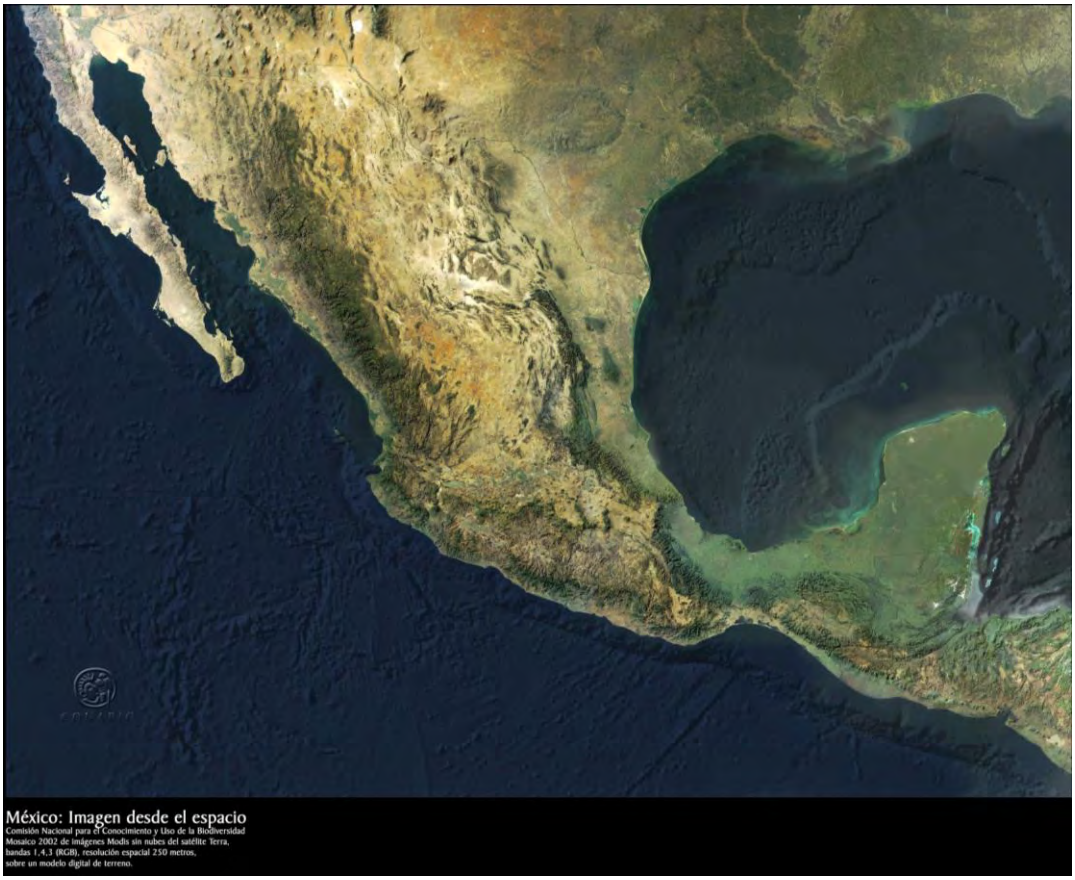
CONSERVATION OF BIODIVERSITY IN MÉXICO: ECOREGIONS, SITES AND CONSERVATION TARGETS

SYNTHESIS OF IDENTIFICATION AND PRIORITY SETTING EXERCISES



DRAFT

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TNC, Conservation Priority Setting for Birds in Latin America
SEMARNAP, Species at Risk Official Mexican Norm

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Instituto de Ecología - UNAM (Ceballos et al.)
SEMARNAP, Species at Risk Official Mexican Norm

3.2.3 Other Animal Groups

SEMARNAP, Species at Risk Official Mexican Norm
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WWF-IUCN, Centres of Plant Diversity.
World Resources Institute, The Last Frontier Forests
The Nature Conservancy Vegetation Type/Protected Area Gap Analysis
CONABIO-UNAM, Mexican Flora: Richness and Endemism
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Secretaría de Desarrollo Social - Mainly Terrestrial
World Wildlife Fund - Freshwater
Great Barrier Reef Marine Park Authority, The World Bank, IUCN - Coastal Marine
World Wildlife Fund - Coastal Marine
Wetlands International/WWF - Coastal Marine
RAMSAR Convention on Wetlands - Wetlands
Conservación Internacional - Wetlands

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CIPAMEX - Sierra Madre Occidental, old growth forests

5. BIBLIOGRAPHY

ANNEX I

Changes made to WWF 1998, Sullivan y Bustamante 1999 and Olson et al. 1998 ecoregions for this synthesis.

DEVELOPMENT OF A NATIONAL CONSERVATION BLUEPRINT FOR MEXICO

In recent years a consensus has emerged within the international conservation community about the importance of planning and working at larger geographic scales to conserve biodiversity. Responding to these developments in conservation science and to the organization's own experiences in implementing landscape-scale projects, in 1996 The Nature Conservancy adopted the ecoregional approach and conservation goal outlined in Conservation by Design: A Framework for Mission Success (TNC 1997). Translating the vision set forth by the Conservation Framework into on-the-ground results in Latin America and the Caribbean represents special challenges. One of the greatest challenges in this case, is assembling an Ecoregionally based Conservation Blueprint.

Since it is not realistic to create over the short term an Ecoregionally based Conservation Blueprint for Latin America and the Caribbean, due mainly to: the large number of ecoregions within the region; an unequal knowledge of conservation targets between different countries; the limited technical and financial resources that can be channeled to integrate the ecoregional portfolios; and, the urgency for conservation action in the region, a **Nationally based Conservation Blueprint approach** is being developed.

The Nationally based Conservation Blueprint approach being experimented for The Conservancy's Mexico Division is based on a three pronged approach: **ecoregional priorities and site priorities, within an identifiable conservation targets component.**

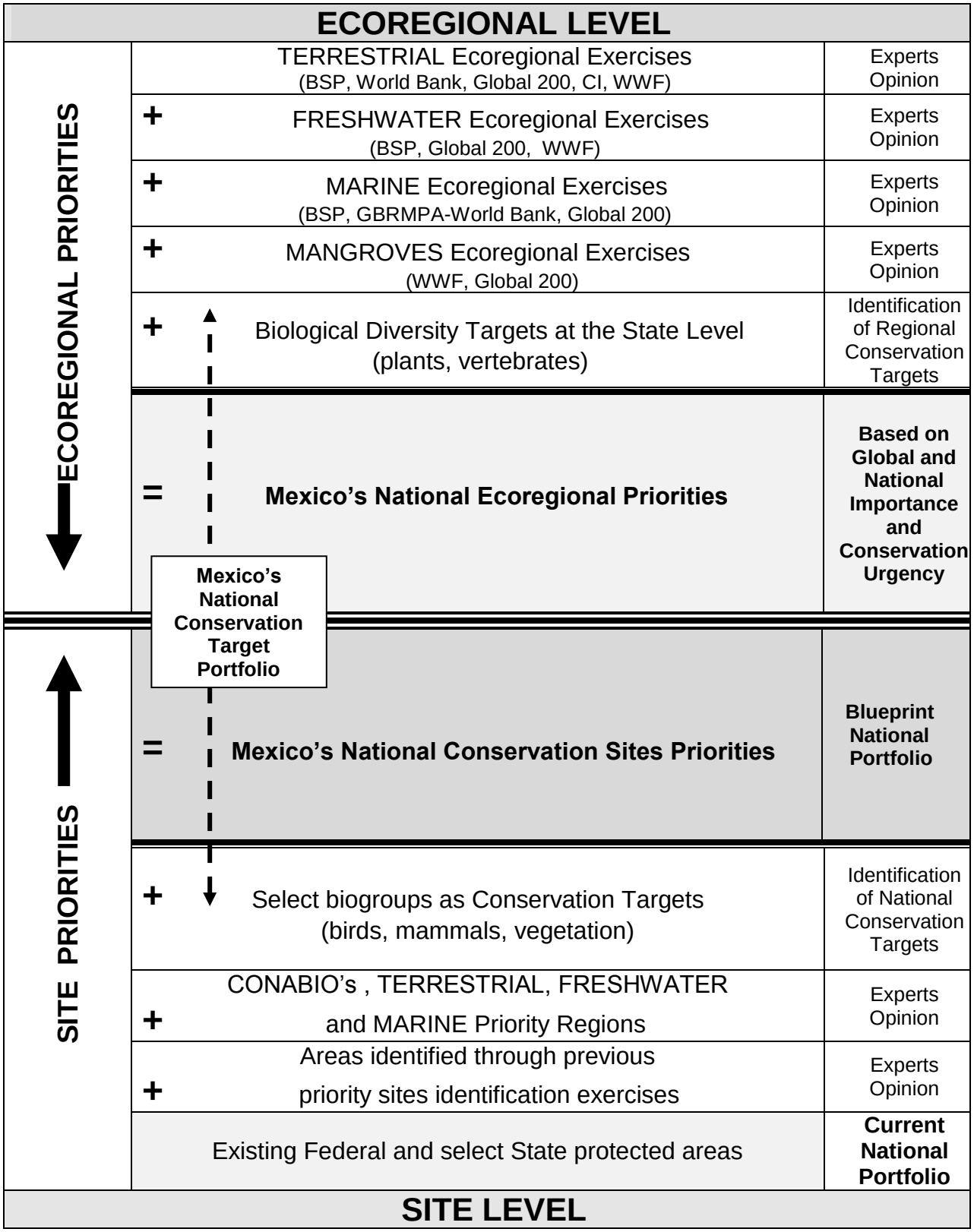
At the **Ecoregional Level,** an analysis of all previous ecoregional priority setting exercises was carried out, in order to determine the ranking of each ecoregion within the country. Out of this exercise a three level ranking system of **"Mexico's National Ecoregional Portfolio"** was developed, including all terrestrial, marine, mangrove and freshwater ecoregions contained within its borders.

