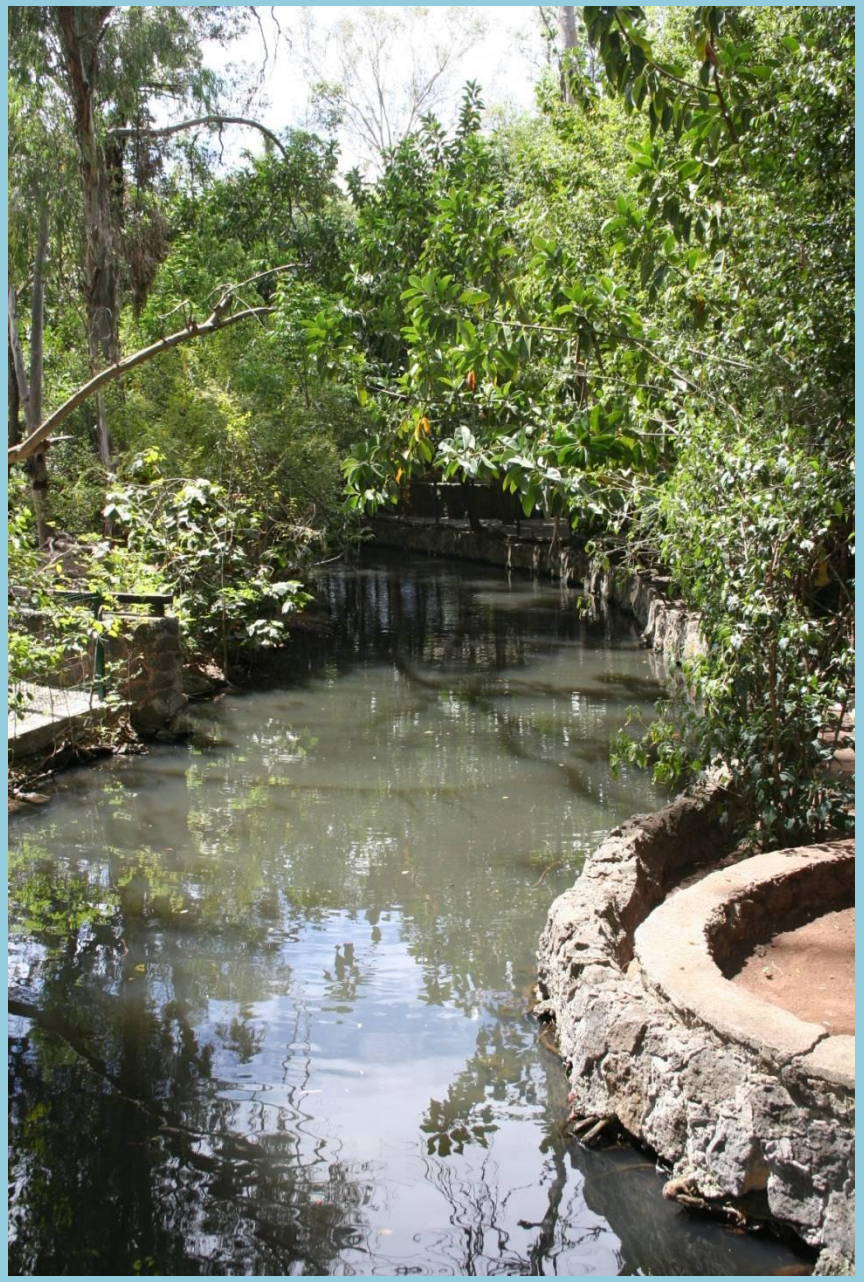
tema del día

El especial de Cambio

MORELIA

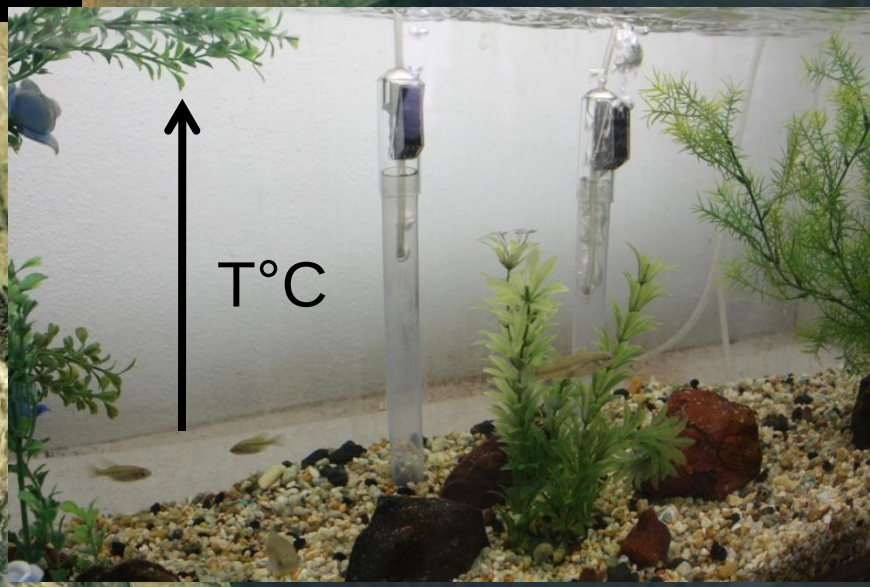
El acuario, la gran atracción del zoológico de Morelia






Why no Poecilids?

25°C but <10°C
Not optimal conditions for Poecilids



Most of the Poecilids live in lowland and tropical areas of Mexico

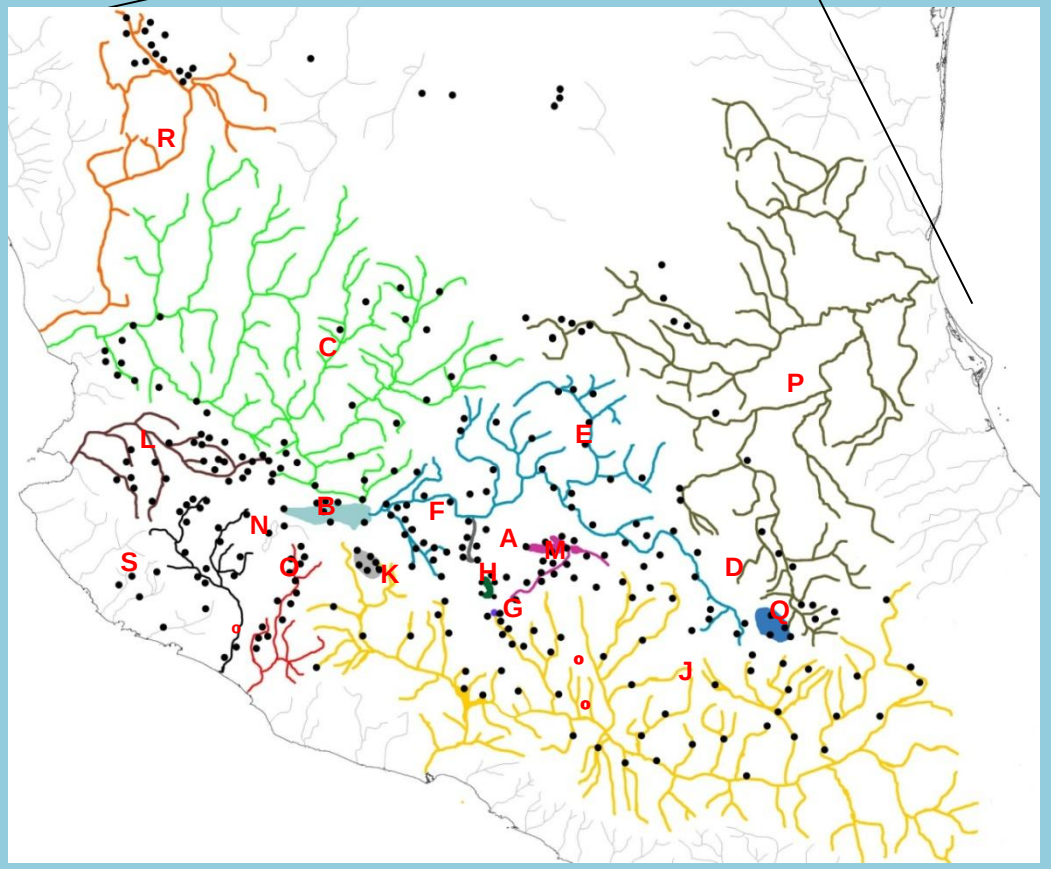
If we really like to conserve the biodiversity of the fishes in Mexico?

Fish ark-Mexico

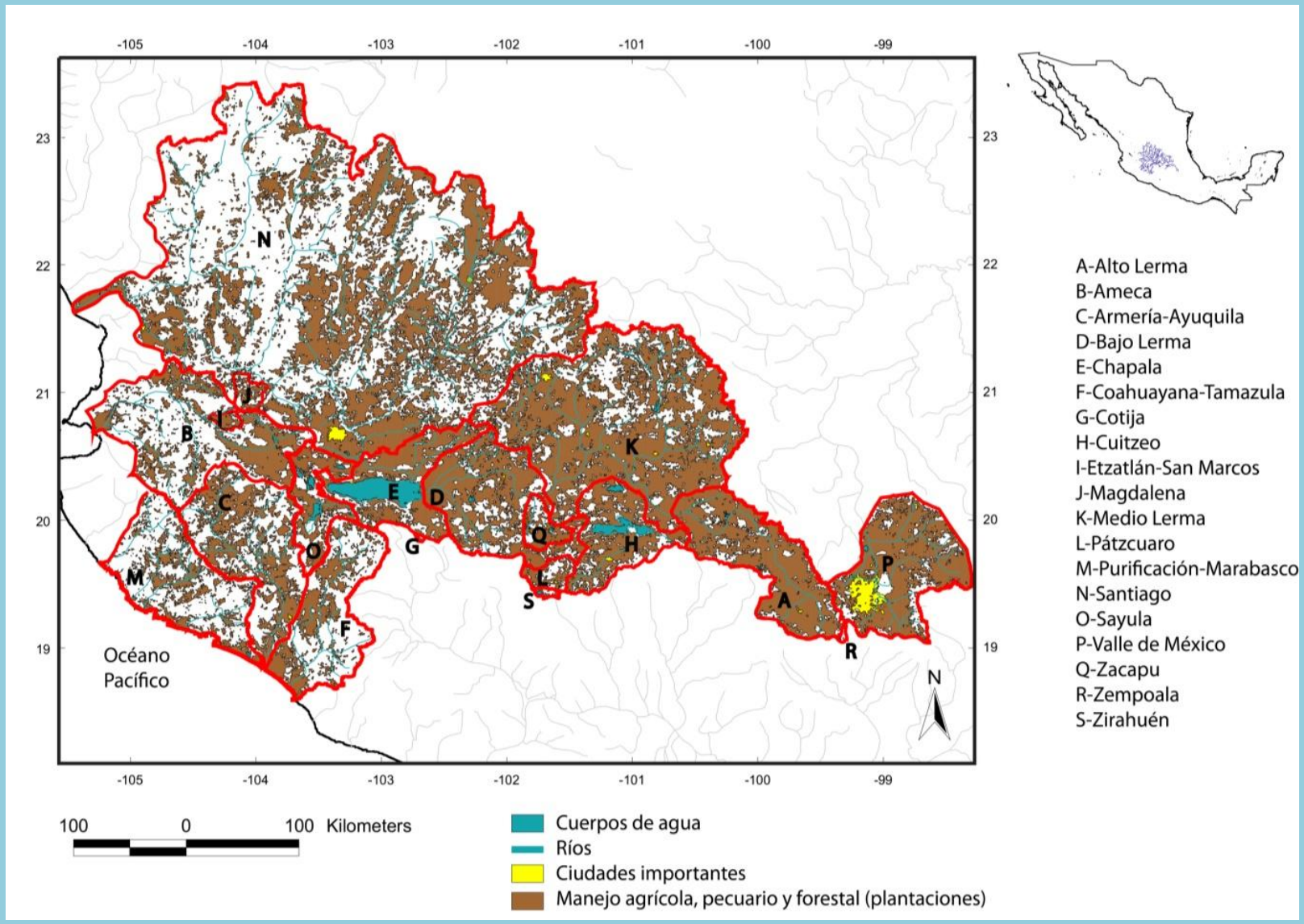
Hobbyist Aqualab Conservation Project

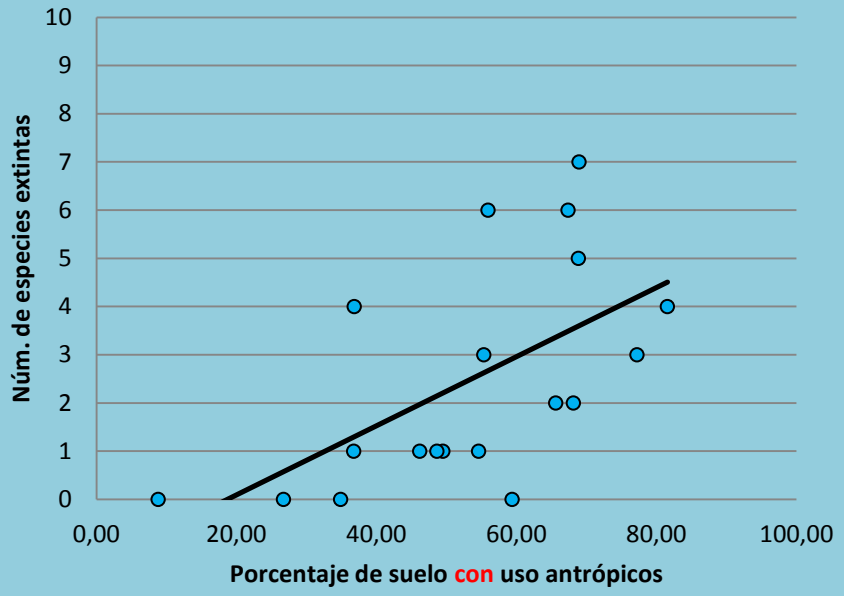

NEW RESERCH WORK

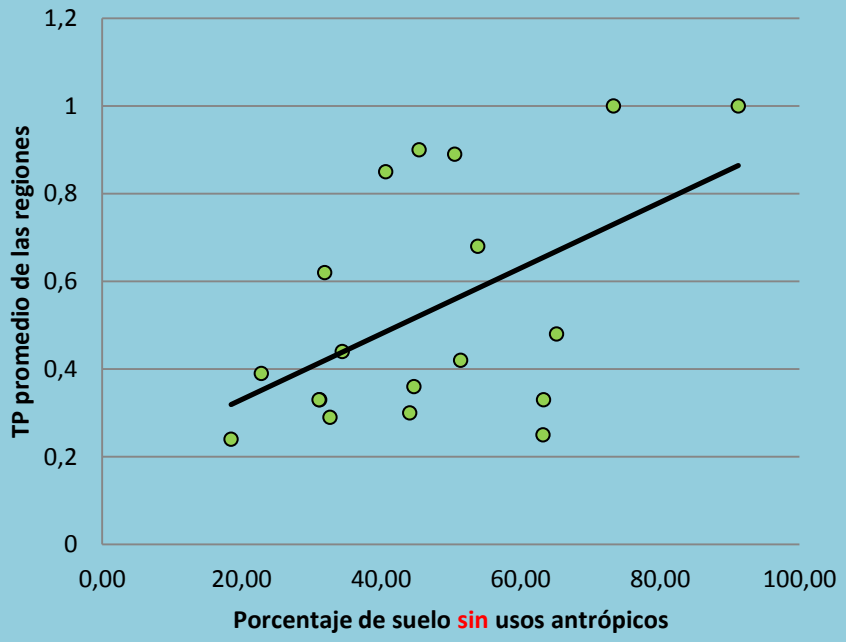
Take periodic samples, determination of historical distribution and conservation status.



73.4% of the distribution area of the goodeids are altered habitats

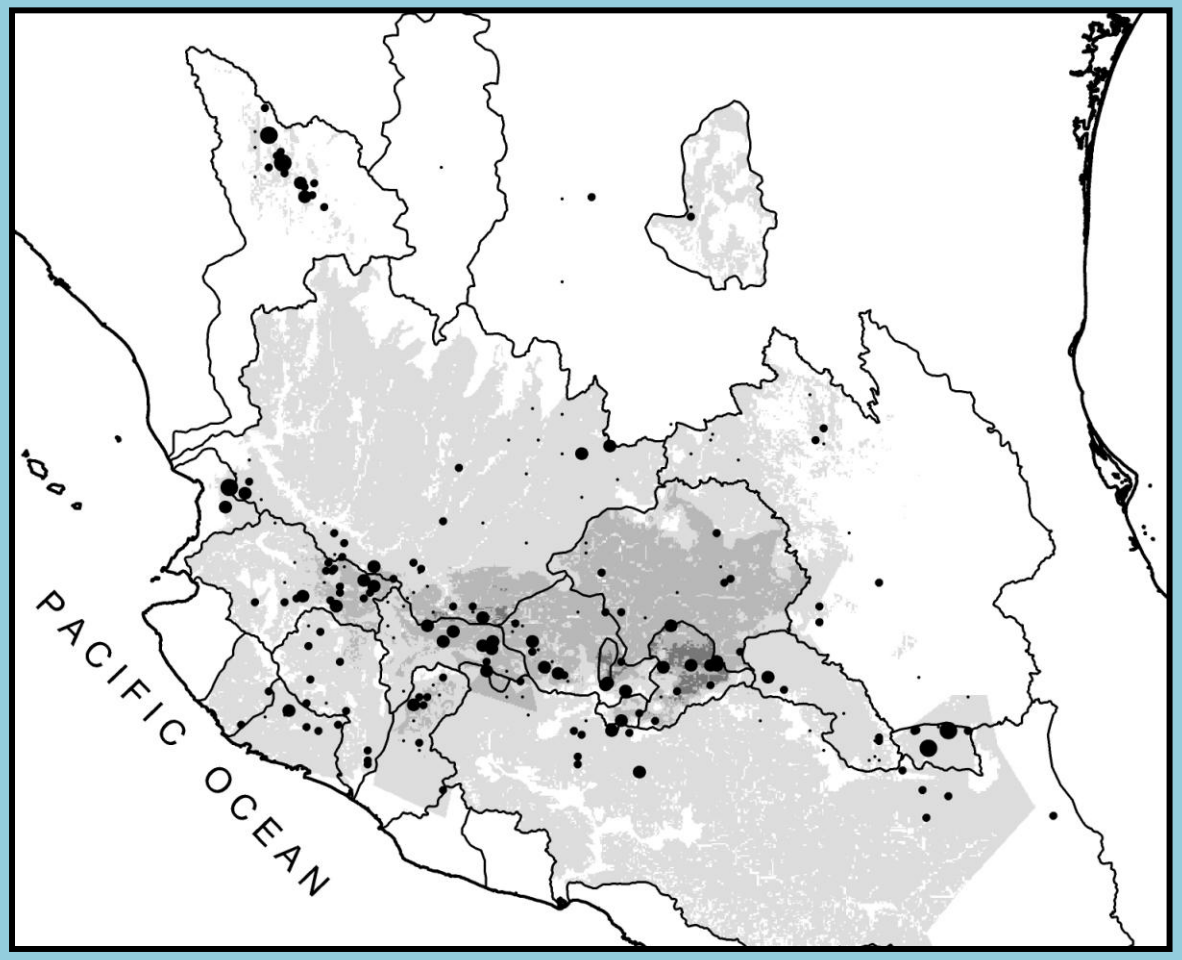


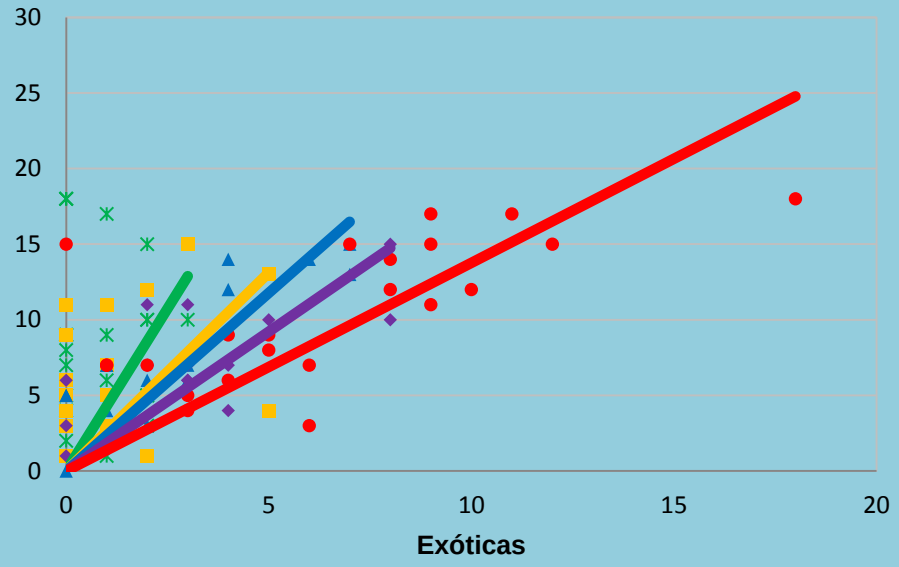

Núm. de especies extintas
10
9
8
7
6
5
4
3
2
1
0
0,00
20,00
40,00
60,00
80,00
100,00
Porcentaje de suelo con uso antrópicos


TP promedio de las regiones
1,2
1
0,8
0,6
0,4
0,2
0
0,00
20,00
40,00
60,00
80,00
100,00
Porcentaje de suelo sin usos antrópicos

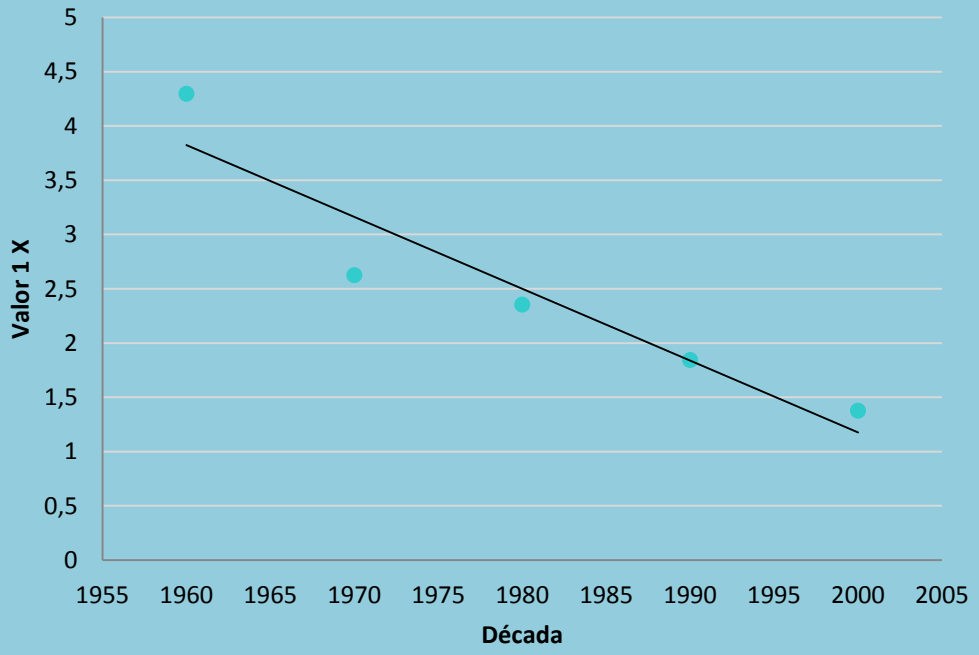
82% of the localities have at least 1 exotic species

40% with carp and Tilapia, 12% with bass, 8% Poecilids



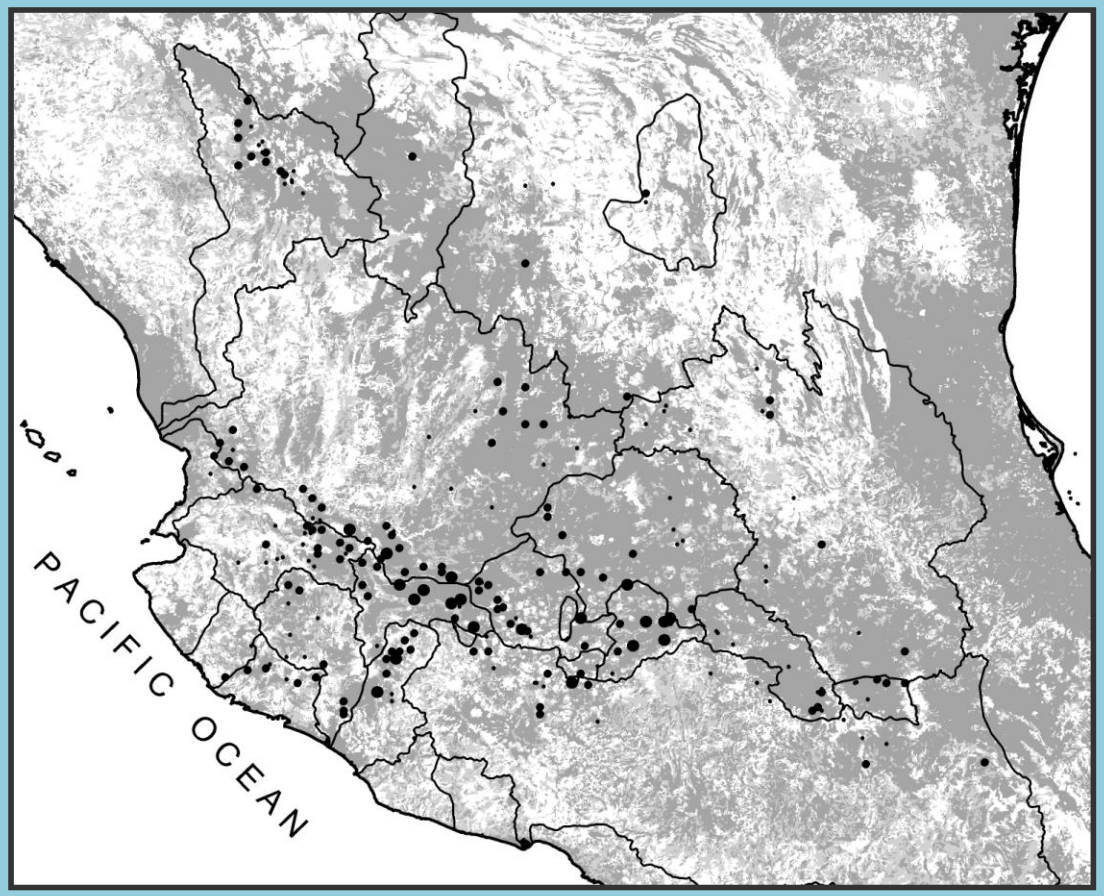

30
25
20
15
10
5
0
0
5
10
15
20
Exóticas

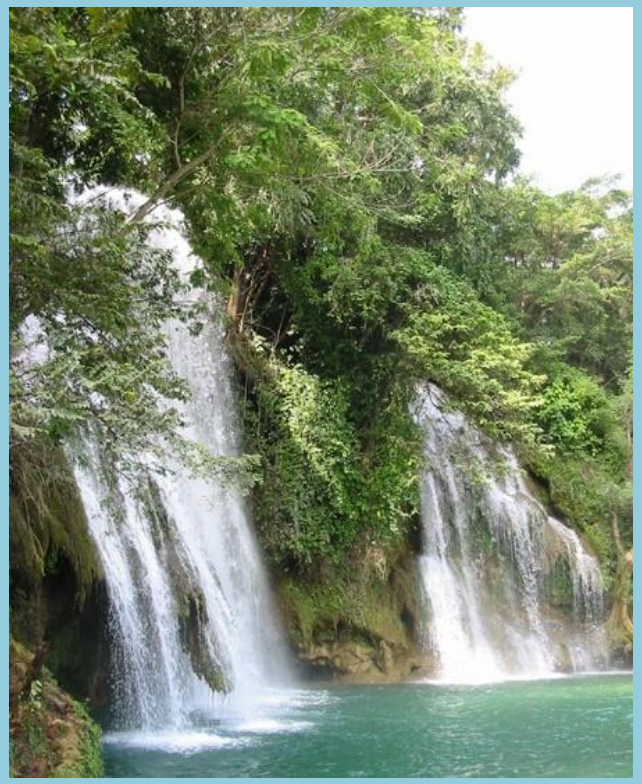

www.naturfoto.cz
© Jiří Bohdal

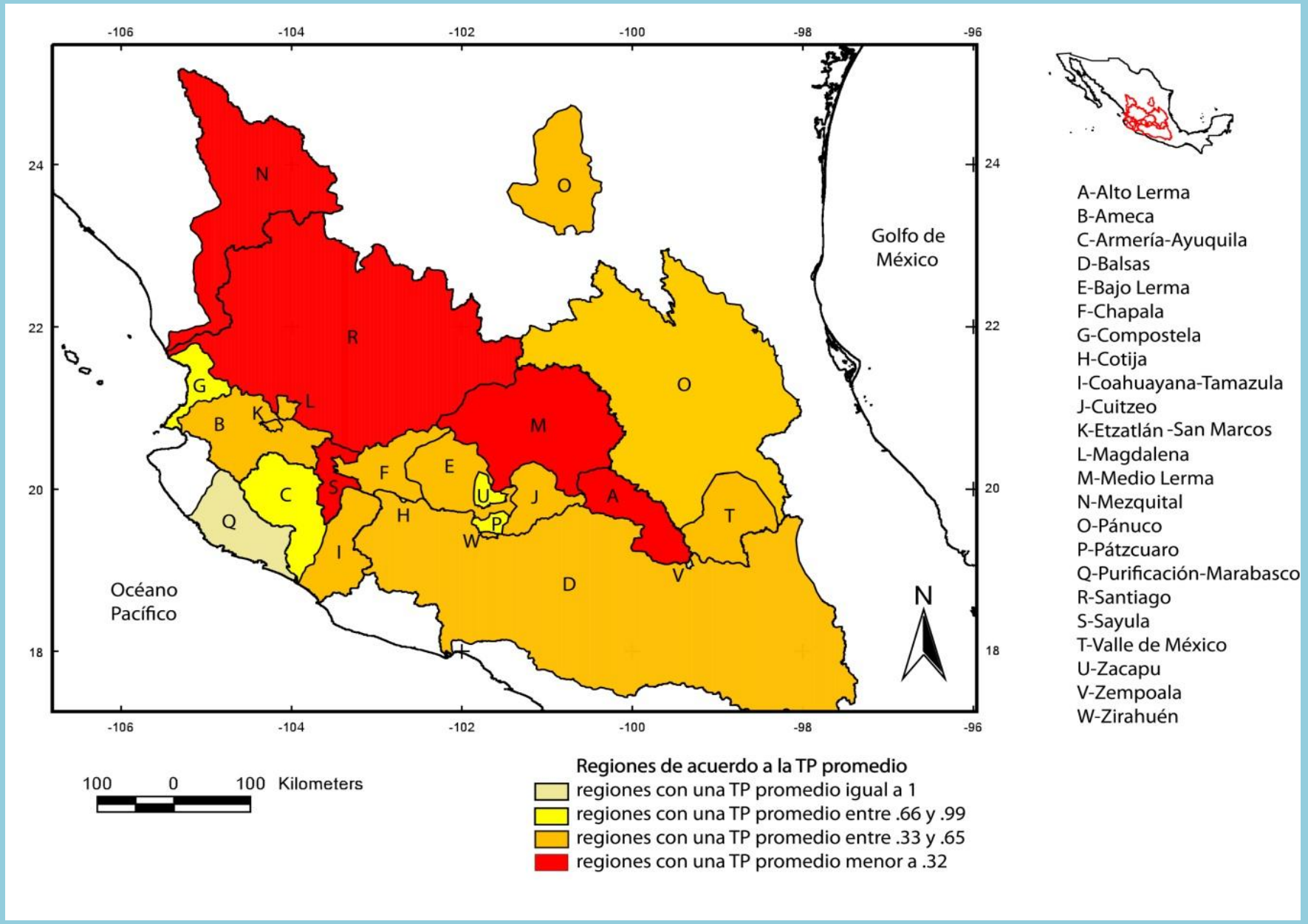

5
4,5
4
3,5
3
2,5
2
1,5
1
0,5
0
Valor 1 X
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
Década

Influence of *Poecilia mexicana* in the extinction risk of *Ameca splendens, Goodea atripinnis* and *Zoogoneticus tequila*

60% of the species show 50% of reduction and 15% were lost in more than 70% of the area, 10 are extinct in nature.