Since the results of most of the ecoregional priority setting exercises analyzed were developed by using experts opinion and in order to be able to capture more specific **conservation targets**, an analysis of **existing vertebrate and plant State level data** was further utilized and compared with an evaluation of "TNC's Current Country Ecoregional Portfolio", along with a feasibility analysis for TNC's possibility to effectively work in the different States in order to generate "TNC's Priority Country Ecoregions Portfolio", which together will integrate **"TNC's Country Ecoregional Portfolio".**

At the **Site Level** the approach to the integration of **"Mexico's National Site Portfolio"** was achieved through the inclusion of: select Federal and State protected areas with importance towards the protection of biodiversity; CONABIO's terrestrial, marine and freshwater priority regions; and, areas identified through previous priority exercises. In order to include identifiable **conservation targets**, select **biogroups targets** were identified (birds, mammals and vegetation, including a gap analysis of remaining vegetation types surface area in 1996, in relation to existing protected areas). The CONABIO and biogroups information was further utilized to evaluate "TNC's Country Current Site Portfolio", which together with priority sites to carry out future work, chosen within "TNC's Country Ecoregional Portfolio" for their biodiversity, leverage and feasibility, will integrate **"TNC's Country Site Portfolio".**

The following table schematizes the above outlined three pronged approach, used to in the construction of Ecoregionally Based National Sites and Target Portfolios. TNC's Ecoregional, Sites and Target Country Portfolios for Mexico, are not dealt with in this document and are developed in "Annex I - Developing a Conservation Blueprint for a Sites & Partners Ecoregional System structure in Mexico", of The Conservancys Mexico Mexico Division, Mexico Country Program 2001-2005:

CONSTRUCTION OF AN ECOREGIONALLY BASED NATIONAL PORTFOLIO FOR MEXICO



IDENTIFICATION AND PRIORITIZATION OF BIODIVERSITY IN MEXICO

IDENTIFICACION Y PRIORIZACIÓN DE LA BIODIVERSIDAD DE MEXICO

Los ejercicios de identificación y priorización de la biodiversidad en México y su ubicación a nivel territorial que son analizados en el presente trabajo, han sido elaborados con diferentes objetivos, teniendo por ende tanto diversos enfoques como cobertura territorial. Estos ejercicios pueden ser clasificados en cinco categorías generales.

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MEXICO, A MEGADIVERSE COUNTRY
MÉXICO, UN PAÍS MEGADIVERSO

Con una superficie terrestre de 1,972,544 km², ubicados en la confluencia de las regiones biogeográficas Neártica y Neotropical y entre dos de los grandes océanos del mundo, el Pacífico y el Atlántico, la República Mexicana es un país calificado como de megadiversidad.

De acuerdo a Mittermeier *et al.* (1997), el concepto de países de megadiversidad se apoya en estas cuatro premisas:

- La biodiversidad de cada país es fundamental para la supervivencia de esa nación y debe ser un componente básico de toda estrategia nacional o regional para el desarrollo.

- Sin embargo, la biodiversidad no está distribuida uniformemente en nuestro planeta y ciertos países en particular los tropicales, albergan concentraciones de biodiversidad mucho mayores que las de otros.

- Algunas de las naciones más ricas y diversas también poseen ecosistemas muy severamente amenazados.

- Para lograr los máximos beneficios con recursos limitados, debemos dirigir nuestros esfuerzos principalmente, mas no exclusivamente, a los países más ricos en biodiversidad y endemismos, así como a los más severamente amenazados; la inversión que en ellos se efectúe deberá ser mas o menos proporcional a su porcentaje de la biodiversidad global.

Los mismos autores de acuerdo a los análisis que realizaron, nos indican que Brasil e Indonesia son los dos países con mayor biodiversidad en el mundo. Colombia se encuentra claramente en tercer lugar, en tanto que México y Australia compiten por la cuarta y quinta posición. En general México presenta mayor biodiversidad de vertebrados, excepto reptiles y dispone de una fauna mucho más equilibrada en la que se mezclan elementos norteamericanos y sudamericanos. Por su parte, Australia es definitivamente más rica en endemismos de vertebrados (excepto peces) y su total de vertebrados endémicos en general es mucho más alto. Ambos países cuentan con una diversidad relativamente baja de peces dulceacuícolas, pero son muy ricos en diversidad de peces marinos. México tiene casi el doble de especies de peces dulceacuícolas, pero Australia lo supera en peces marinos. México tiene mayor biodiversidad de plantas superiores que Australia, pero esta última lo supera en endemismos. Algunos de los datos utilizados por dichos autores para su análisis se tabulan a continuación.

Grupo	Diversidad Global	Diversidad México	% Mex. Glob.	Pos.	Endemismos México	% de Mex	Pos.
Plantas Superiores	248,428	18,000 a 30,000	7 - 12%	--	10,000 a 15,000	33 - 50%	5o
Escarabajos Cincindélidos	--	116	--	6o	57	49%	7o
Mariposas	--	2,237	--	6o	200	9%	7o
Mariposas papiliónidas	--	52	--	10o	5	10%	7o
Anfibios	4,222	284	7%	4o	169	60%	6o
Reptiles	6,458	717	11%	2o	368	51%	2o
Aves	9,040	1,050	12%	12o	125	12%	6o
Mamíferos	4,629	450	10%	5o	140	31%	3o
Vertebrados no peces	24,359	2,501	10%	6o	802	32%	3o

Otros indicadores de esta megadiversidad, es que México tiene la mayor diversidad de pinos (55 especies), de encinos (138 especies), de cactáceas (834 especies), así como de mamíferos marinos (33 especies) (Mittermeier *et al.* 1997). Siete de las ocho especies de tortugas marinas del mundo anidan en sus playas.

De todos los países de megadiversidad del hemisferio occidental, es indudable que México es el más rico en lo que a diversidad marina se refiere, a la que solo supera la de los países asiáticos del Pacífico, Australia y posiblemente Papua Nueva Guinea. Su fauna piscícola marina es una prueba de ello con cálculos que oscilan entre las 2,000 y 3,500 especies en total (Mittermeier *et al.* 1997).

En cuanto al resultado de las presiones ejercidas por el hombre sobre las especies y como indicadores, México se encuentra en el lugar número 17 en cuanto el número de especies de aves gravemente amenazadas, amenazadas y vulnerables con 36 especies y en el quinto en cuanto a mamíferos en dichas categorías con 64 especies (IUCN,1996 **in** Mittermeier *et al.* 1997).