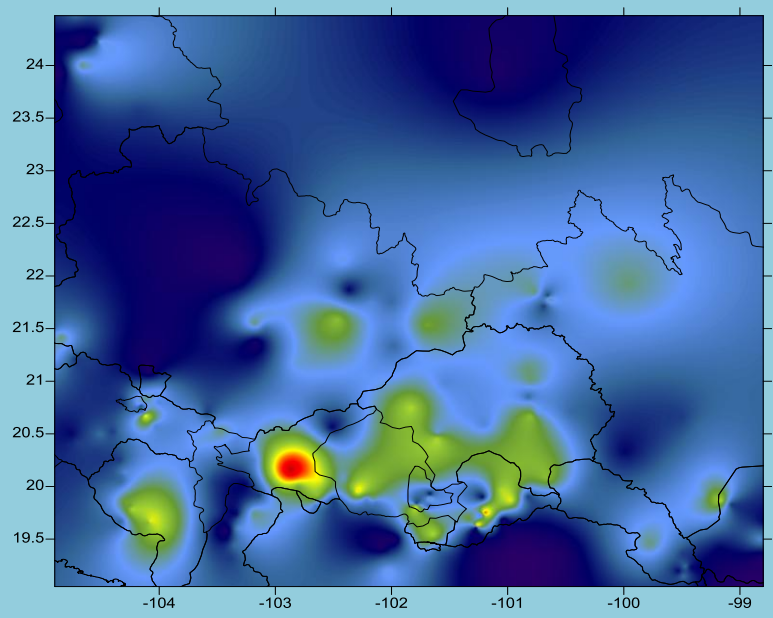




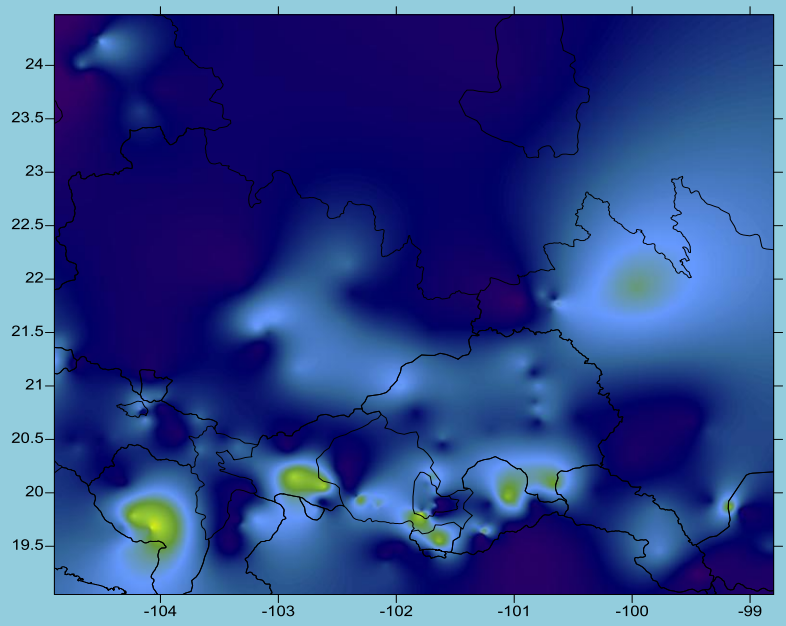


TP= NspH/NspA. Means TP 1 all the species historical registered are present

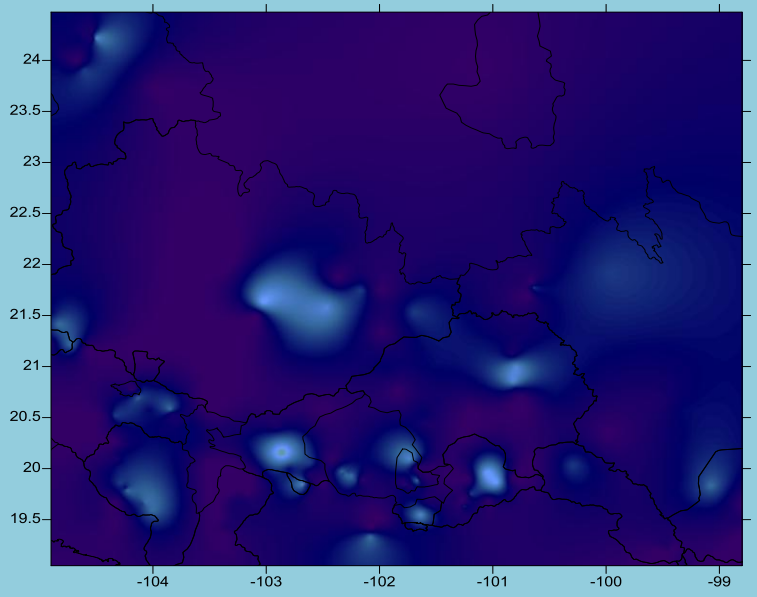
Climatic change vs native species



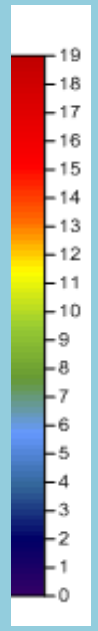
2000



2050

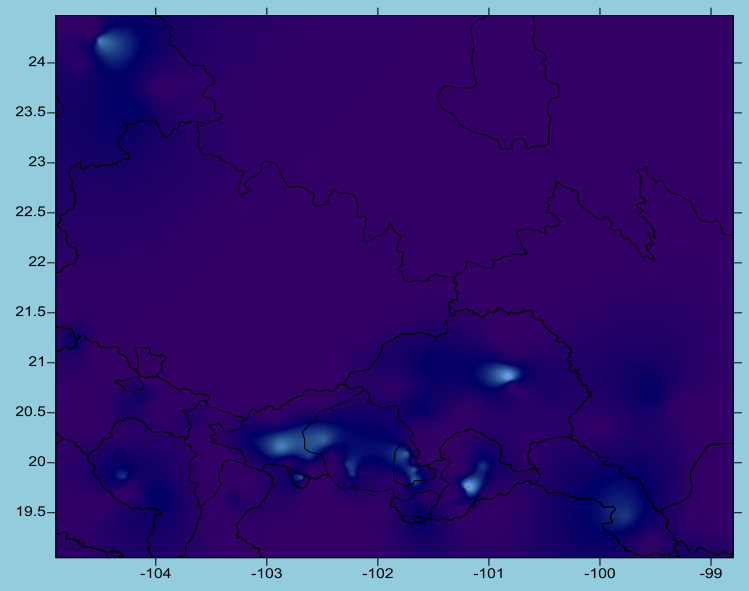


2080

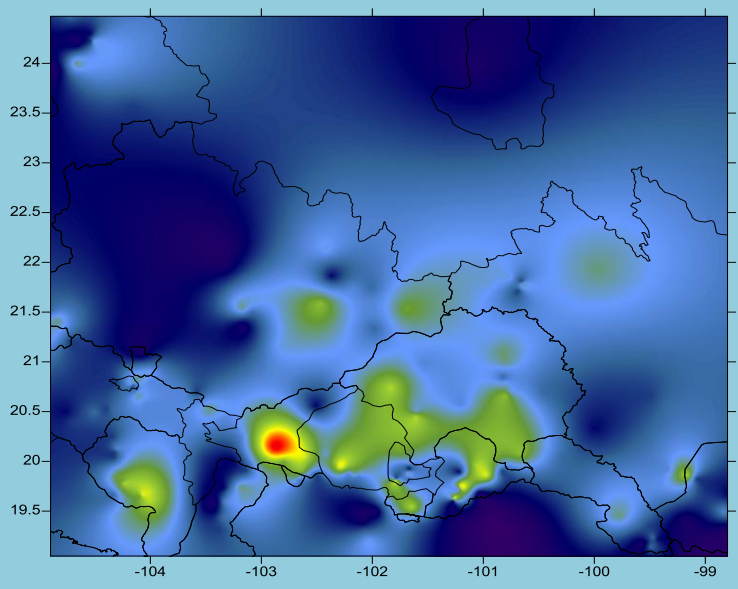


Number of species

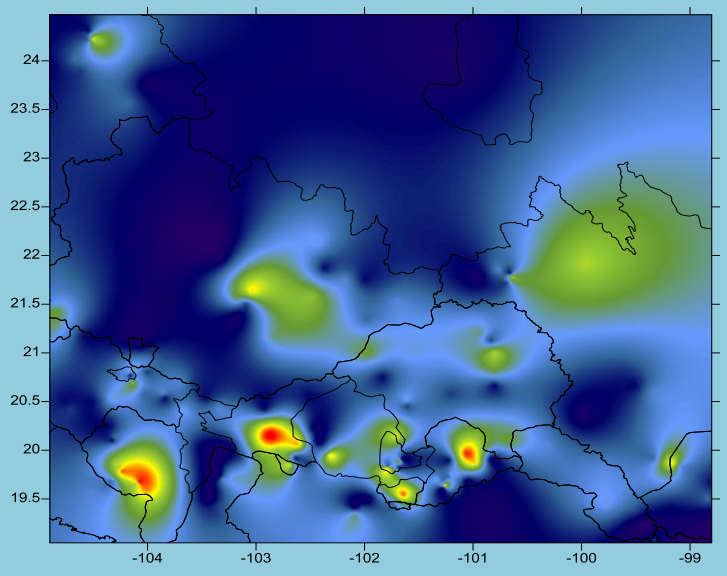
Climatic change vs introduced species



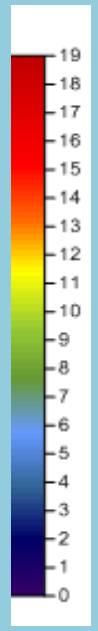
2000



2050



2080



Number of species

Why?

Neartic

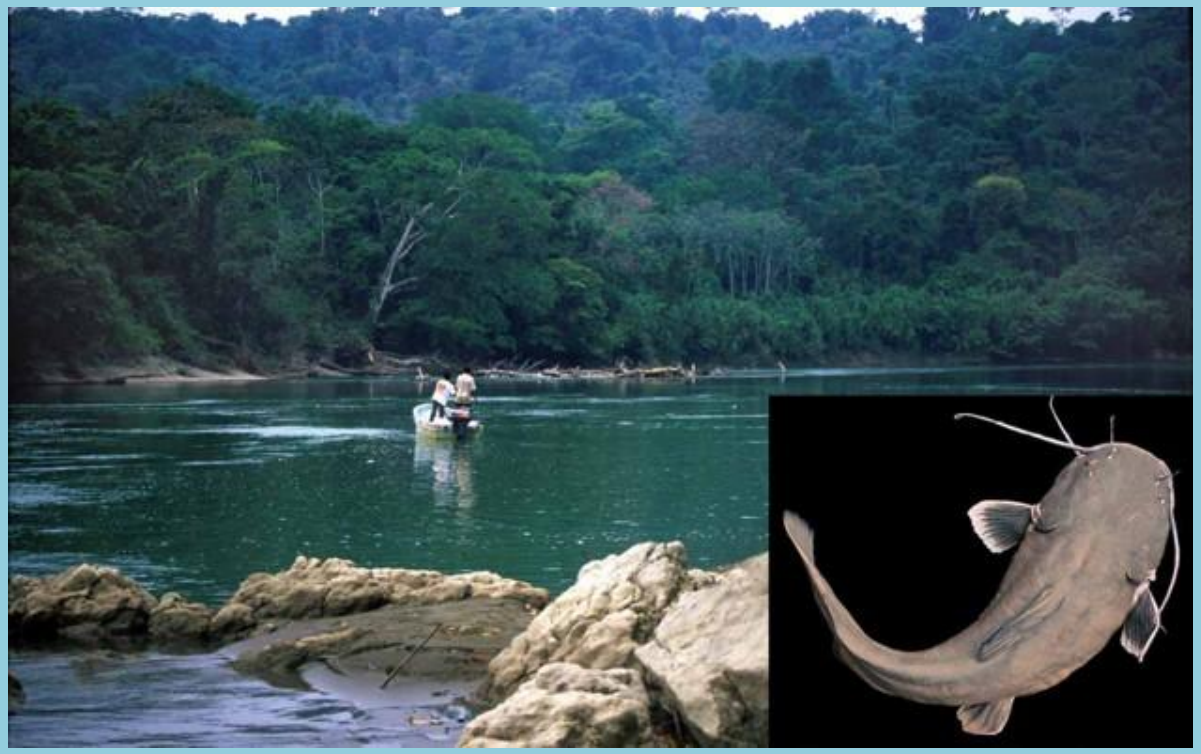
Endemics

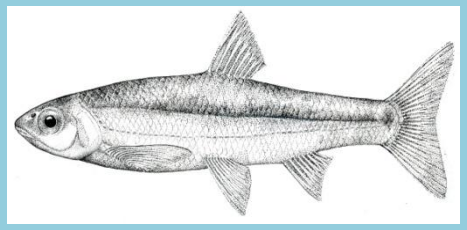
Neotropical

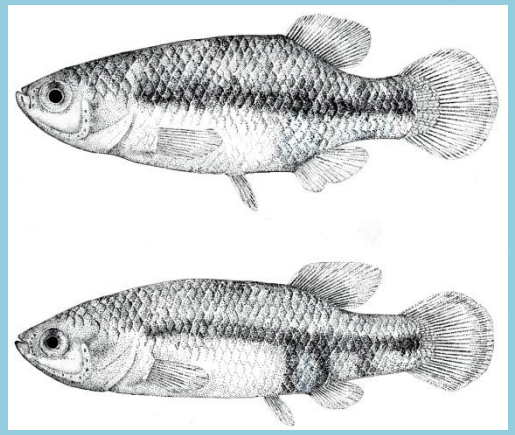
México: Imagen desde el espacio
Comisión Nacional para el Conocimiento y Uso de la Biodiversidad
Mosaico 2002 de imágenes Modis sin nubes del satélite Terra,
bandas 1,4,3 (RGB), resolución espacial 250 metros,
sobre un modelo digital de terreno.


EVEN MORE

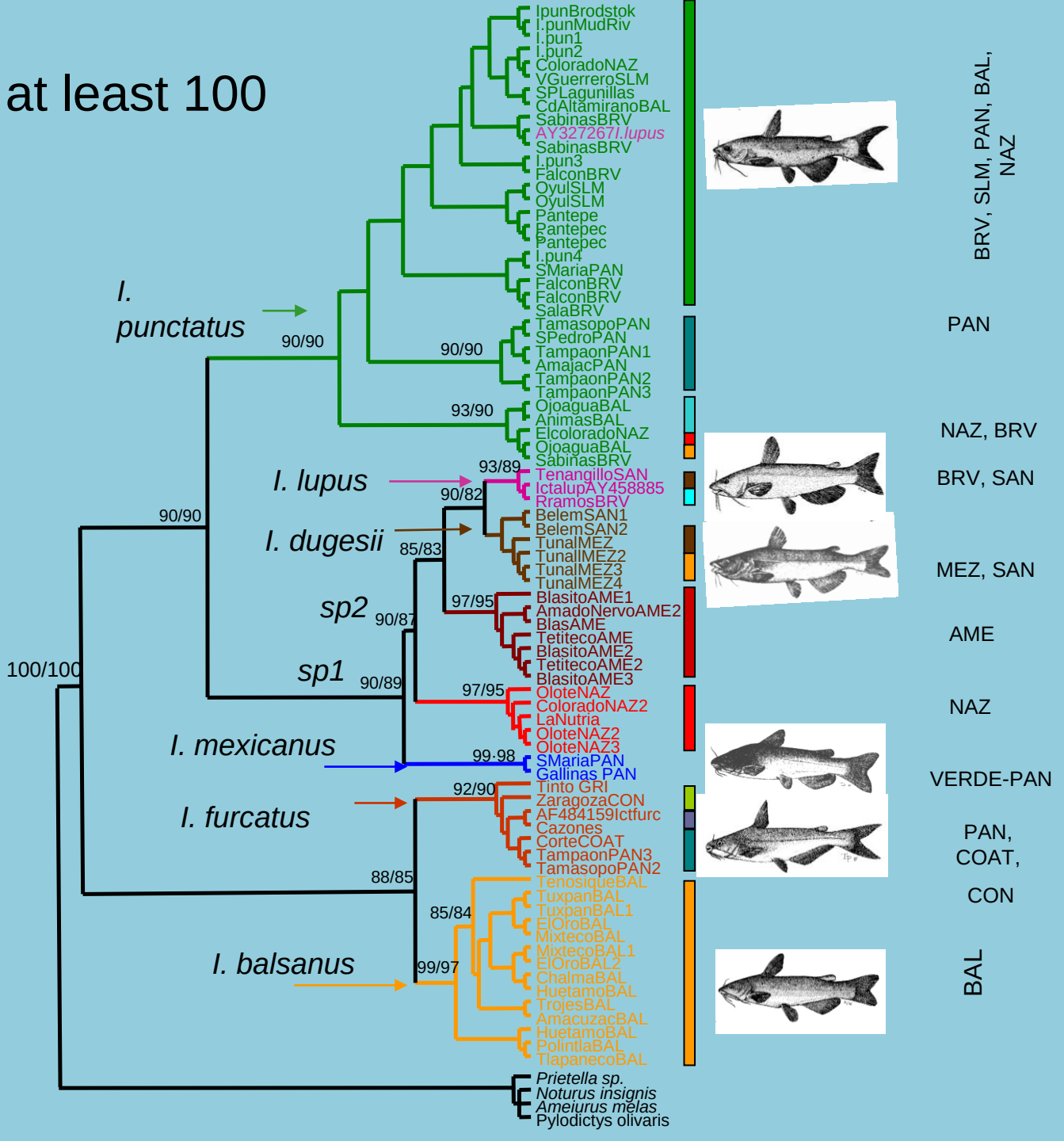
New techniques increased the knowledge of fish biodiversity. In the last 5 years one family of fish, 9 genera and about 25 species have been described (5 per year).





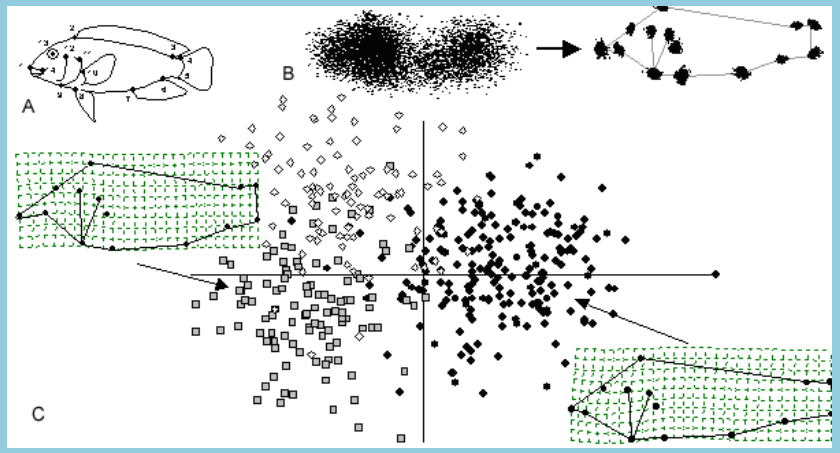


We calculate that at least 100 new species

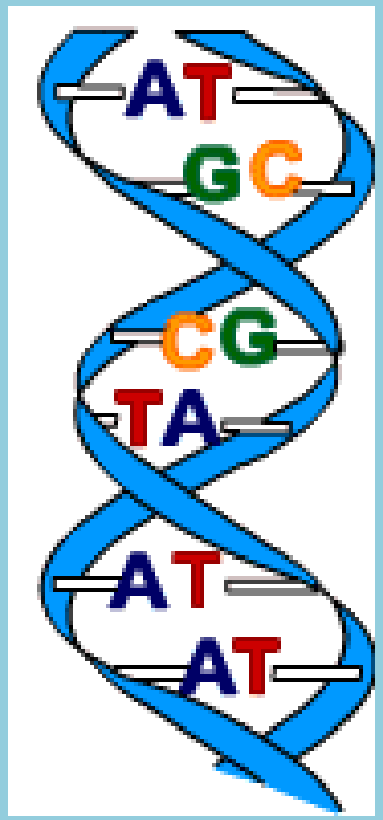


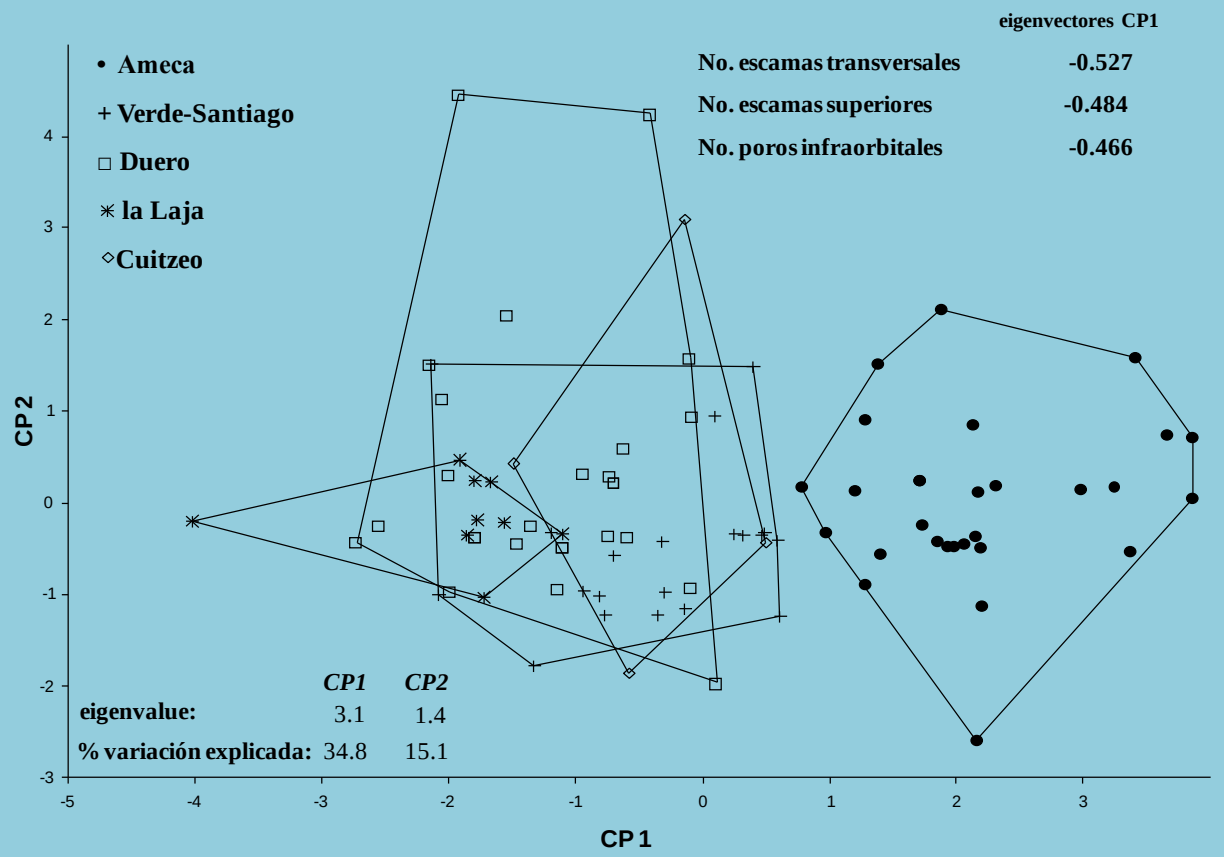

WE ARE LOSING SPECIES
BEFORE DISCOVERY

New research work


A
B
C

Taxonomy


AT
GC
CG
TA
AT
AT


eigenvectores CP1
• Ameca
+ Verde-Santiago
□ Duero
✳ la Laja
◇Cuitzeo
No. escamas transversales -0.527
No. escamas superiores -0.484
No. poros infraorbitales -0.466
CP 2
CP 1
CP1 CP2
eigenvalue: 3.1 1.4
% variación explicada: 34.8 15.1

What is a species?