Sea como sea, lo realmente importante no es el concurso para averiguar que país ocupa que lugar en la lista de megadiversidad, sino cuales de estos países crearán programas eficaces para lograr conservar este patrimonio.

En este sentido es claro e inobjetable que México juega un papel fundamental a nivel global en la conservación de la biodiversidad. Sin embargo, para lograr obtener un mayor impacto de la aplicación de los limitados recursos económicos y humanos que se dedican a dicho fin, es necesario precisar a mayor detalle, que porciones del territorio mexicano son aquellas en las que estos deberán ser canalizados principalmente, mas no exclusivamente, tomando en cuenta su biodiversidad, su nivel de endemismo y el grado de urgencia en cuanto a la aplicación de las medidas requeridas para mitigar las amenazas que tienden a reducir la biodiversidad.

El objetivo del presente trabajo es, conjuntar el conocimiento resultante de los diversos ejercicios que se han realizado para ubicar las porciones del territorio mexicano más importantes para la conservación de la diversidad, con el objeto de contar con los elementos que permitan orientar la toma de decisiones, en cuanto a la inversión dedicada a su conservación en el tiempo y el espacio.

2. ECOREGIONAL PRIORITIES
2.1.1 TERRESTRIAL ECOREGIONAL EXERCISES

A REGIONAL ANALYSIS OF GEOGRAPHIC PRIORITIES FOR BIODIVERSITY CONSERVATION IN LATIN AMERICA AND THE CARIBBEAN

Biodiversity Support Program *et al.*, 1995

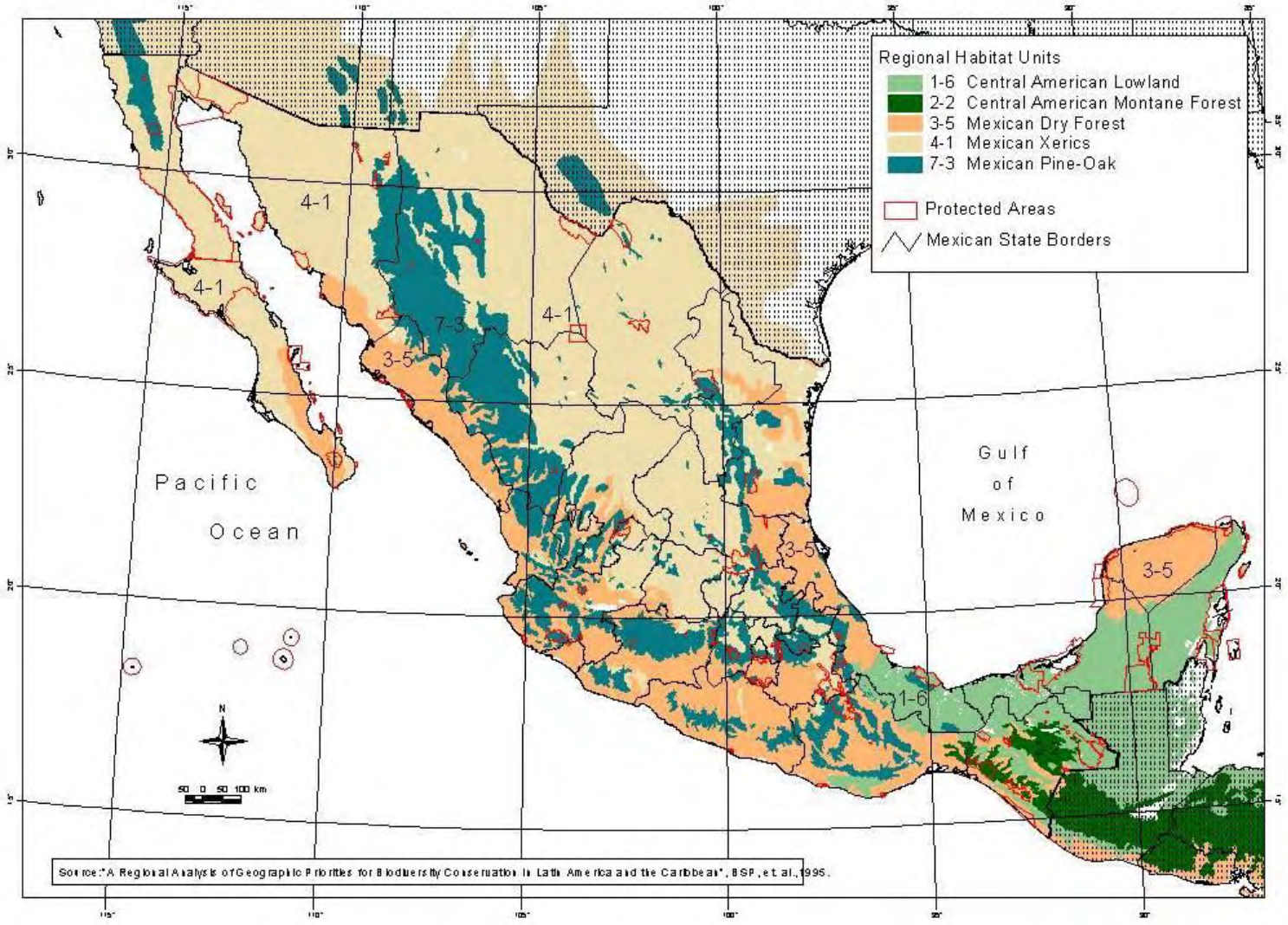
The U.S. Agency for International Development (USAID) initiated in 1993 this exercise to establish geographic priorities for biodiversity in Latin America and the Caribbean. The exercise was coordinated by the Biodiversity Support Program with the participation of Conservation International, The Nature Conservancy, Wildlife Conservation Society, World Resources Institute and World Wildlife Fund. The principles underlying this geographic priority-setting approach are:

- Every nation's biodiversity is critical to its own sustainable development. Therefore, biodiversity conservation is important for every country. The recommendations from this exercise will help determine which areas should be priorities for biodiversity conservation *at the regional level*. The focus on this exercise is on where to conserve, not on what, how, or why to conserve.
- Biodiversity includes not only diversity of species but also diversity of biological communities and ecosystems. Therefore, effective conservation requires maintaining representation of all major habitat types found in the region. Since these cut across national boundaries, the priority-setting analysis is based on biogeographic units, not country units.
- Biological importance alone is not a sufficient criterion for determining biodiversity conservation priorities at a regional level since natural habitats have been degraded to varying extents and because national commitment to biodiversity conservation varies. Biodiversity conservation priorities should integrate consideration of an area's biological importance, conservation threat and opportunity, policy/institutional feasibility and utility factors.

Major Habitat Type (MHT) Regional Habitat Unit (RHU)	Plants (1)	Insects (1)	Birds (1)	Herps (1)	Mamm (1)	Total (2)	RHU Rank (3) Cons. Status (4)	Biol. Value (5) Cons. Prior. (6)
Tropical Moist Lowland Forests 1-6 Central American Lowland	2	2	1	2	1	8	**4**/6 Endan	L Locally
Tropical Moist Montane Forests 2-2 Central American Montane Forest	2	2	2	3	1	10	**3**/5 Vulner	S Locally
Tropical Dry Forests 3-5 Mexican Dry Forest	2	3	3	1	2	11	**3**/6 Endan	S Locally
Xeric Formations 4-1 Mexican Xerics	3	3	3	2	2	13	**1**/6 Vulner	R Highest Region
Temperate Forests 7-3 Mexican Pine-Oak	2	3	3	3	3	14	**1**/3 Endan	R Highest Region

(1) For individual taxonomic groups 3 is the highest score 1 the lowest.
(2) Total score is the sum of the five taxonomic scores.
(3) RHUs are ranked from highest total score to lowest total score. **RHU score** / No. of RHU in MTH
(4) Conservation Status: Crit.= Critical; Endan. = Endangered; Vulner. = Vulnerable; Sta. = Stable;
(5) Biological Value: R = Regionally Outstanding; S = Regionally Significant; L = Locally Important
(6) Conservation Priority: one RHU within each MHT was chosen as Highest Regional Priority for a total of seven, other seven were recommended as High Regional Priority and the other 21 RHUs were qualified as Locally Important out of a total 35 RHUs.

Biodiversity Support Program,1995 - Regional Habitat Units of Mexico



A CONSERVATION ASSESMENT OF THE TERRESTRIAL ECOREGIONS OF LATIN AMERICA AND THE CARIBBEAN

The World Bank - WWF (Dinerstein *et al.* 1995)

This priority-setting study elevates, as first principle, maintaining the representation of all ecosystem and habitat types in regional investment portfolios. Second, it recognizes landscape-level features as an essential guide for effective conservation planning.

The goals of this study are:

1) To replace the relatively ad hoc decision making process of donors investing in biodiversity conservation with a more transparent and scientific approach.
2) To move beyond evaluations based largely on species lists to a new framework that also incorporates maintaining ecosystem and habitat diversity.
3) To better integrate the principles of conservation biology and landscape ecology into decision making.
4) To ensure that proportionately more funding be channeled to areas that are of high biological value.

The study biogeographic approach divides Latin America and the Caribbean in 5 major ecosystem types, 11 major habitat types and 178 ecoregions (excluding 13 mangrove complexes of which 5 or 38% are present in Mexico), 50 of these ecoregions or 28% of them are present in Mexico.

The conservation assessment integrates two fundamental data layers: **(A)** biological distinctiveness and **(B)** conservation status, into an overall **(C)** biodiversity priority ranking. Fourteen ecoregions present in Mexico are considered to be of the highest priority at a regional scale.

(A) 1= Globally Outstanding, 2 =Regionally Outstanding, 3 =Bioregionally Outstanding, 4 =Locally Important
(B) C = Critical, E = Endangered, V = Vulnerable, S = Relatively Stable, I = Relatively Intact
(C) I = Highest Priority at Regional Scale, II = High Priority at Regional Scale,
III = Moderate Priority at Regional Scale, IV = Important at National Scale,
* indicates ecoregions elevated at level Ia priority ranking to achieve better bioregional representation.

(- AB/C)

TROPICAL BROADLEAF FORESTS

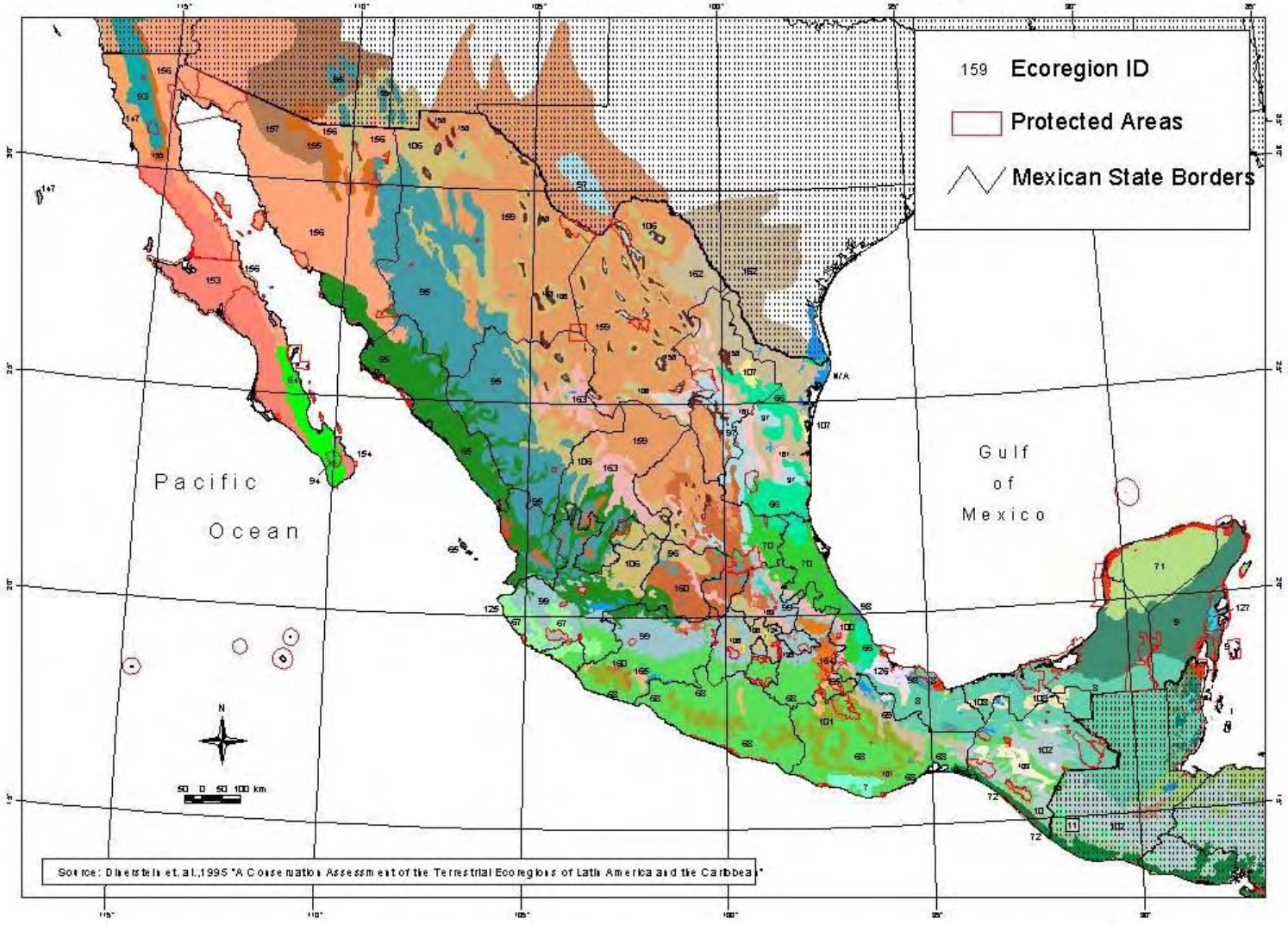
Tropical Moist Broadleaf Forests

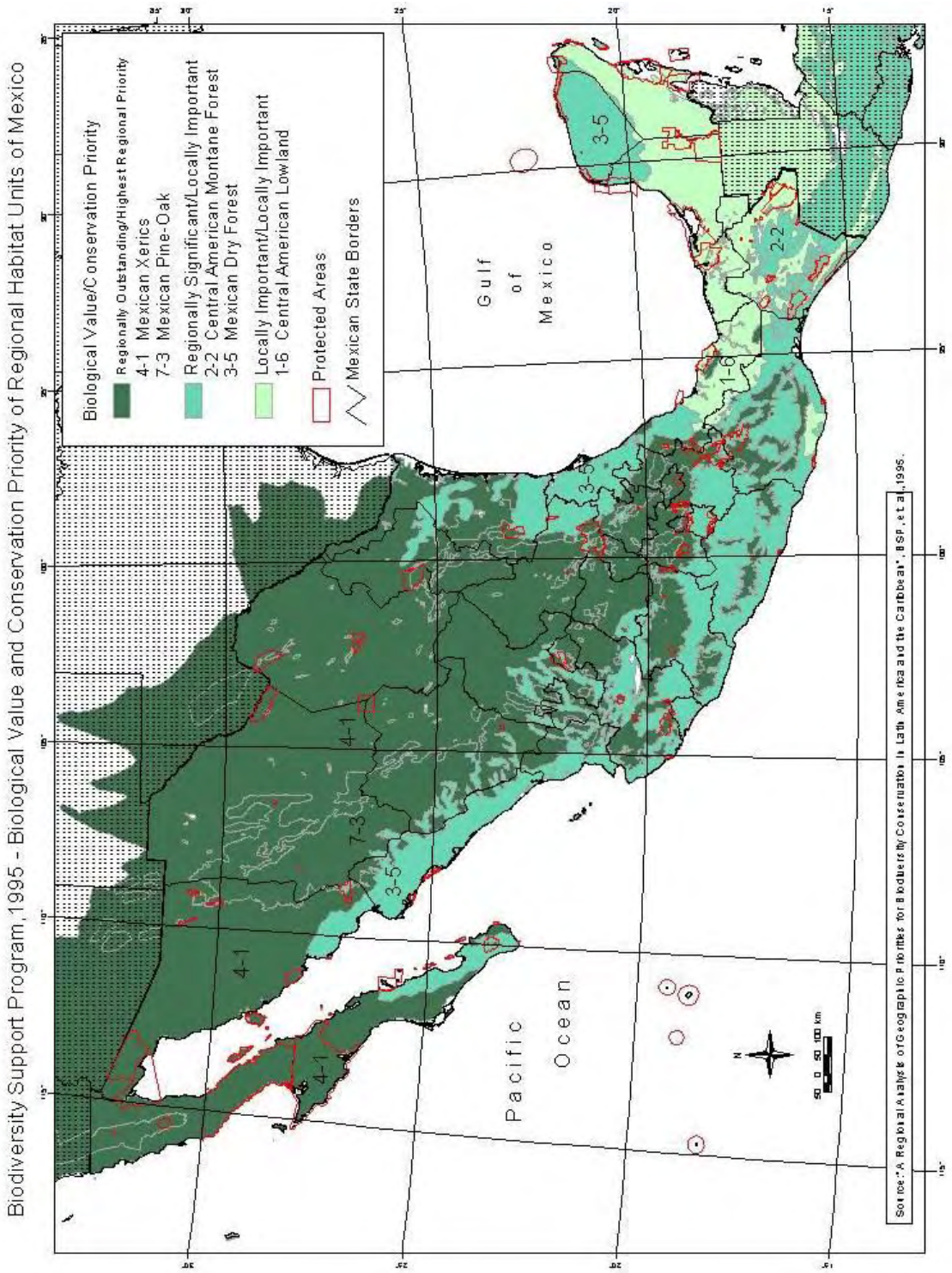
7.- Oaxacan moist forest - **3E/II**
8.- Tehuantepec moist forests - **3E/II***
9.- Yucatán moist forest - **3V/III**
10.- Sierra Madre moist forest - 3E/II
11.- Central American montane forest - **3E/II**
12.- Belizean Swamp Forests - **4E/III** (marginally mapped for Mexico)