One of the oldest discussions in science

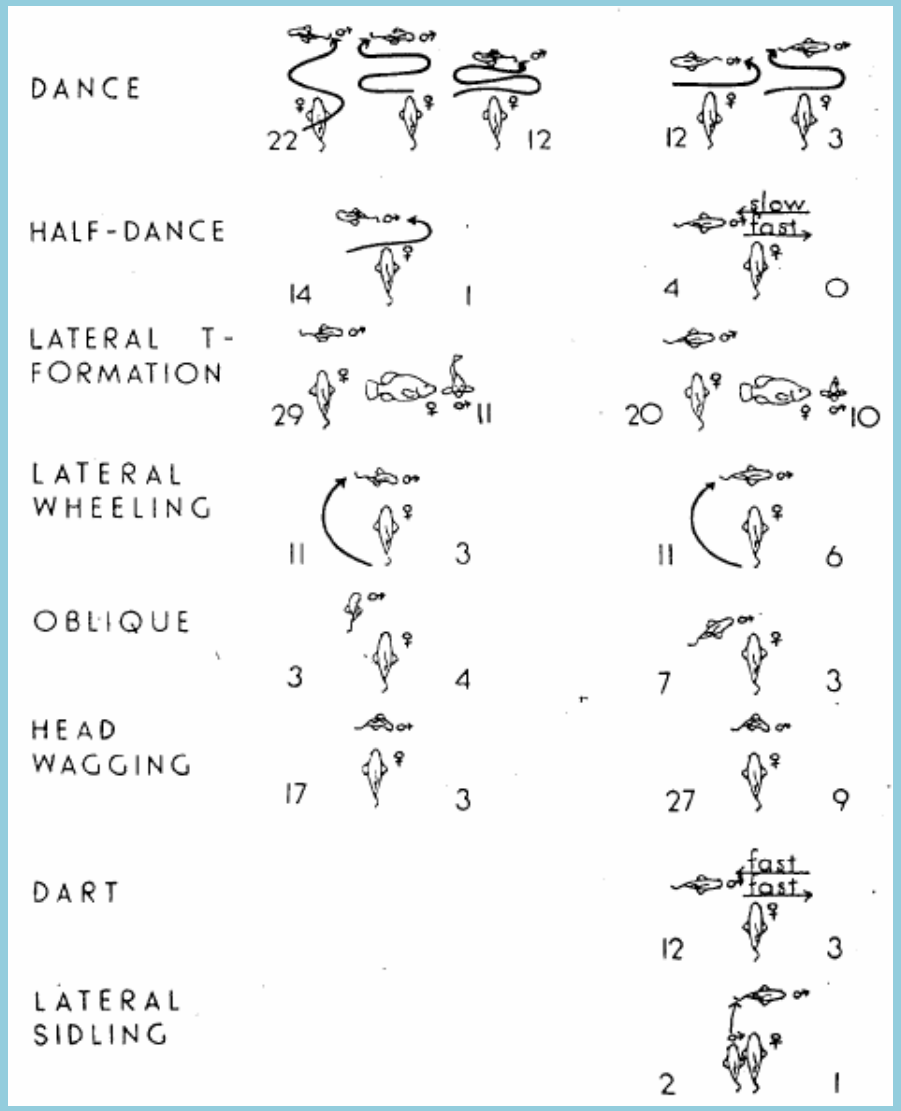
Biological concept? Evolutionary concept?

Ecological concept? Cohesive concept?

All of them maybe are correct depending on the species and the interest of the scientist…….

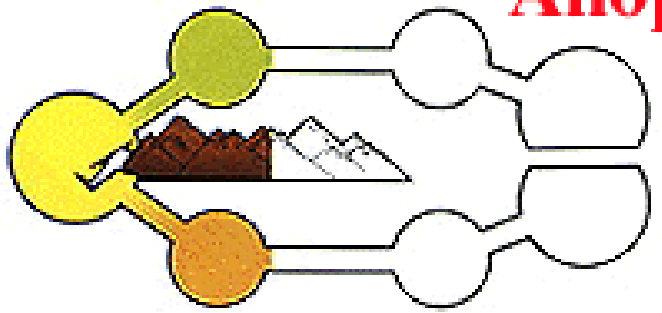
Which concept we accept…….Phylogenetic concept…. Why?

Reproductive isolation

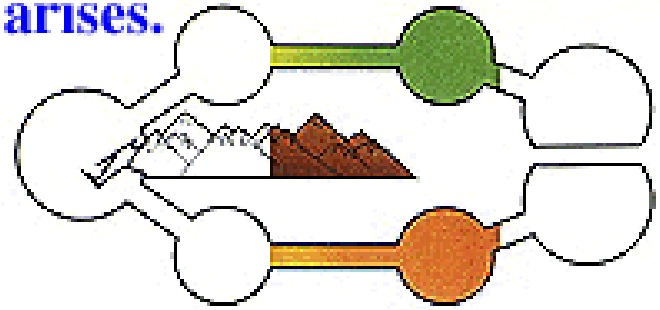


Allopatric Speciation Model

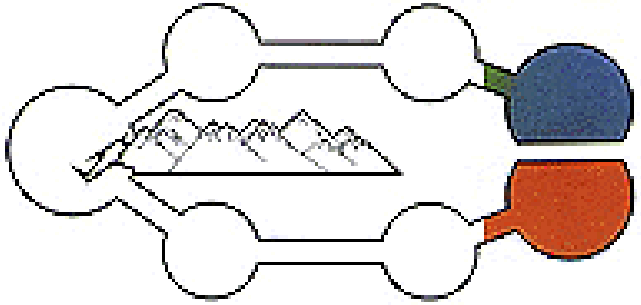
- initiated by a physical barrier



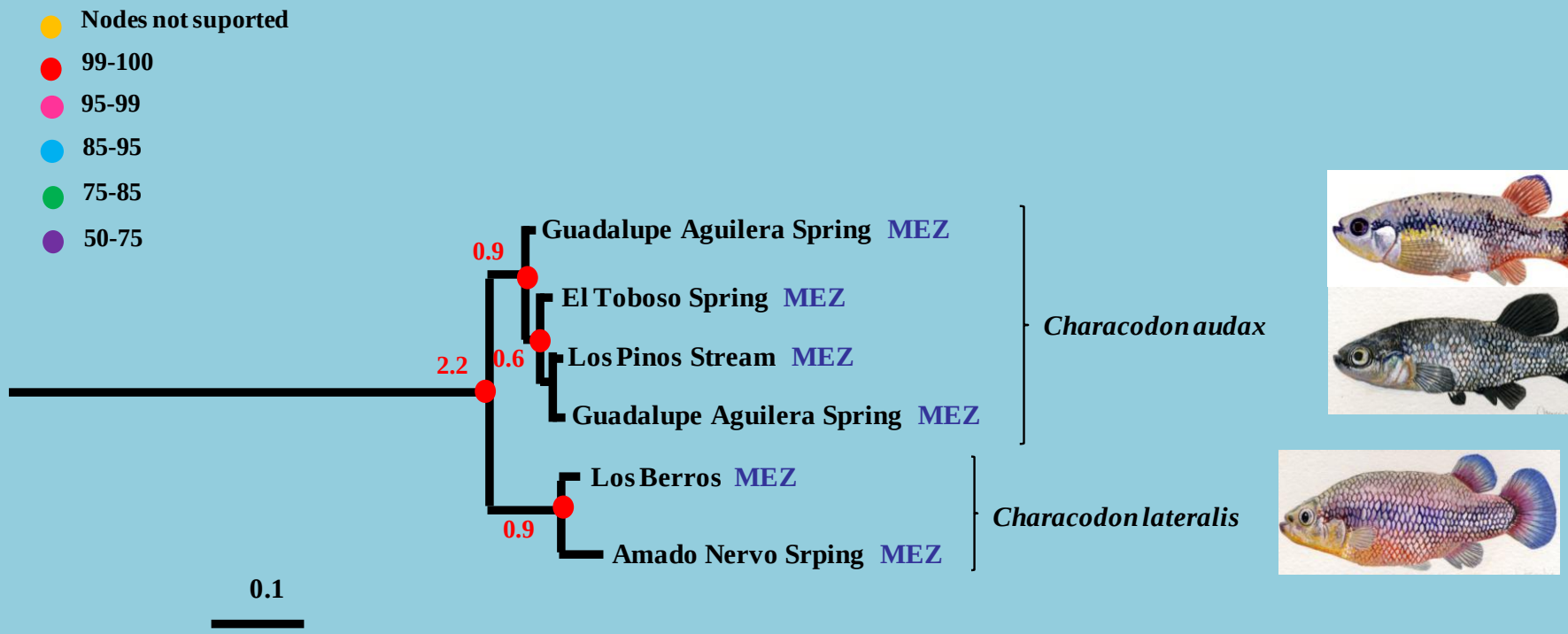
1. A physical barrier to breeding arises.

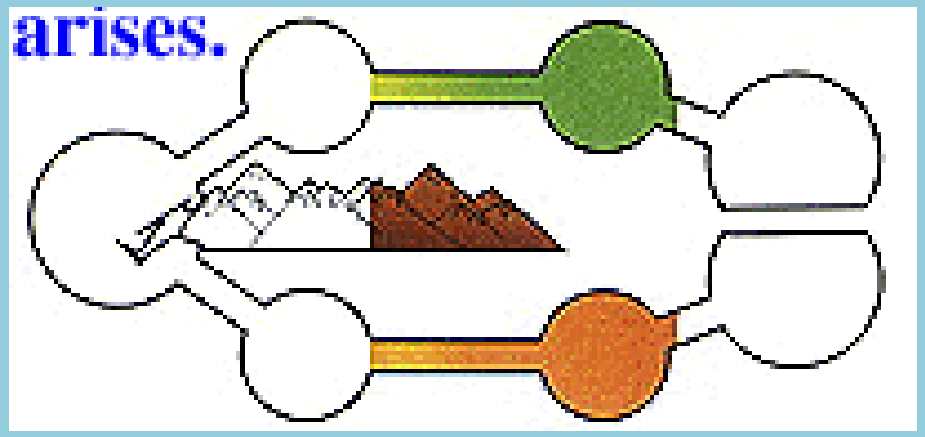


2. Genetic differences accumulate.

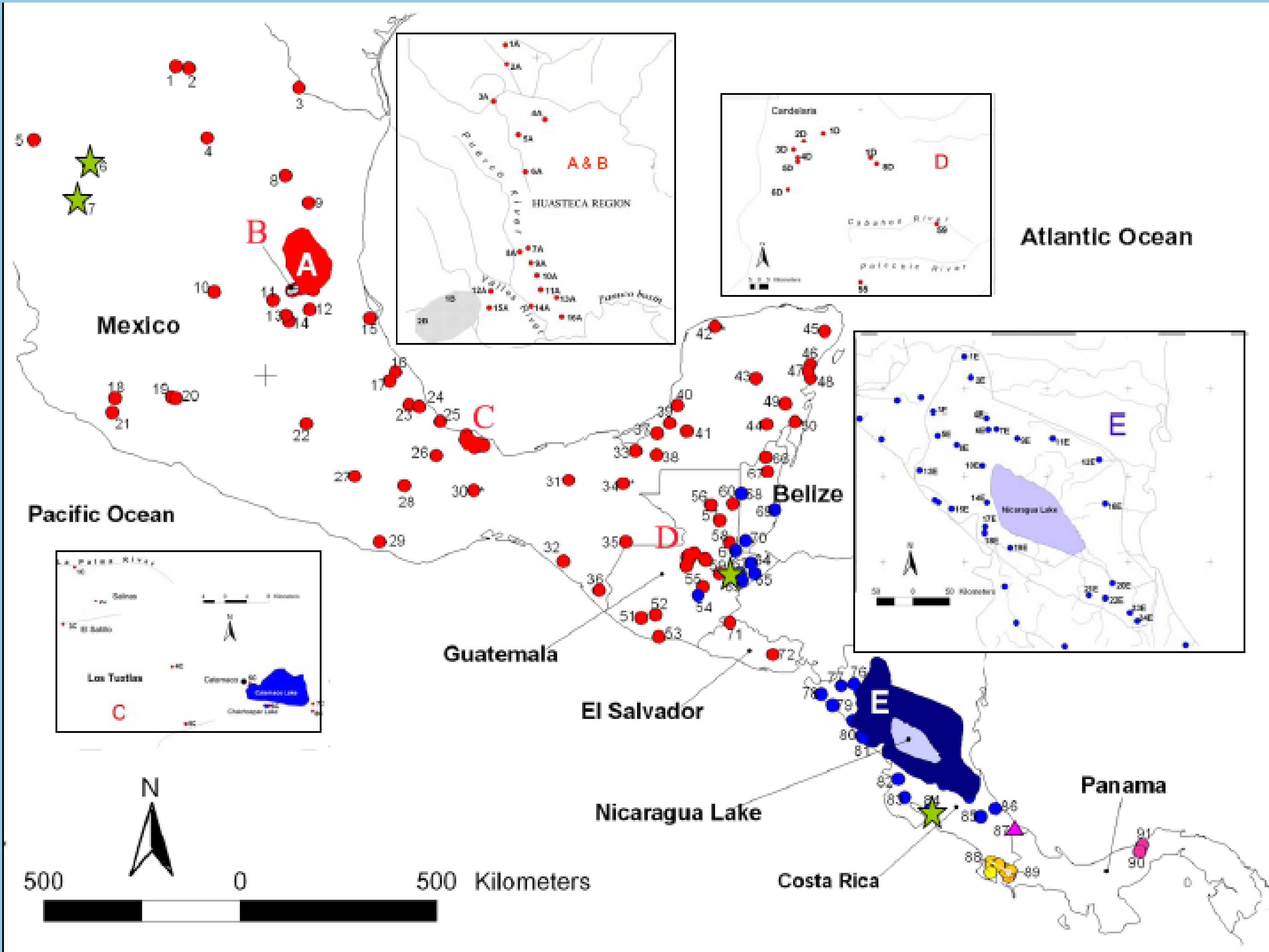


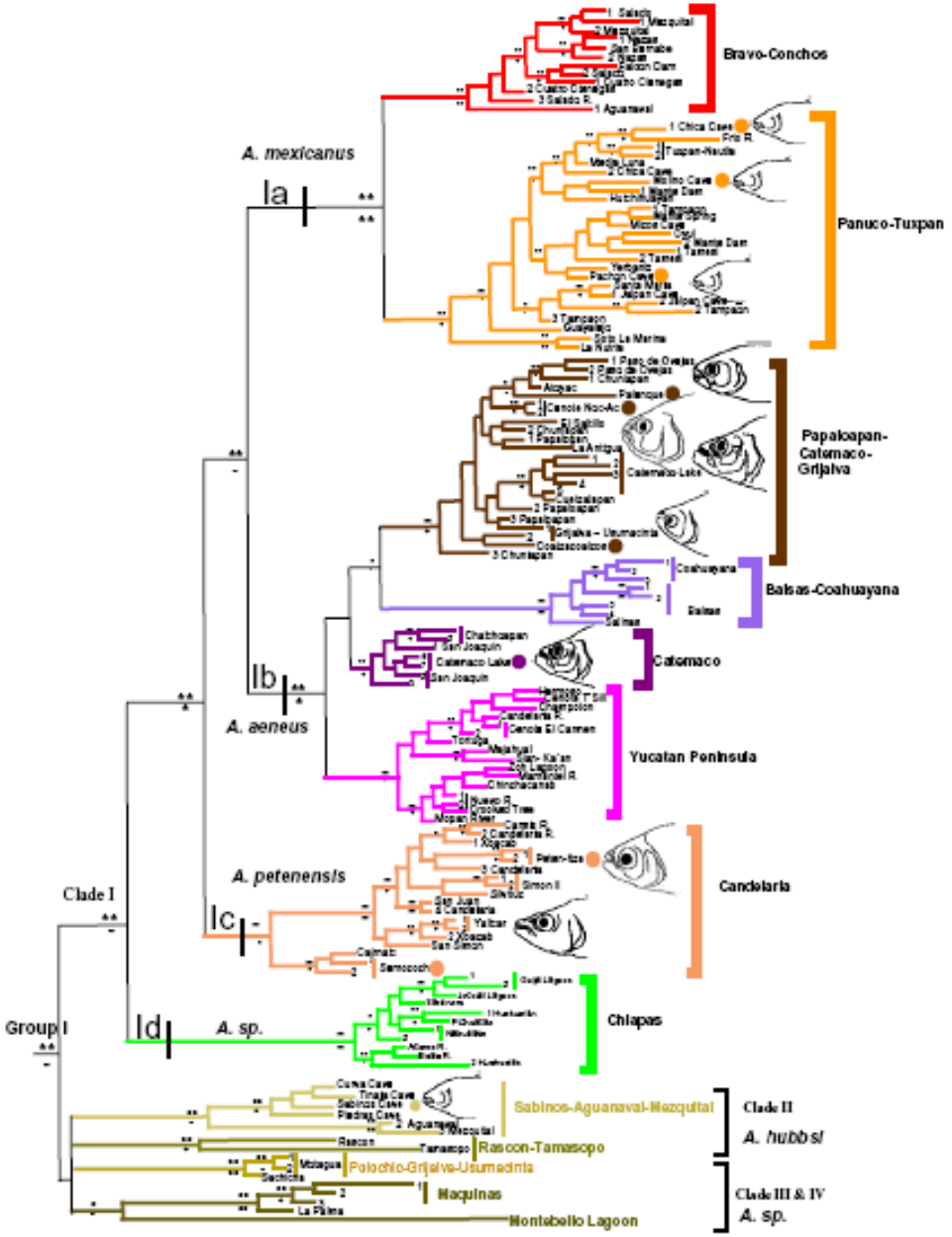
3. Reproductive isolation has occurred.