Tropical Dry Broadleaf Forests

64.- Baja California dry forests - **4S/IV**
65.- Sinaloan dry forests - **3V/III**
66.- Tamaulipas/Veracruz dry forests - **4E/III***
67.- Jalisco dry forests - **2E/I**
68.- Balsas dry forests - **2E/I**
69.- Oaxacan dry forests - **3E/II**
70.- Veracruz dry forests - **4C/III**
71.- Yucatán dry forests - **4E/III**
72.- Central American Pacific dry forests - **3C/II** (included in map not in text)

The World Bank/World Wildlife Fund, 1995 - Ecoregions of Mexico




Biodiversity Support Program, 1995 - Biological Value and Conservation Priority of Regional Habitat Units of Mexico
Biological Value/Conservation Priority
Regionally Outstanding/Highest Regional Priority
4-1 Mexican Xerics
7-3 Mexican Pine-Oak
Regionally Significant/Locally Important
2-2 Central American Montane Forest
3-5 Mexican Dry Forest
Locally Important/Locally Important
1-6 Central American Lowland
Protected Areas
Mexican State Borders
Gulf of Mexico
Pacific Ocean
4-1
7-3
3-5
2-2
1-6
N
50 0 50 100 km
Source: "A Regional Analysis of Geographic Priorities for Biodiversity Conservation in Latin America and the Caribbean", BSP, et al, 1995.

CONIFER/TEMPERATE BROADLEAF FORESTS

93.- Sierra de Juárez pine-oak forests - **4V/IV**
94.- San Lucan pine-oak forests - **4I/IV**
95.- Sierra Madre Occidental pine-oak forests - **1E/I**
96.- Central Mexican pine-oak forests - **3E/II**
97.- Sierra Madre Oriental pine-oak forests - **2S/II**
98.- Veracruz oak forests - **4C/III**
(The Spanish version of Dinerstein *et al.* 1995, utilizes bosques de roble, instead of pine-oak forests used in the English version, thus pine will be dropped from all references of this ecoregion, characterized by associations dominated by *Quercus oleoides*, present from the states of Tamaulipas to Campeche)
99.- Mexican transvolcanic pine-oak forests - **2S/I**
100.- Veracruz montane forests - **3S/III**
101.- Sierra Madre del Sur pine-oak forests - **1C/I**
102.- Central American pine-oak forests -**3V/III**
103.- Belizean Pine Forests - **2S/II**
(Not mapped for Mexico, present only in Savana el Jaguactal, Q.Roo)

GRASSLANDS/SAVANNAS/SHRUBLANDS

Grasslands/Savannas/Shrublands

106.- Central Mexican grasslands - **3-/-**
107.- Eastern Mexican grasslands - **4-/-**
108.- Tabasco/Veracruz savannas - **4C/III***
109.- Tehuantepec savannas - **4C/III**

Flooded Grasslands

124.- Central Mexican wetlands - **2C/I**
125.- Jalisco palm Savannas - **3C/II***
126.- Veracruz palm savannas - **3C/II**
127.- Quintana Roo wetlands - **3I/IV**
N/A. Laguna Madre wetlands - **--/-**

Montane Grasslands

135.- Mexican Alpine Tundra - **3V/III***

XERIC FORMATIONS

Mediterranean Scrub

147.- California coastal sage-chaparral - **1C/I**

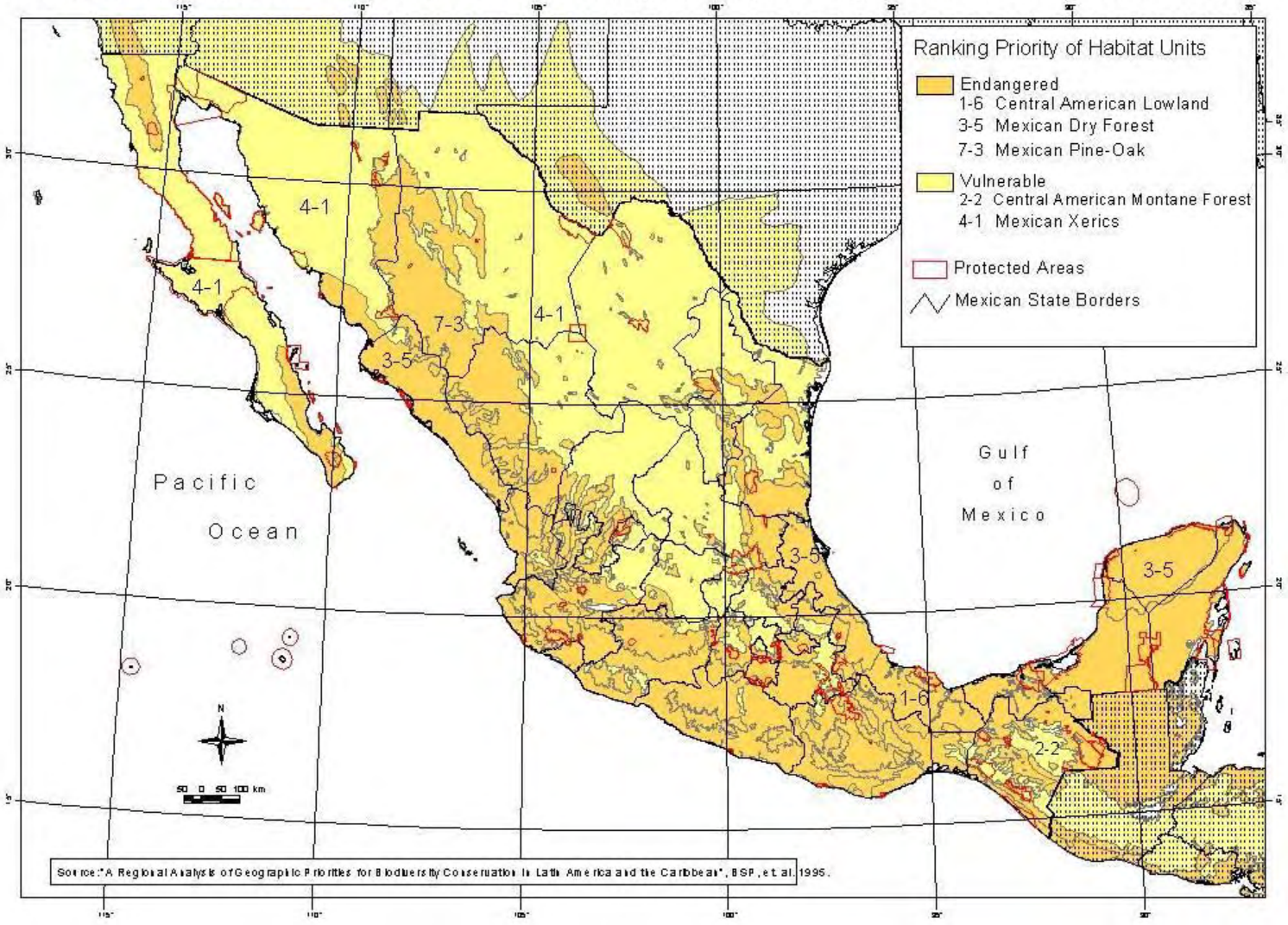
Desert and Xeric Shrublands

153.- Baja California xeric scrub - **3I/IV**
154.- San Lucan mezquital - 4I/IV
155.- Western Mexican mezquital - **4-/-**
156.- Sonoran xeric scrub - 2S/II
157.- Northern Sonora cactus scrub - **1S/I**
158.- Mexican Interior chaparral - **4-/-**
159.- Chihuahuan xeric scrub - **4V/IV**
160.- Central Mexican mezquital - **4E/III**
161.- Eastern Mexican matorral - **3-/-**
162.- Eastern Mexican mezquital - **4V/IV**
163.- Central Mexican cactus scrub - **3-/-**
164.- Pueblan Xeric Scrub - **3C/II***
165.- Guerreran cactus scrub - **3V/III**

MANGROVES

See details on mangrove ecoregions in the chapter 2.4.1 A Conservation Assessment of Mangrove Ecosystems of Latin America and the Caribbean, WWF (Olson *et al.* 1996)

Biodiversity Support Program, 1995 - Ranking Priority of Regional Habitat Units of Mexico



MEXICAN ECOREGIONS OF HIGHEST PRIORITY AT REGIONAL SCALE

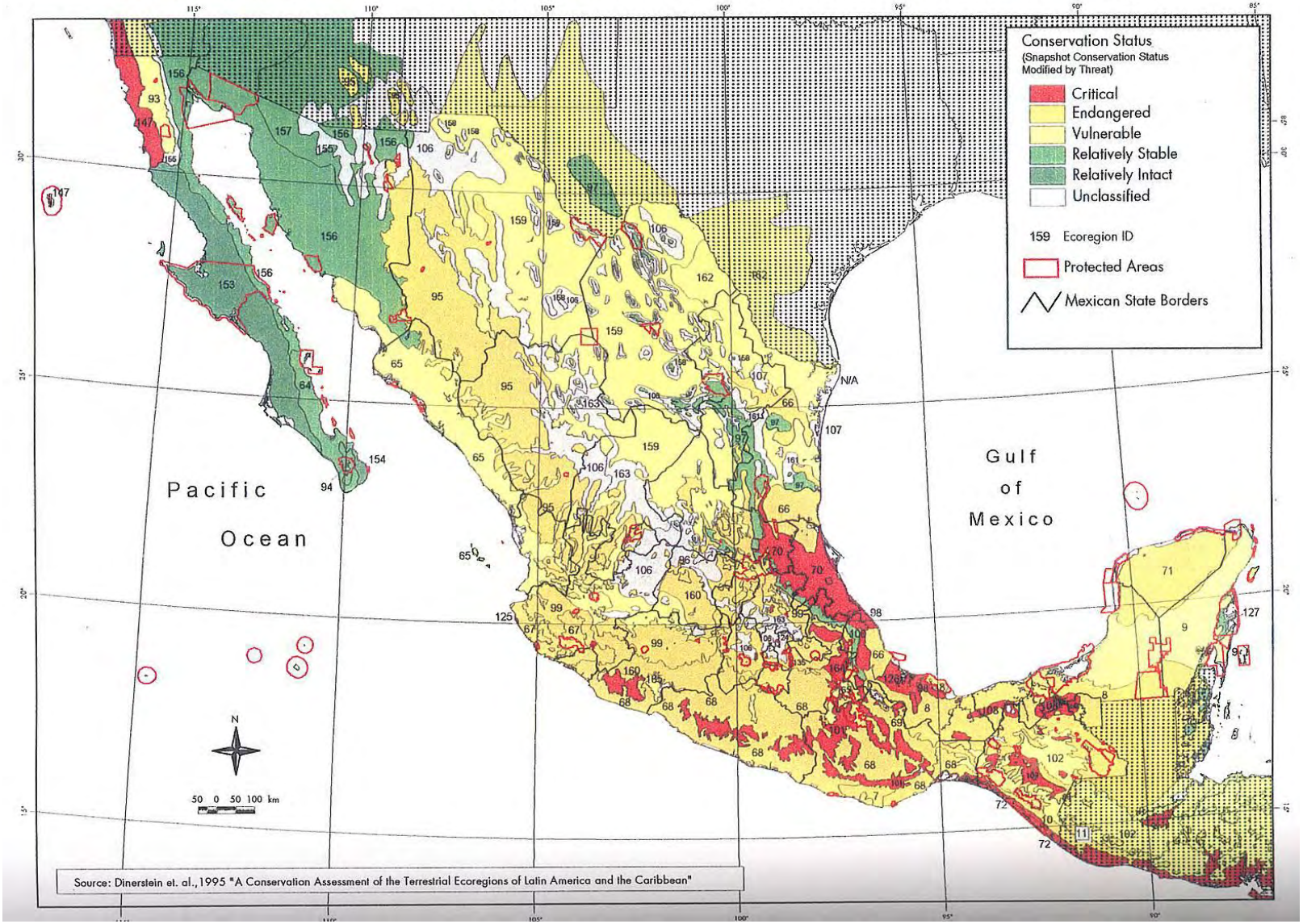
MAJOR ECOSYSTEM TYPE Major Habitat Type Level	Ecoregion
TROPICAL BROADLEAF FORESTS	
Tropical Moist Broadleaf Forests	
Ia	8.- Tehuantepec moist forests
Tropical Dry Broadleaf Forests	
I	67.- Jalisco dry forests
I	68.- Balsas dry forests
Ia	66.- Tamaulipas/Veracruz dry forests
CONIFER/TEMPERATE BROADLEAF FORESTS	
I	95.- Sierra Madre Occidental pine-oak forests
I	99.- Mexican transvolcanic pine-oak forests
I	*101.- Sierra Madre del Sur pine-oak forests*
XERIC FORMATIONS	
Mediterranean Scrub	
I	*147.- California coastal sage-chaparral*
Desert and Xeric Shrublands	
I	157.- Northern Sonora cactus scrub
Ia	164.- Pueblan xeric scrub
GRASSLANDS/SAVANNAS/SHRUBLANDS	
Grasslands/Savannas/Shrublands	
Ia	108.- Tabasco/Veracruz savannas
Flooded Grasslands	
I	*124.- Central Mexican Wetlands*
Ia	125.- Jalisco palm savannas
Montane Grasslands	
Ia	135.- Mexican alpine tundra

Level I = Highest Priority at Regional Scale

Level I (in italics) = Critical and Globally/Regionally Outstanding or Endangered and Globally Outstanding

Level Ia = Ecoregion considered of Highest Priority at Regional Scale to achieve bioregional representation.

The World Bank/World Wildlife Fund, 1995 - Final Conservation Status of Mexican Ecoregions



THE GLOBAL 200

A Representation Approach to Conserving the Earth's Distinctive Ecoregions

World Wildlife Fund, (Olson and Dinerstein 1997)

To better incorporate representation of the Earth's distinctive ecosystems in conservation strategies, WWF's scientists conducted an analysis of ecoregions representing the Earth's 19 terrestrial, freshwater, and marine major habitat types. Based on a comparative global analysis and synthesis of five extensive regional studies, these scientists identified 233 ecoregions (The Global 200) that are outstanding examples of the world's diverse ecosystems and priority targets for conservation action. These include 136 terrestrial, 36 freshwater, and 61 marine ecoregions. Selection of ecoregions was based on analyses of species richness, species endemism, unique higher taxa, unusual ecological or evolutionary phenomena, and global rarity of major habitat types. Outstanding ecoregions were selected within each major habitat type from each of the world's biogeographic realms and ocean basins to better capture the variation in species assemblages around the world.