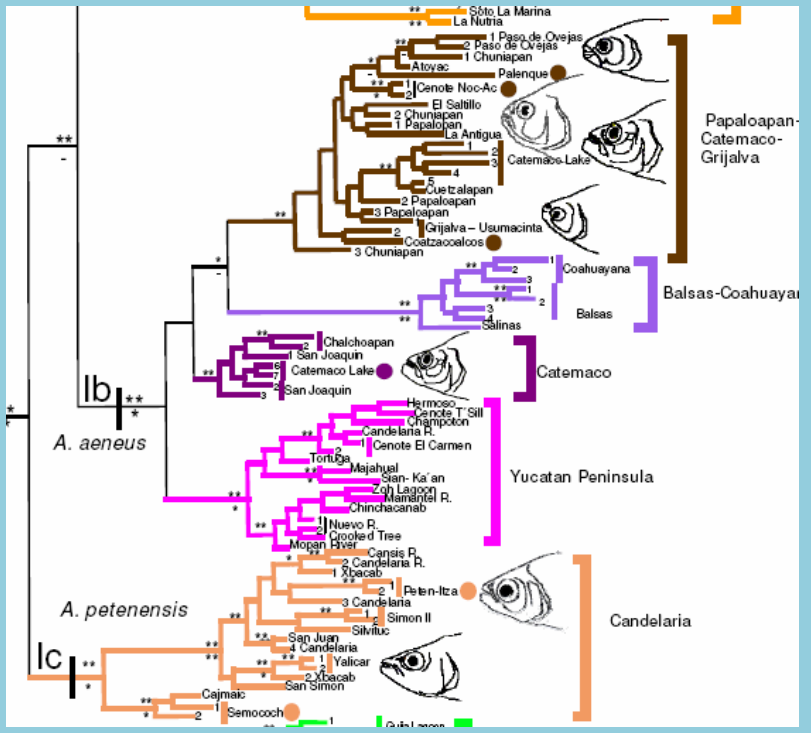
Natural groups


Mexico
Pacific Ocean
Atlantic Ocean
Belize
Guatemala
El Salvador
Nicaragua Lake
Costa Rica
Panama
HUASTECA REGION
A & B
D
E
C
Nicaragua Lake
Los Tuxtlas
500 0 500 Kilometers
N

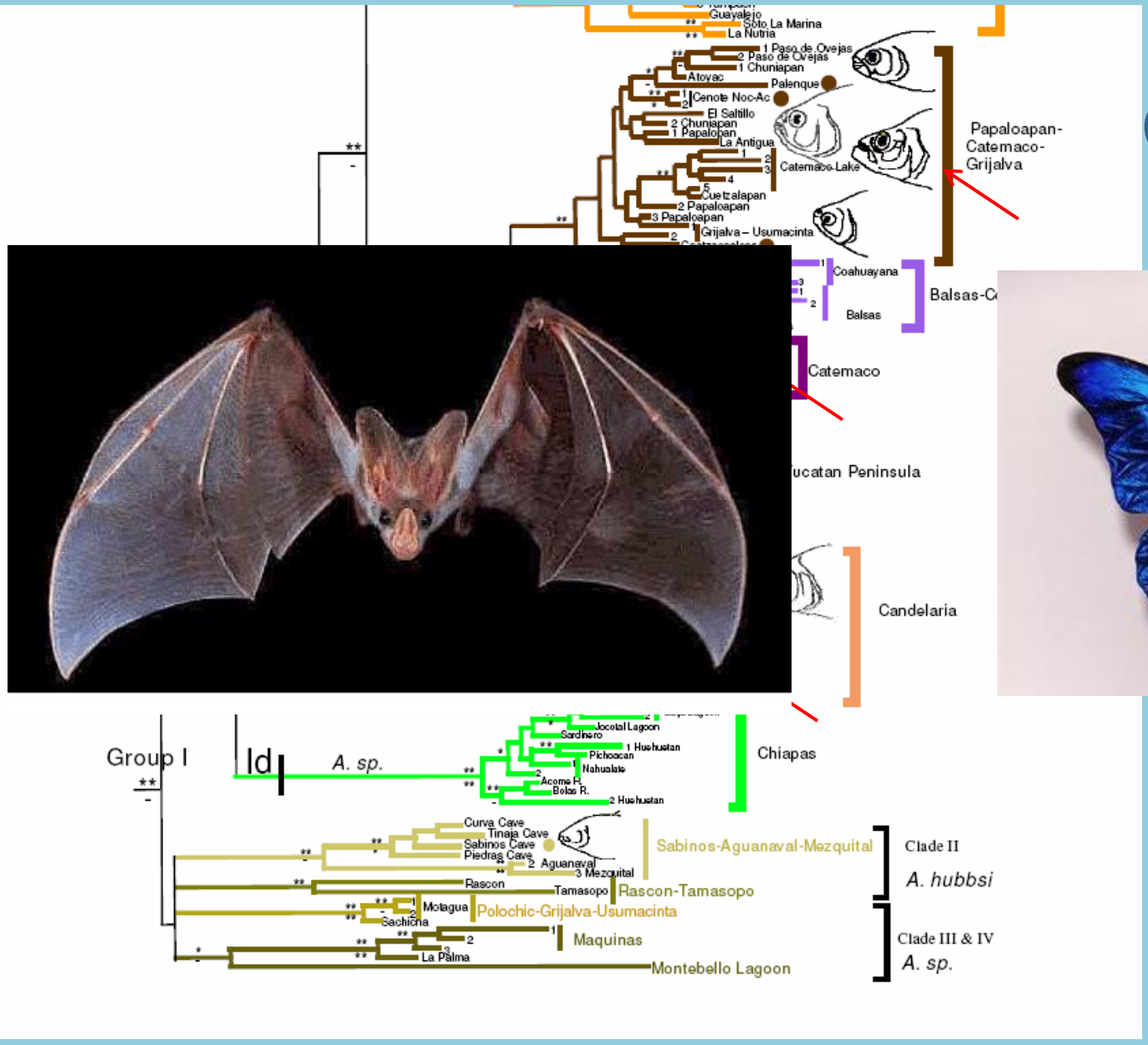


Morphological adaptation to predation of piscivorous species or to live in caves

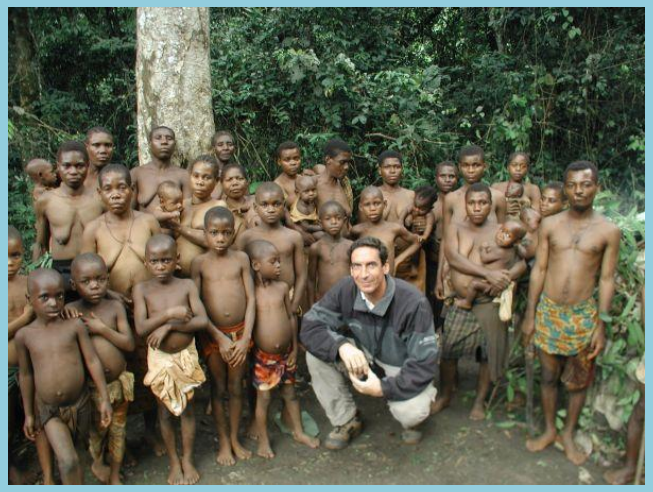
Evolutionary convergence

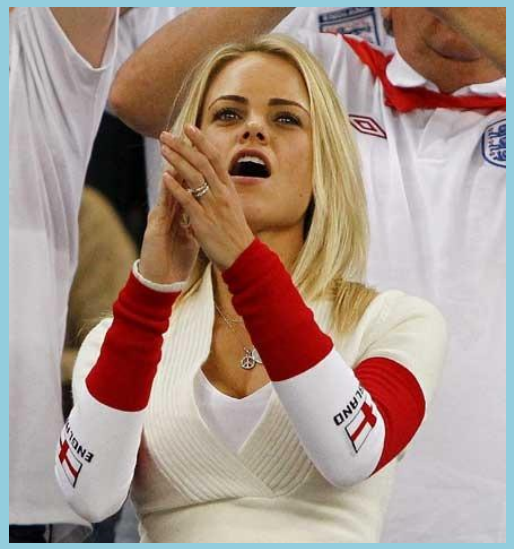


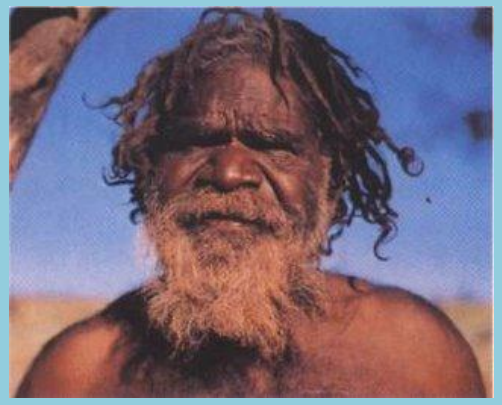
Morphological adaptation to predation by piscivorous species



Epigenesis, 1 gen expressed or not expressed

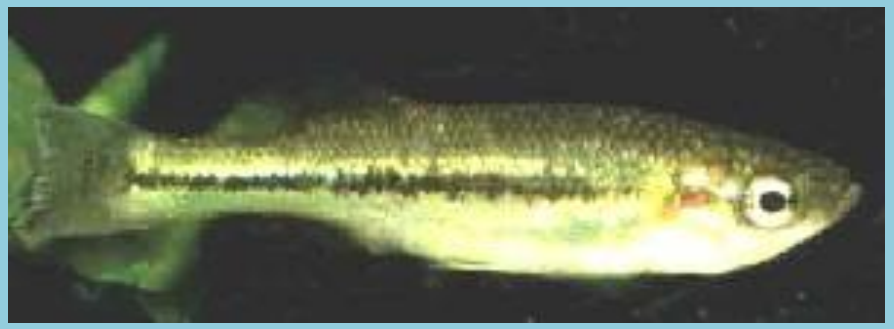




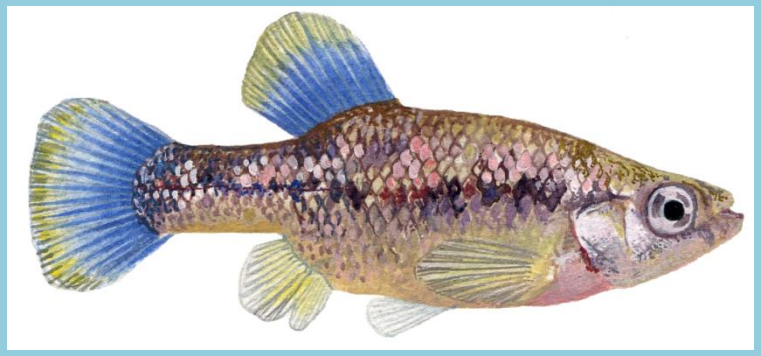


Is it the same species?

Habitat adaptation?
Incipient speciation?



Xenotoca dibbleni under description



BI/ML
NJ

ZAC-1 (1 Zac)
ZAC-2 (1 Zac)
ZAC-3 (1 Zac)
ZAC-4 (1 Zac)
ZAC-5 (1 Zac)
ZAC-6 (1 Zac)
ZAC-7 (1 Zac)
ZAC-8 (3Zac)

70/99
64

Clade 2.1

CHA-9 (1 Alb)
CHA-11 (1 Alb)
CHA-12 (1 Alb)
CHA-13 (1 Alb)
CHA-10 (15 Alb)

Clade 2.7

100/100
100

JMA-37 [5 IAD; 7 JMa; 5 SFR 5 Tqe; 5 Yur]
IAD-42 (1 IAD)
IAD-43 (1 IAD)
IAD-44 (1 IAD)
YUR-39 (1 Yur)
YUR-38 (1 Yur)
SFR-45 (1 SFR)
YUR-40 (1 Yur)
YUR-41 (1 Yur)
TQE-46 (1Tqe)
TQE-47 (1Tqe)
TQE-48 (1Tqe)
JMA-49 (1 JMa)
JMA-50 (1 JMa)
JMA-51 (1 JMa)
JMA-52 (1 JMa)
JMA-53 (1 JMa)

66/48
58

84/61
69

Clade 3.2

ZAT-31 (1 Zat)
ZAT-32 (5 Zat; 10 Val)
VAL-33 (1 Val)
VAL-34 (1 Val)
VAL-35 (1 Val)
VAL-36 (1 Val)

Clade 2.3

SES-14 (2 SEs)
CUI-19 (1 Bel)
SCR-28 (1 SCr)
SCR-29 (1 SCr)
CUI-16 [4 SEs; 6 Bel; 4 Min; 4 SCr]
CUI-20 (1 Bel)
CUI-21 (1 Bel)
CUI-17 (1 Bel)
MIN-22 (2 Min)
MIN-23 (1 Min)
MIN-24 (1 Min)
MIN-25 (1 Min)
MIN-26 (1 Min)
SEs -15 (1 SEs)
SCR-27 (1 SCr)
SCR-30 (1 SCr)
CUI-18 (1 Bel)

100/100
100

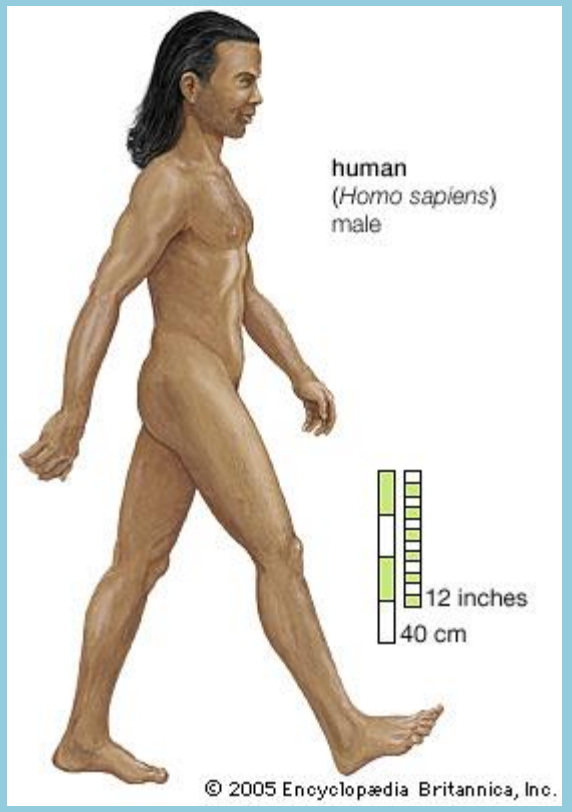
Lineage I

Lineage II

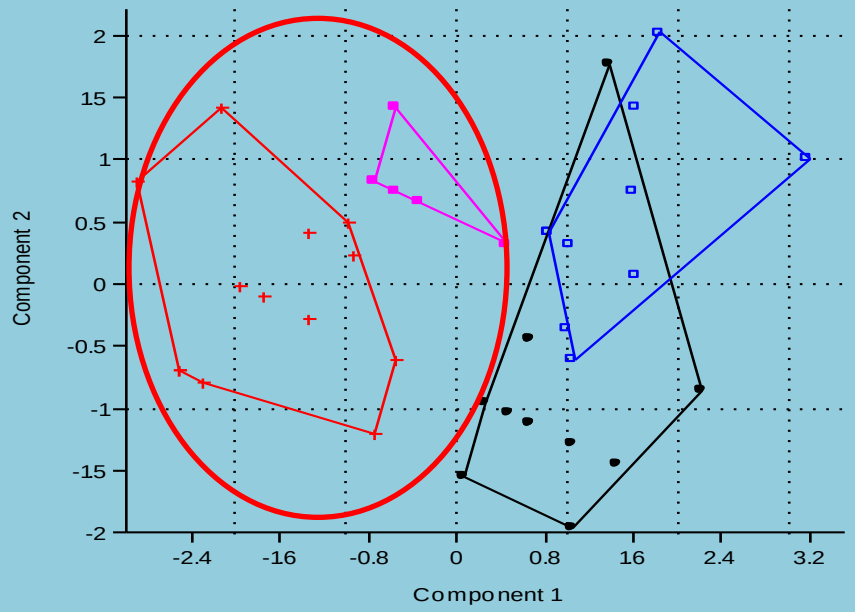
$\bar{D}_{ML}$ = 5.4 %
$\bar{D}_{p}$ = 5.08%,

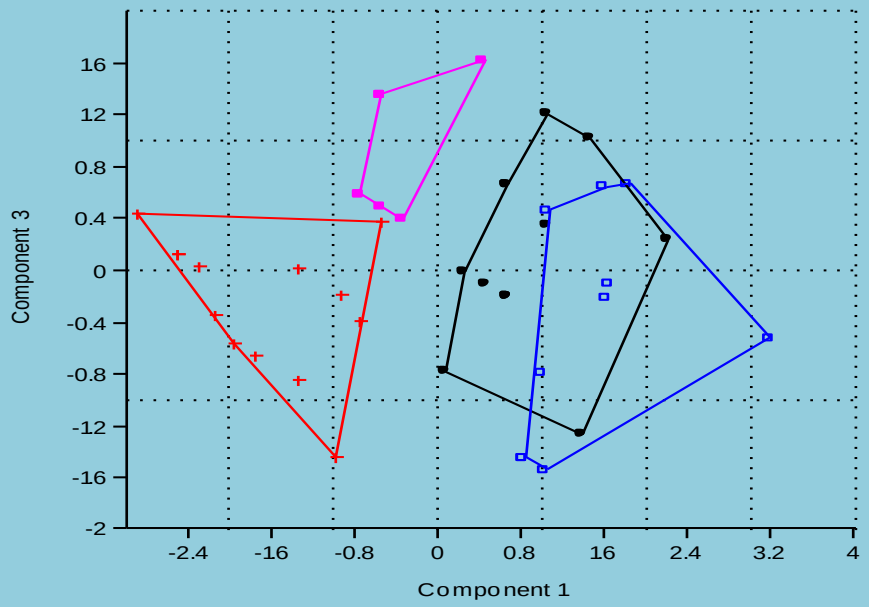
0.001 substitutions/site

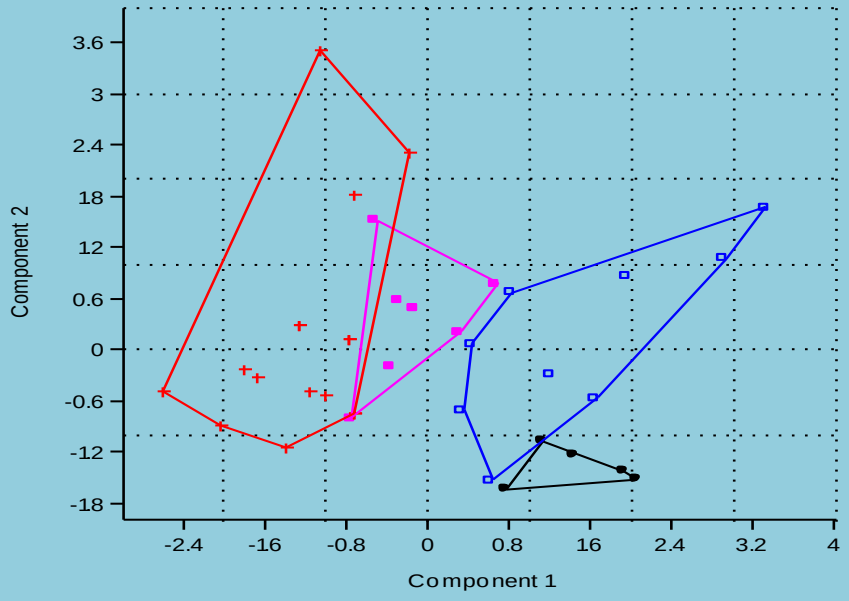
3 %

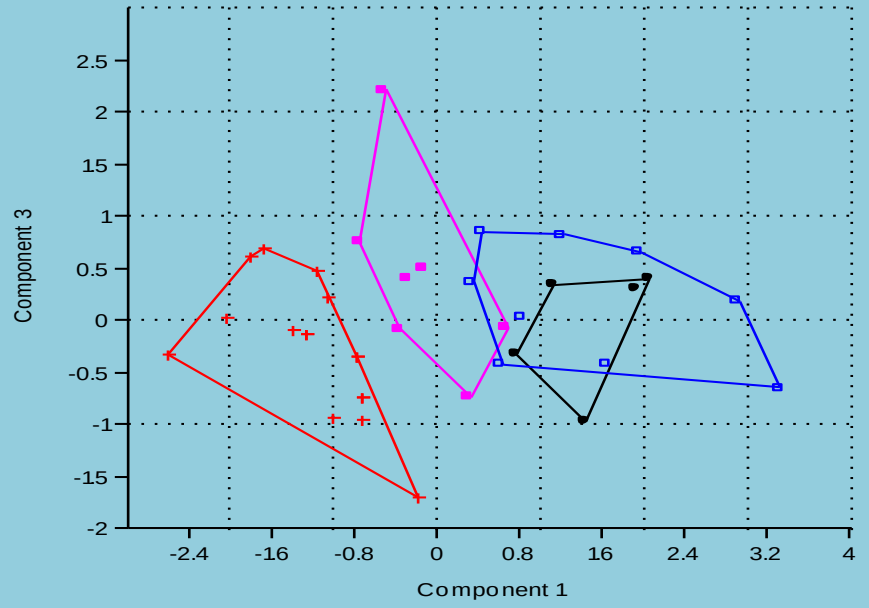

human
(*Homo sapiens*)
male
12 inches
40 cm
© 2005 Encyclopædia Britannica, Inc.

Meristic: Blue JM; Black SAL; Red MIN; Pink SCR



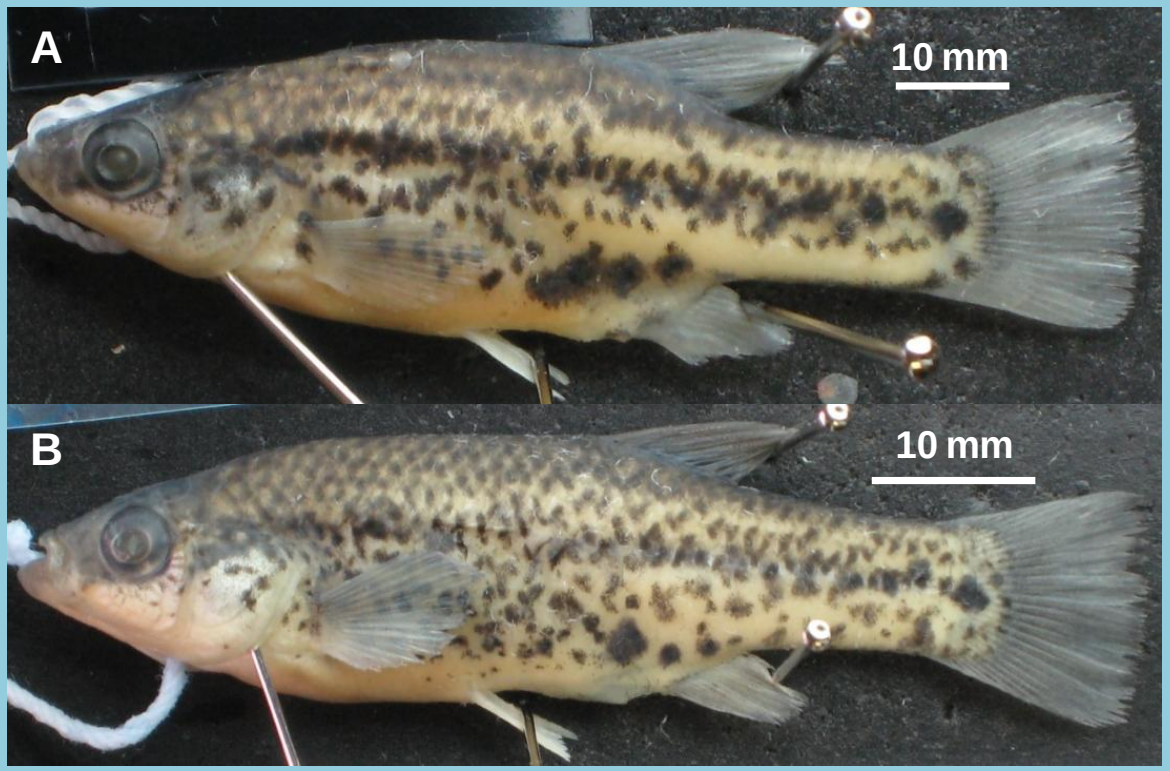




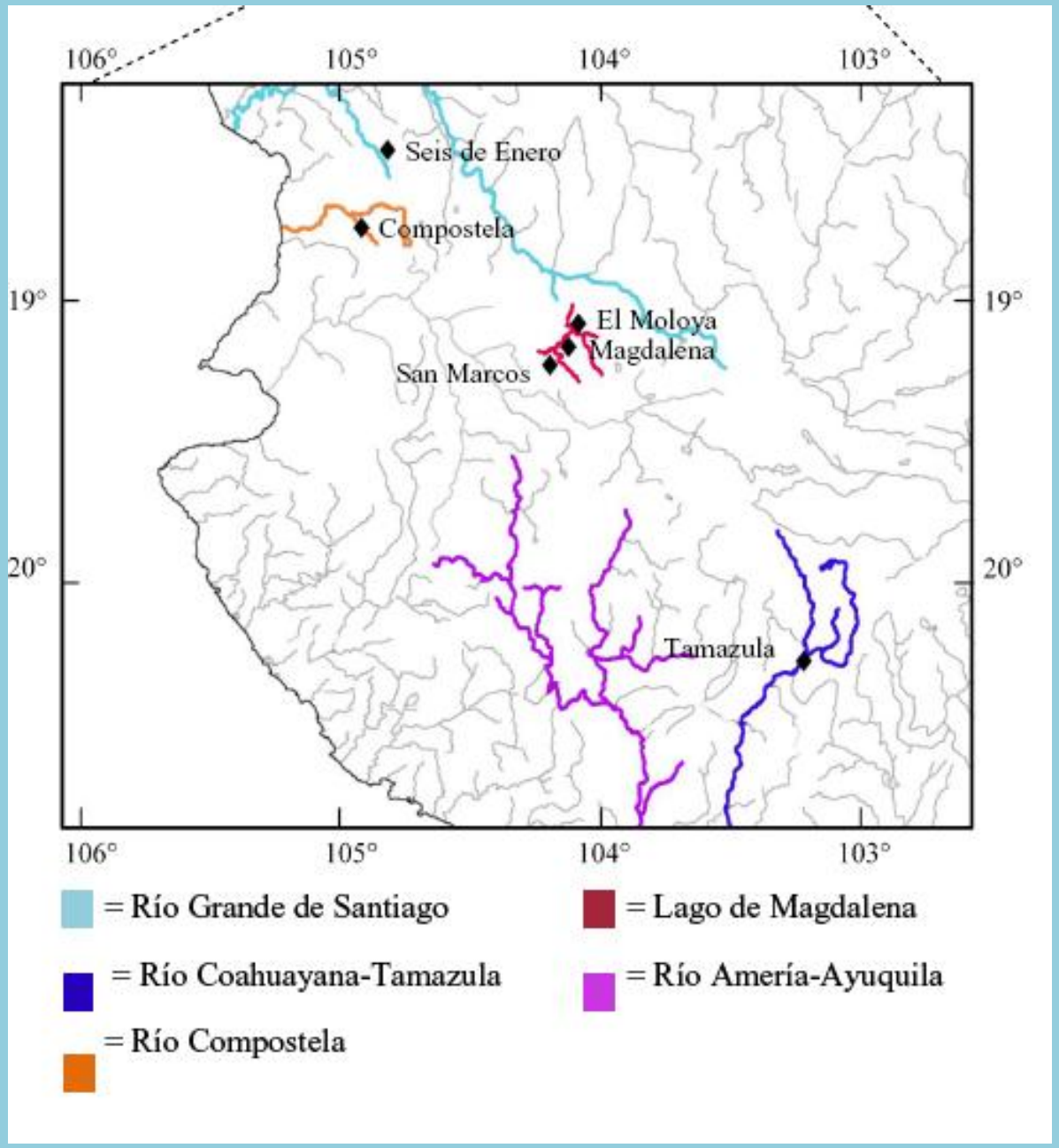


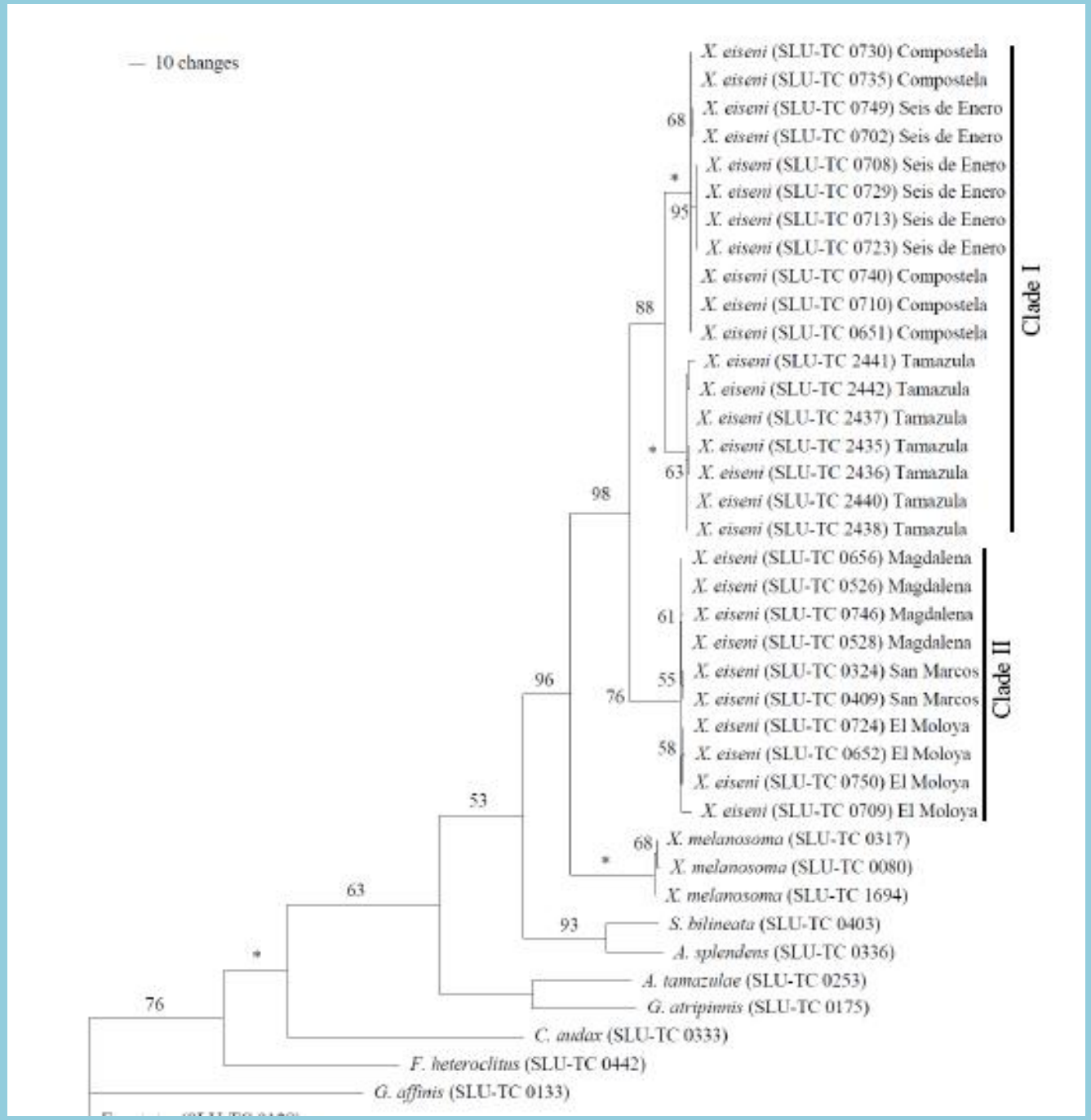
Diagnosis

14 (13 or15) rays in the dorsal fin
21 (17-20 or 22-24) gill rakers in the first arch
45 molecular autapomorphies in the cyt *b*



Xenotoca eiseni complex under description



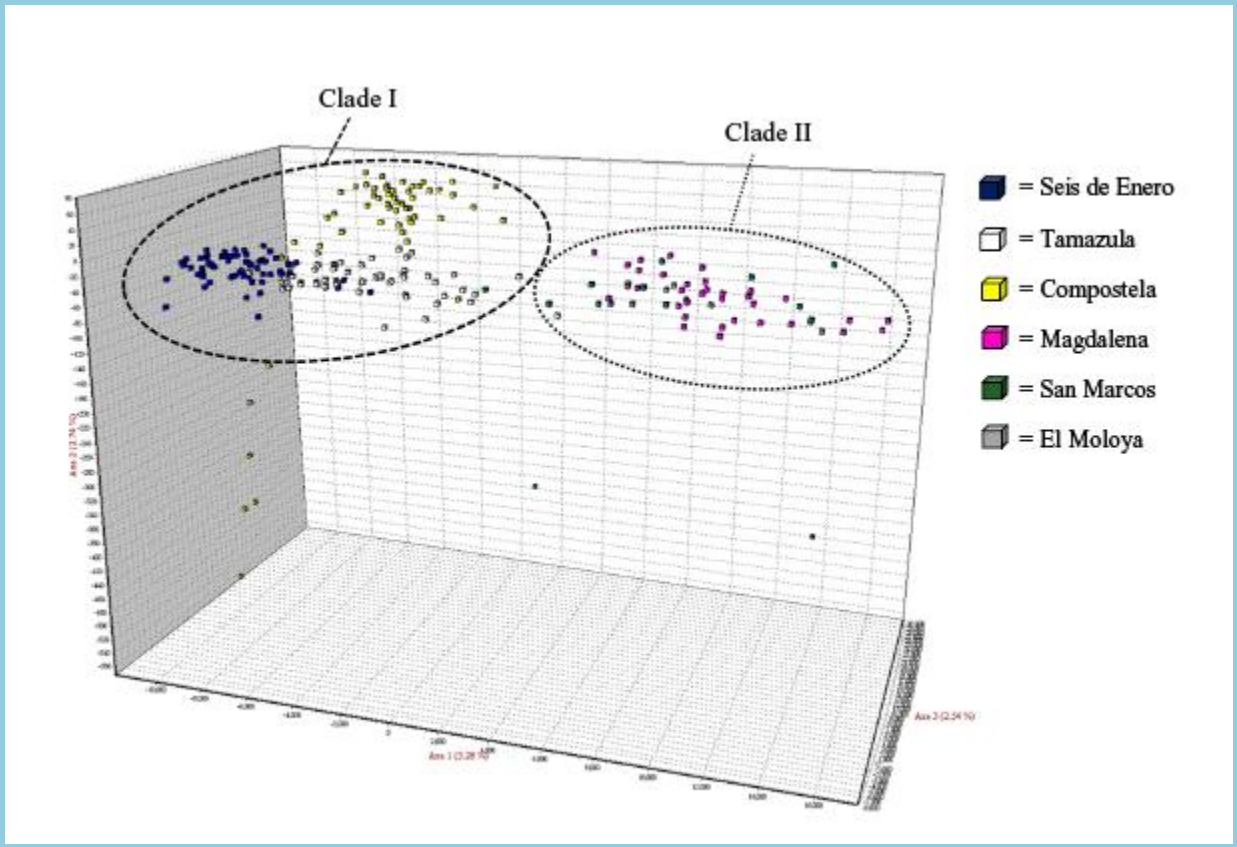

— 10 changes
X. eiseni (SLU-TC 0730) Compostela
X. eiseni (SLU-TC 0735) Compostela
X. eiseni (SLU-TC 0749) Seis de Enero
X. eiseni (SLU-TC 0702) Seis de Enero
X. eiseni (SLU-TC 0708) Seis de Enero
X. eiseni (SLU-TC 0729) Seis de Enero
X. eiseni (SLU-TC 0713) Seis de Enero
X. eiseni (SLU-TC 0723) Seis de Enero
X. eiseni (SLU-TC 0740) Compostela
X. eiseni (SLU-TC 0710) Compostela
X. eiseni (SLU-TC 0651) Compostela
X. eiseni (SLU-TC 2441) Tamazula
X. eiseni (SLU-TC 2442) Tamazula
X. eiseni (SLU-TC 2437) Tamazula
X. eiseni (SLU-TC 2435) Tamazula
X. eiseni (SLU-TC 2436) Tamazula
X. eiseni (SLU-TC 2440) Tamazula
X. eiseni (SLU-TC 2438) Tamazula
X. eiseni (SLU-TC 0656) Magdalena
X. eiseni (SLU-TC 0526) Magdalena
X. eiseni (SLU-TC 0746) Magdalena
X. eiseni (SLU-TC 0528) Magdalena
X. eiseni (SLU-TC 0324) San Marcos
X. eiseni (SLU-TC 0409) San Marcos
X. eiseni (SLU-TC 0724) El Moloya
X. eiseni (SLU-TC 0652) El Moloya
X. eiseni (SLU-TC 0750) El Moloya
X. eiseni (SLU-TC 0709) El Moloya
X. melanosoma (SLU-TC 0317)
X. melanosoma (SLU-TC 0080)
X. melanosoma (SLU-TC 1694)
S. bilineata (SLU-TC 0403)
A. splendens (SLU-TC 0336)
A. tamazulae (SLU-TC 0253)
G. atripinnis (SLU-TC 0175)
C. audax (SLU-TC 0333)
F. heteroclitus (SLU-TC 0442)
G. affinis (SLU-TC 0133)
Clade I
Clade II
68
95
88
63
98
61
55
76
58
96
53
68
63
93
76