The current extinction crisis requires dramatic action to save the variety of life on Earth. Because funding for conservation action is limited, governments, donors, and conservation groups must be strategic and earmark the greatest amount of resources for protecting the areas richest in biodiversity. Most conservation biologists recognize that although we cannot save everything, we should at least ensure that all ecosystem and habitat types are represented within regional conservation strategies.

(n) = Number in WWF Global 200 Manuscript [n] = Number in modified ecoregions
CE = Critical or endangered V = Vulnerable RS = Relatively stable or intact

TERRESTRIAL ECOREGIONS

5 out of 136 Global 200 terrestrial ecoregions = 3.6%

TROPICAL & SUBTROPICAL DRY & MONSOON BROADLEAF FORESTS

(56) **Southern Mexican Dry Forests**, Mexico [75,76,77,78,79,80,83] CE
The tropical dry forests of southern and southwestern Mexico are noted for high levels of regional and local endemism in a wide range of taxa. The richest tropical dry forests in the world with high levels of regional and local endemism.

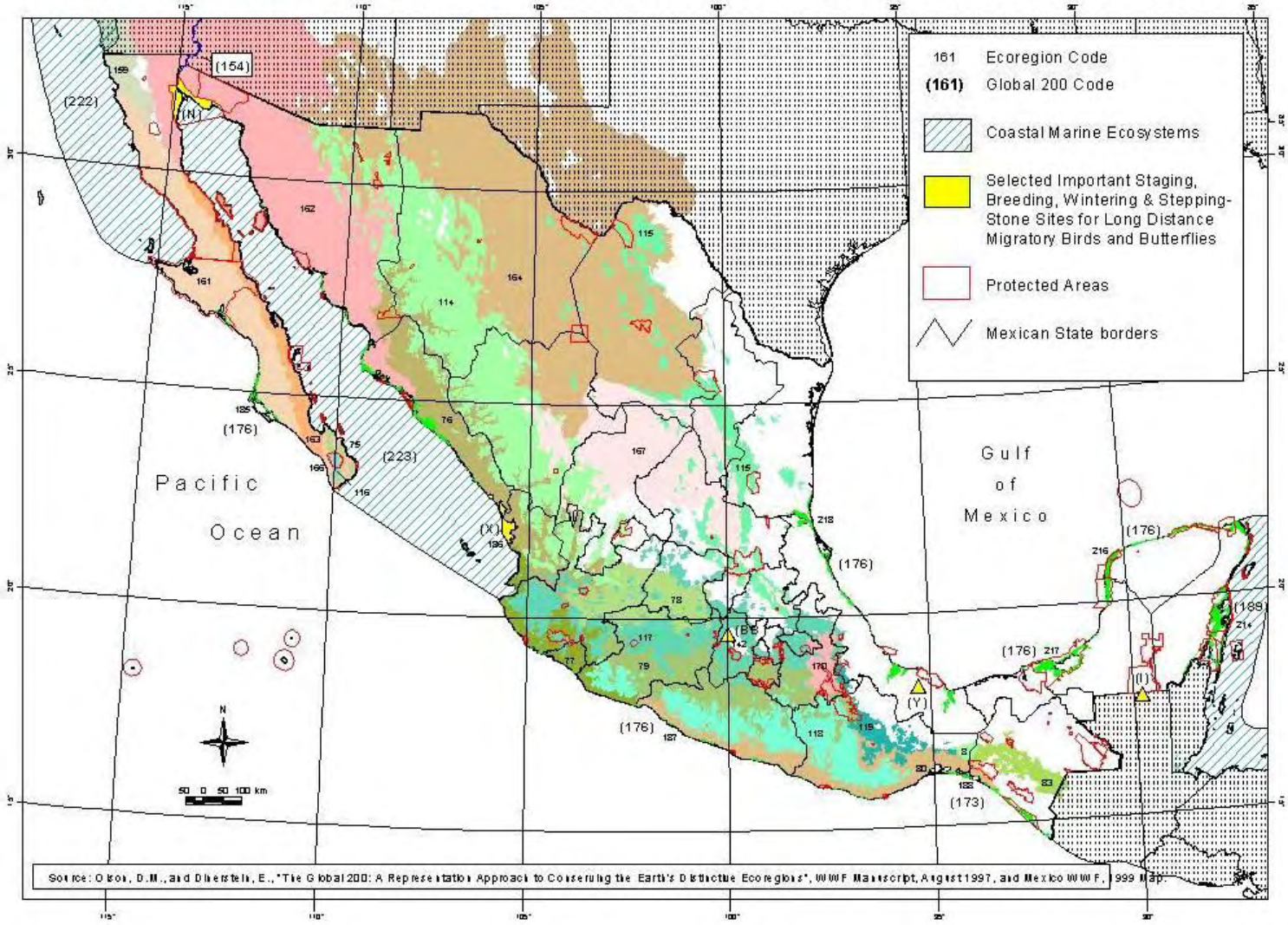
TROPICAL AND SUBTROPICAL CONIFER FORESTS

(64) **Mexican Pine-Oak Forests** - Mexico, United States [114,115,116,117,118] CE
This ecoregion contains some of the world's most extensive subtropical coniferous forests. Many plants and animal species are restricted to single ranges or individual peaks or watersheds throughout the region, notably birds, conifers, reptiles and amphibians. These are the richest subtropical conifer forests in the world.

DESERTS & XERIC SHRUBLANDS

(121) **Sonoran & Baja Deserts** - Mexico, United States [161.162,163,76] V
The cactus scrub communities of the northern Sonora desert have some of the most diverse and unusual desert plants and animals in the world. Forests of giant cacti are notable here and are associated with a rich variety of plants and animal species. Neotropical deserts with high endemism at species and higher taxonomic levels and globally distinctive communities, dominated by massive columnar cacti.

World Wildlife Fund Global 200, 1997 - Ecoregions and Selected Sites



(122) **Chihuahuan & Tehuacan Deserts** - Mexico, United States [164,167,170] V
This ecoregion has an exceptionally rich desert flora and fauna, globally outstanding for flora, with subregional endemism in some taxa and unusual floristic communities. The richest cactus communities in the world are found in the southern Chihuahua desert. Some of the world's richest desert mammal and reptile faunas also occur here. The most diverse desert in the Neotropical and Neartic region, with globally outstanding levels of desert plant, reptile and mammal diversity.

MEDITERRANEAN SHRUBLANDS & WOODLANDS

(133) **California Chaparral & Woodlands** - United States, Mexico [159] CE
California coastal sage, or chaparral, is one of the most endangered ecosystems in North America. Development along the increasingly crowded seashore threatens to destroy this rare habitat, one of only five Mediterranean scrub ecoregions in the world, which collectively harbors 20% of the earth plant species. High endemism at species and genera levels, high beta diversity, the only Mediterranean shrubland in North America.