Clade I

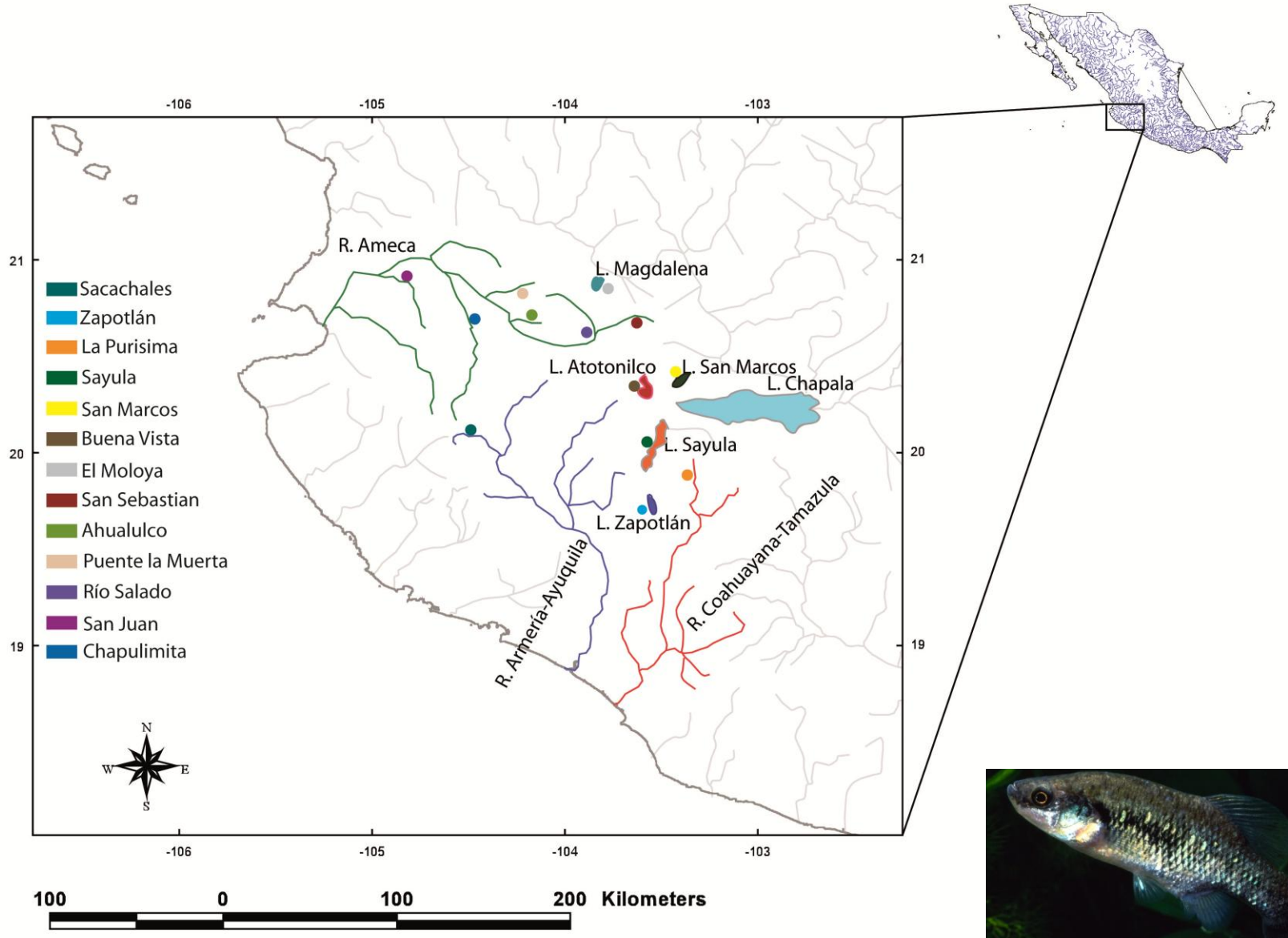
Clade II

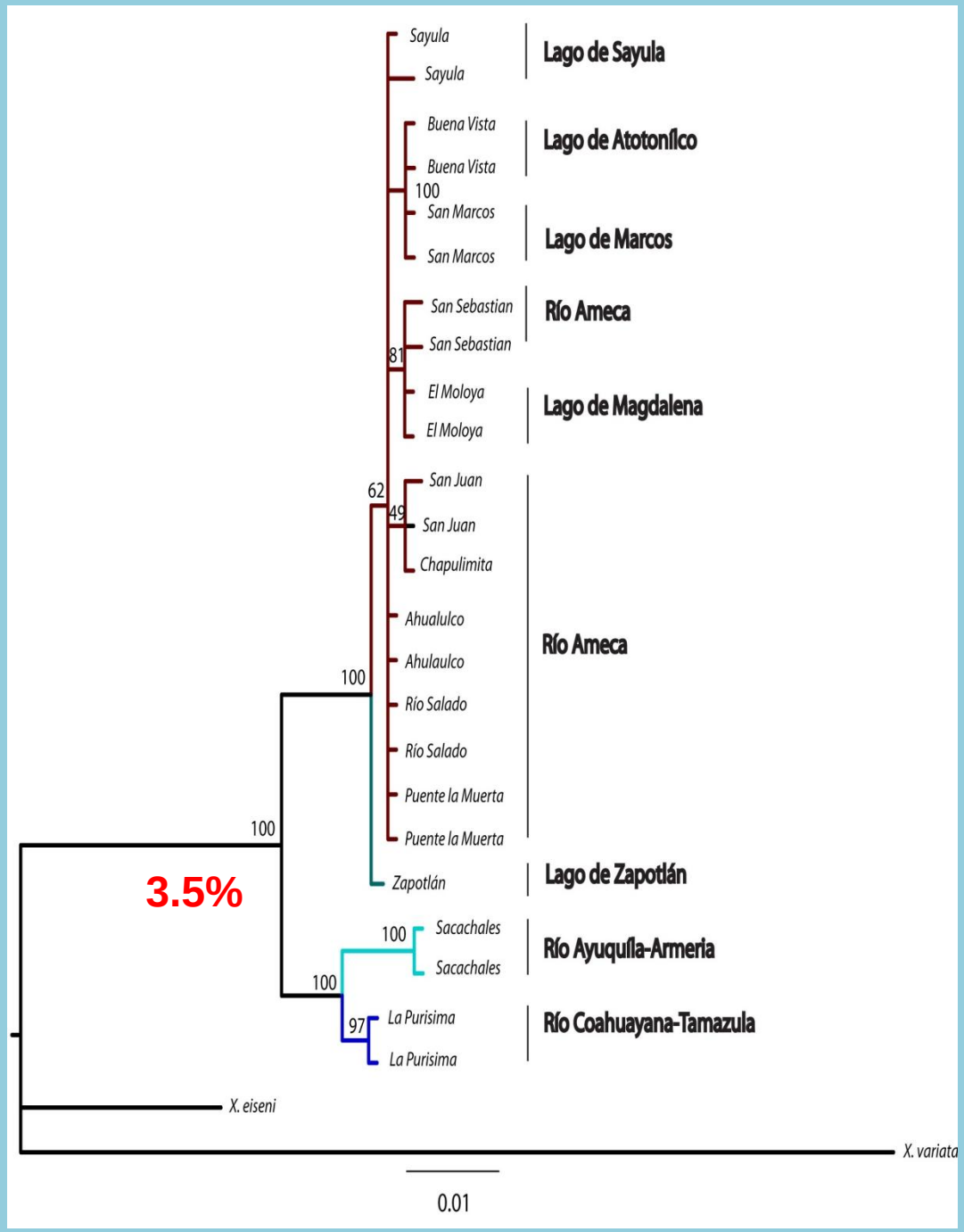
R1

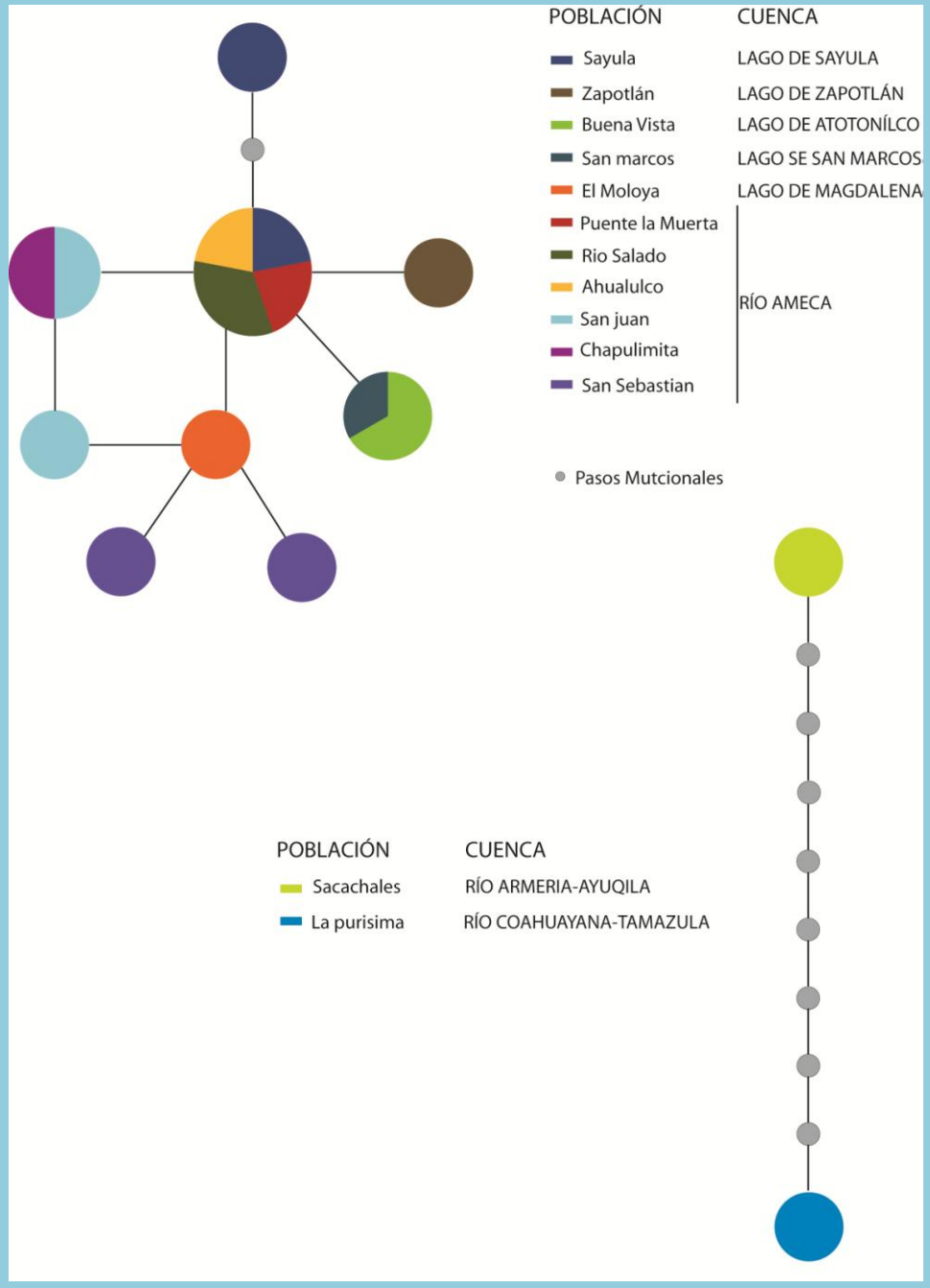
E3


Clade I
Clade II
= Seis de Enero
= Tamazula
= Compostela
= Magdalena
= San Marcos
= El Moloya

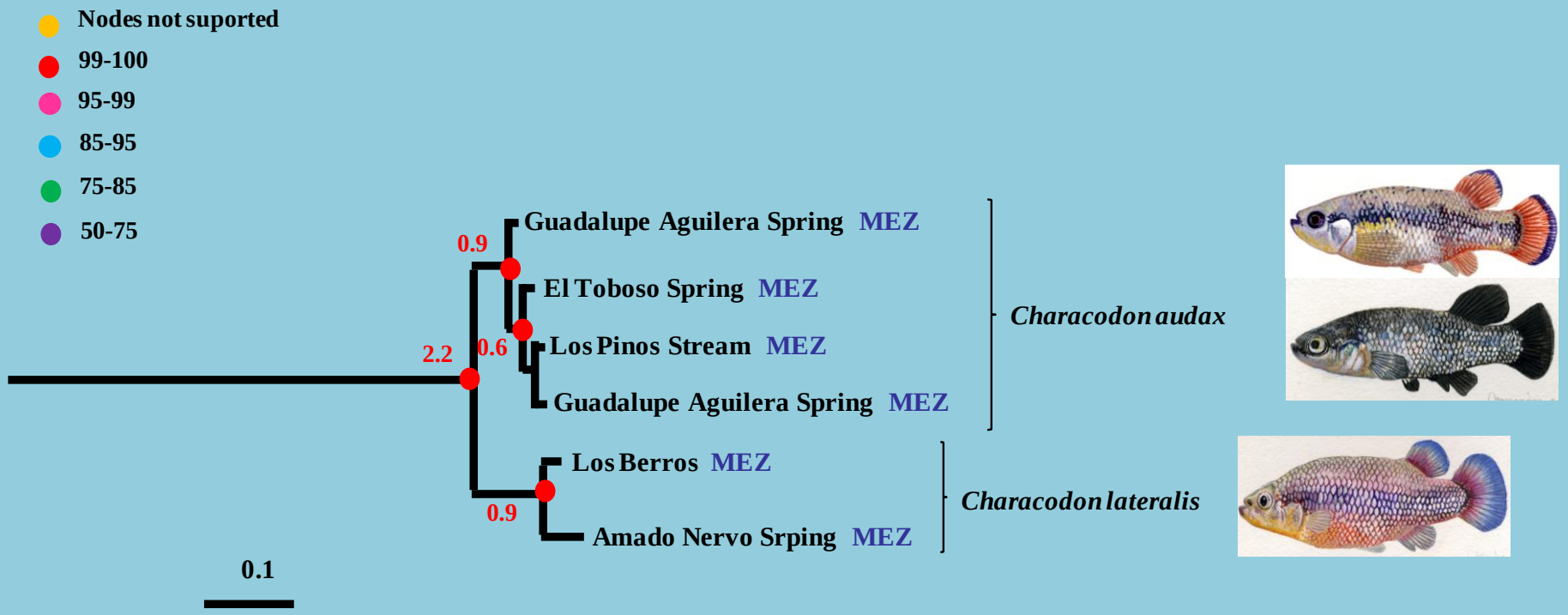
Xenotoca melanosoma complex under description

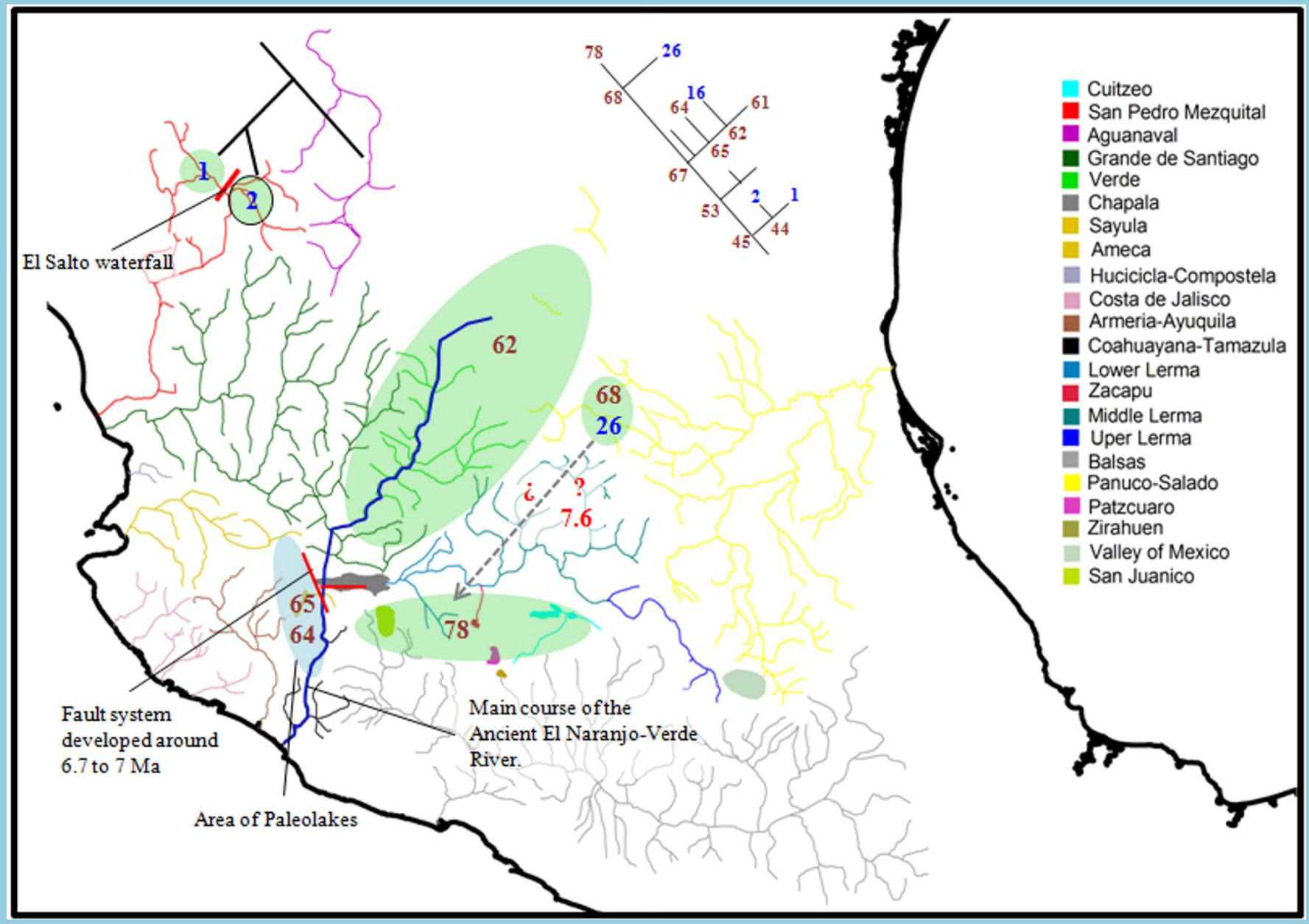



Sayula
Sayula
Lago de Sayula
Buena Vista
Buena Vista
Lago de Atotonílco
100
San Marcos
San Marcos
Lago de Marcos
San Sebastian
San Sebastian
Río Ameca
81
El Moloya
El Moloya
Lago de Magdalena
62
San Juan
49
San Juan
Chapulimita
Ahualulco
Ahulaulco
Río Salado
Río Salado
Puente la Muerta
Puente la Muerta
Río Ameca
100
100
3.5%
Zapotlán
Lago de Zapotlán
100
Sacachales
Sacachales
Río Ayuquíla-Armeria
100
97
La Purisima
La Purisima
Río Coahuayana-Tamazula
X. eiseni
X. variata
0.01


POBLACIÓN
CUENCA
Sayula
LAGO DE SAYULA
Zapotlán
LAGO DE ZAPOTLÁN
Buena Vista
LAGO DE ATOTONÍLCO
San marcos
LAGO SE SAN MARCOS
El Moloya
LAGO DE MAGDALENA
Puente la Muerta
Rio Salado
Ahualulco
San juan
Chapulimita
San Sebastian
RÍO AMECA
Pasos Mutcionales
POBLACIÓN
CUENCA
Sacachales
RÍO ARMERIA-AYUQILA
La purisima
RÍO COAHUAYANA-TAMAZULA

Characodon group

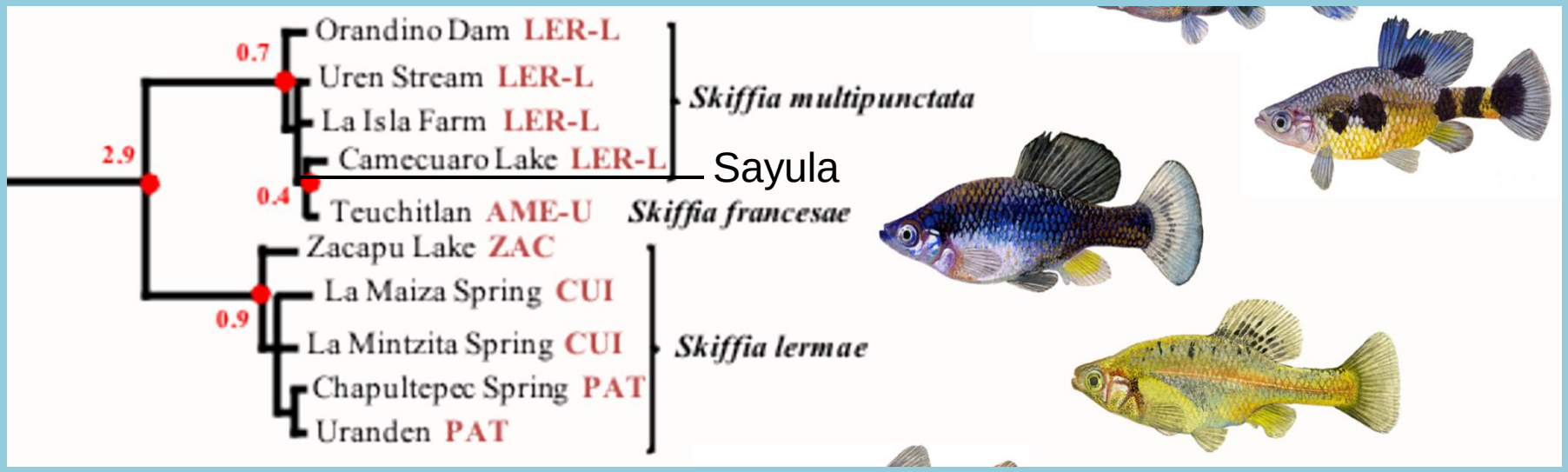

Nodes not suported
99-100
95-99
85-95
75-85
50-75
Guadalupe Aguilera Spring MEZ
El Toboso Spring MEZ
Los Pinos Stream MEZ
Guadalupe Aguilera Spring MEZ
Los Berros MEZ
Amado Nervo Srping MEZ
0.9
2.2
0.6
0.9
0.1
Characodon audax
Characodon lateralis

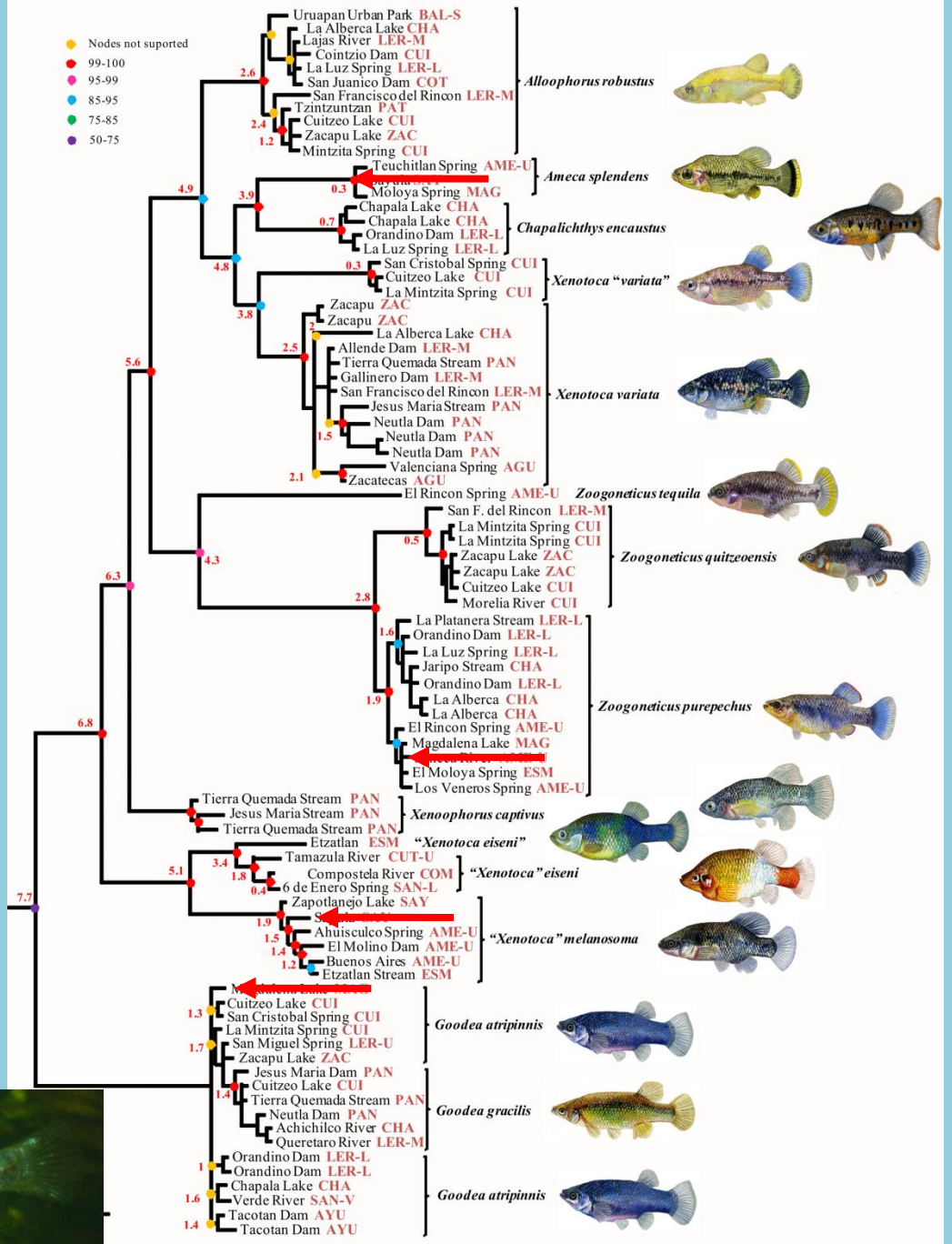

78
26
68
16
64
61
62
65
67
2
1
53
44
45
1
2
El Salto waterfall
62
68
26
¿
?
7.6
65
64
78
Fault system
developed around
6.7 to 7 Ma
Main course of the
Ancient El Naranjo-Verde
River.
Area of Paleolakes
Cuitzeo
San Pedro Mezquital
Aguanaval
Grande de Santiago
Verde
Chapala
Sayula
Ameca
Hucicicla-Compostela
Costa de Jalisco
Armeria-Ayuquila
Coahuayana-Tamazula
Lower Lerma
Zacapu
Middle Lerma
Uper Lerma
Balsas
Panuco-Salado
Patzcuaro
Zirahuen
Valley of Mexico
San Juanico

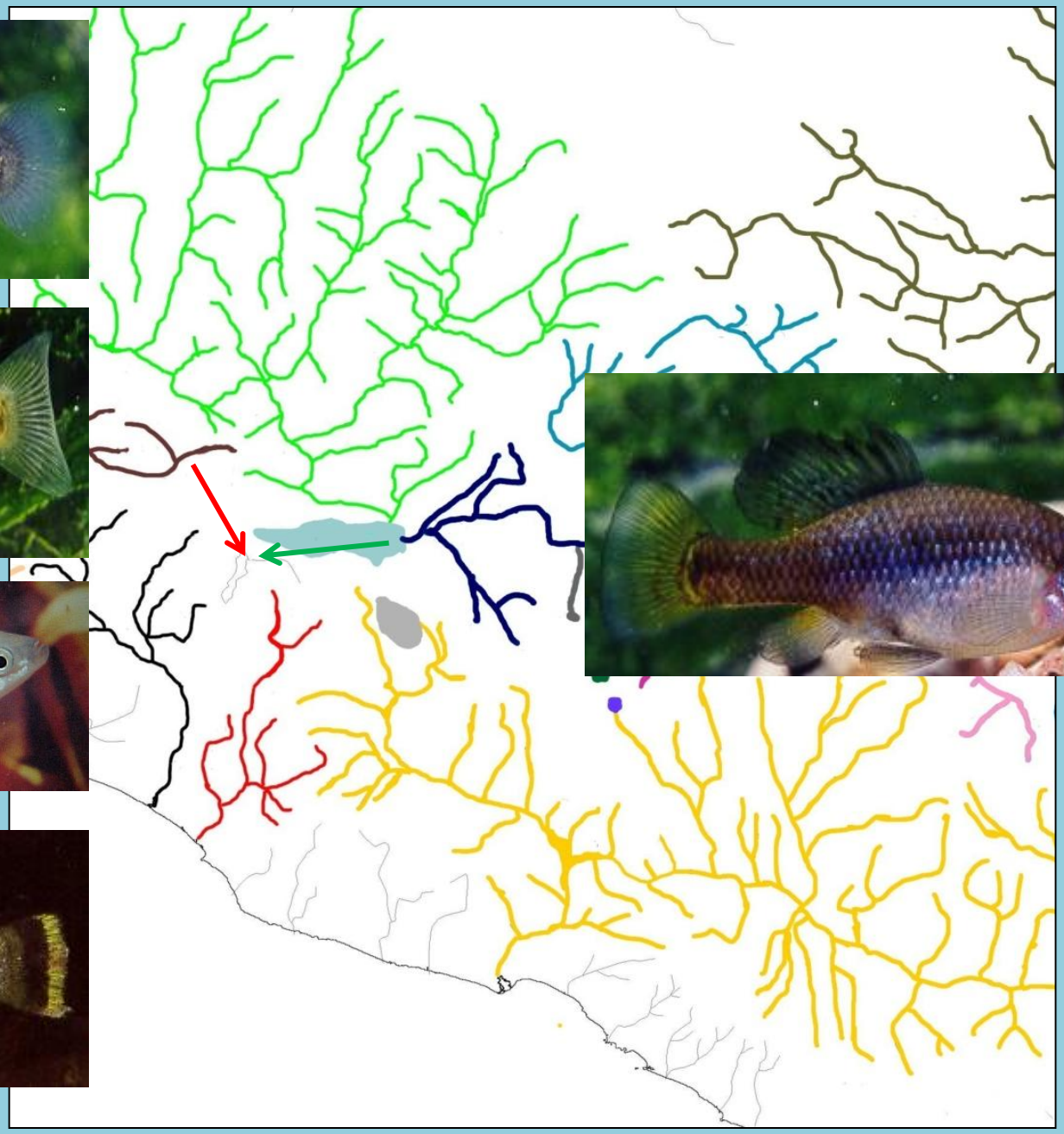
Characodon audax

Characodon lateralis

Skiffia francesae




Nodes not suported
99-100
95-99
85-95
75-85
50-75
Uruapan Urban Park BAL-S
La Alberca Lake CHA
Lajas River LER-M
Cointzio Dam CUI
La Luz Spring LER-L
San Juanico Dam COT
San Francisco del Rincon LER-M
Tzintzuntzan PAT
Cuitzeo Lake CUI
Zacapu Lake ZAC
Mintzita Spring CUI
Alloophorus robustus
Teuchitlan Spring AME-U
Moloya Spring MAG
Ameca splendens
Chapala Lake CHA
Chapala Lake CHA
Orandino Dam LER-L
La Luz Spring LER-L
Chapalichthys encaustus
San Cristobal Spring CUI
Cuitzeo Lake CUI
La Mintzita Spring CUI
Xenotoca "variata"
Zacapu ZAC
Zacapu ZAC
La Alberca Lake CHA
Allende Dam LER-M
Tierra Quemada Stream PAN
Gallinero Dam LER-M
San Francisco del Rincon LER-M
Jesus Maria Stream PAN
Neutla Dam PAN
Neutla Dam PAN
Neutla Dam PAN
Valenciana Spring AGU
Zacatecas AGU
Xenotoca variata
El Rincon Spring AME-U
Zoogoneticus tequila
San F. del Rincon LER-M
La Mintzita Spring CUI
La Mintzita Spring CUI
Zacapu Lake ZAC
Zacapu Lake ZAC
Cuitzeo Lake CUI
Morelia River CUI
Zoogoneticus quitzeoensis
La Platanera Stream LER-L
Orandino Dam LER-L
La Luz Spring LER-L
Jaripo Stream CHA
Orandino Dam LER-L
La Alberca CHA
La Alberca CHA
El Rincon Spring AME-U
Magdalena Lake MAG
El Moloya Spring ESM
Los Veneros Spring AME-U
Zoogoneticus purepechus
Tierra Quemada Stream PAN
Jesus Maria Stream PAN
Tierra Quemada Stream PAN
Xenoophorus captivus
Etzatlan ESM
"Xenotoca eiseni"
Tamazula River CUT-U
Compostela River COM
6 de Enero Spring SAN-L
"Xenotoca" eiseni
Zapotlanejo Lake SAY
Ahuisculco Spring AME-U
El Molino Dam AME-U
Buenos Aires AME-U
Etzatlan Stream ESM
"Xenotoca" melanosoma
Cuitzeo Lake CUI
San Cristobal Spring CUI
La Mintzita Spring CUI
San Miguel Spring LER-U
Zacapu Lake ZAC
Goodea atripinnis
Jesus Maria Dam PAN
Cuitzeo Lake CUI
Tierra Quemada Stream PAN
Neutla Dam PAN
Achichilco River CHA
Queretaro River LER-M
Goodea gracilis
Orandino Dam LER-L
Orandino Dam LER-L
Chapala Lake CHA
Verde River SAN-V
Tacotan Dam AYU
Tacotan Dam AYU
Goodea atripinnis



Future projects

-*Zoogoneticus tequila* reintroduction

-Discovery of lost species or populations

-New pond facilities


Gracias