FRESHWATER ECOREGIONS 3 out of 35 Global 200 freshwater ecoregions = 8.57 %

LARGE RIVERS

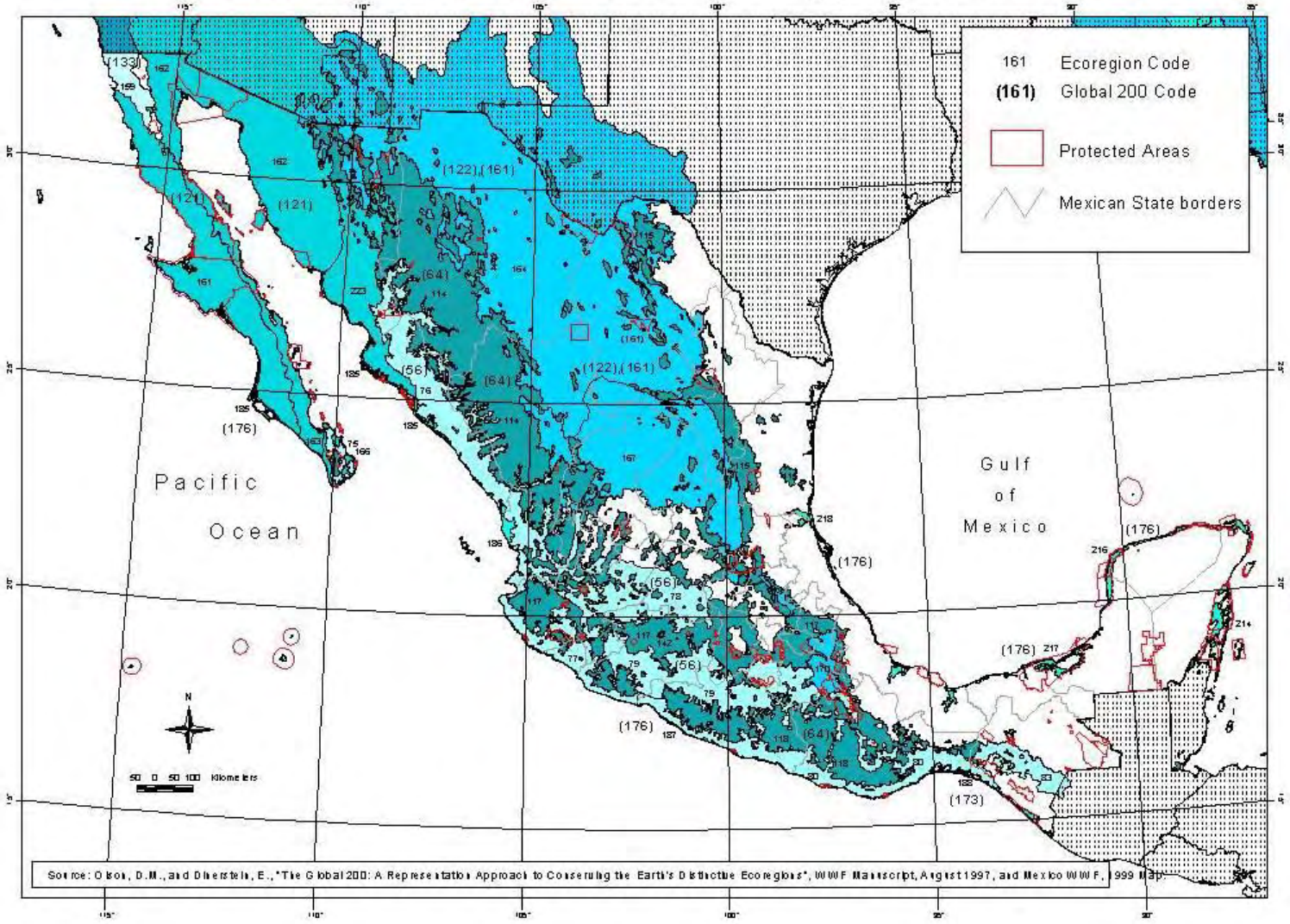
(154) **Colorado River Basin**- United States - Mexico
[BSP FW ecoregions O and 2 based in WWF, 1999 map]
The extreme conditions of the Colorado River - dropping two miles in elevation from its headwaters to the Sea of Cortez, with associated high flows as well as basins geographical isolation, have led to exceptional freshwater fauna adapted to fast-flowing water. Unusual warm temperate, large river fauna adapted to high flow regimes, several endemics.

LAKE & CLOSED BASIN FRESHWATER ECOSYSTEMS

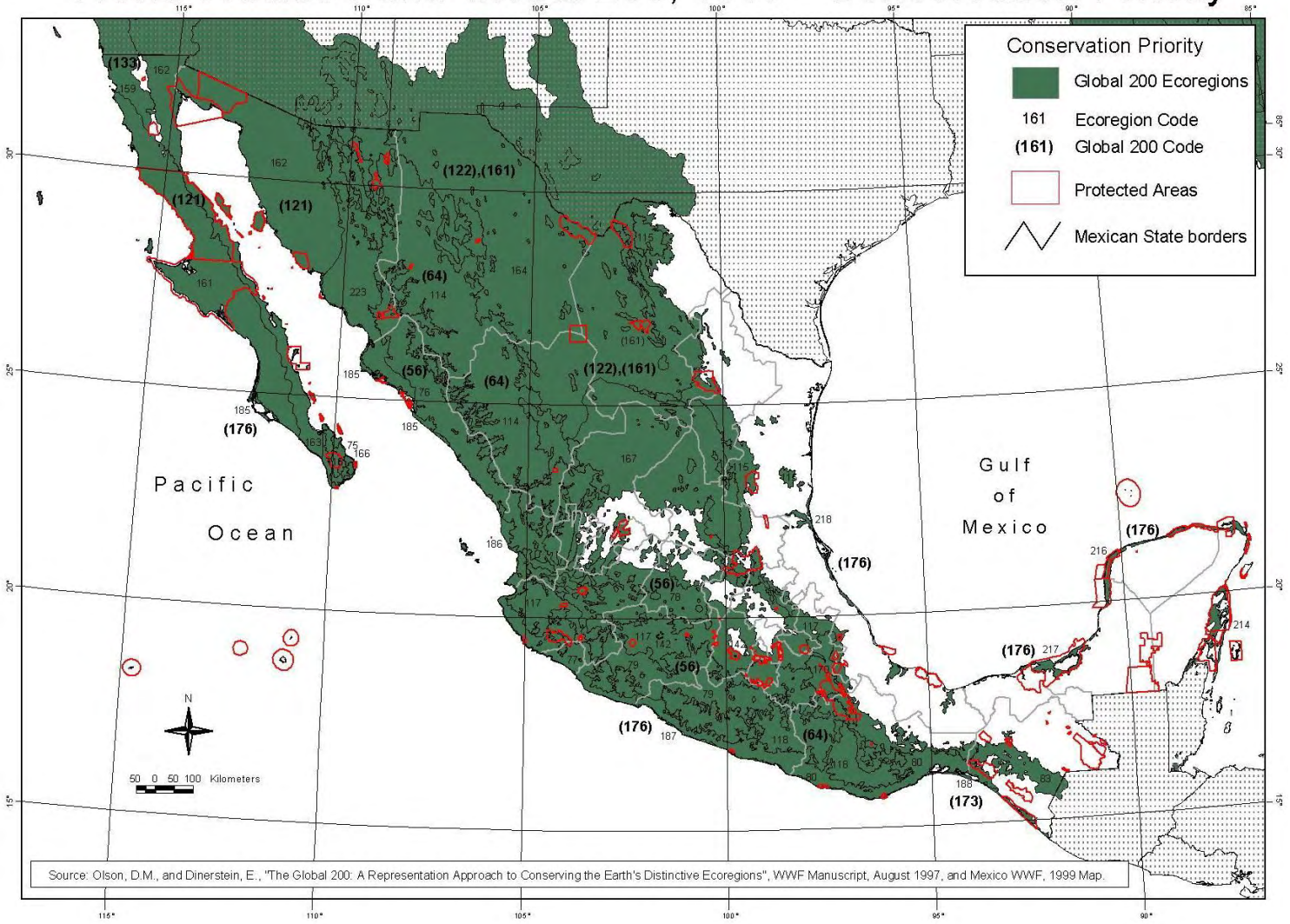
(161) **Chihuahuan Rivers and Springs** - Mexico, United States
[BSP FW ecoregions 5, 6, 7, 8, 9, 11, 12, 13 and 14 based in WWF, 1999 map]
The river basins in this ecoregion are remarkably different from each other, each containing unique species that evolved following geographical isolation. The fish and snails of Cuatro Ciénegas, for example, display an outstanding evolutionary phenomenon, in which endemic species can be restricted to just a few square meters. Other taxa have not diverged appreciably from ancestral forms and are important relict species. Diverse subtropical desert basin fauna with much local endemism, globally outstanding evolutionary radiations and adaptations of Cuatro Ciénegas biota.

(162) **Mexican Highlands Lakes** - Mexico
[BSP FW ecoregions 16, 17, 18, 19, 20, 23 and 27 based in WWF, 1999 map]
These lakes are characterized by unusual swarms of freshwater fish species, as well as by unusual amphibian and invertebrate species. Neotropical lakes with unusual radiations of fish species.

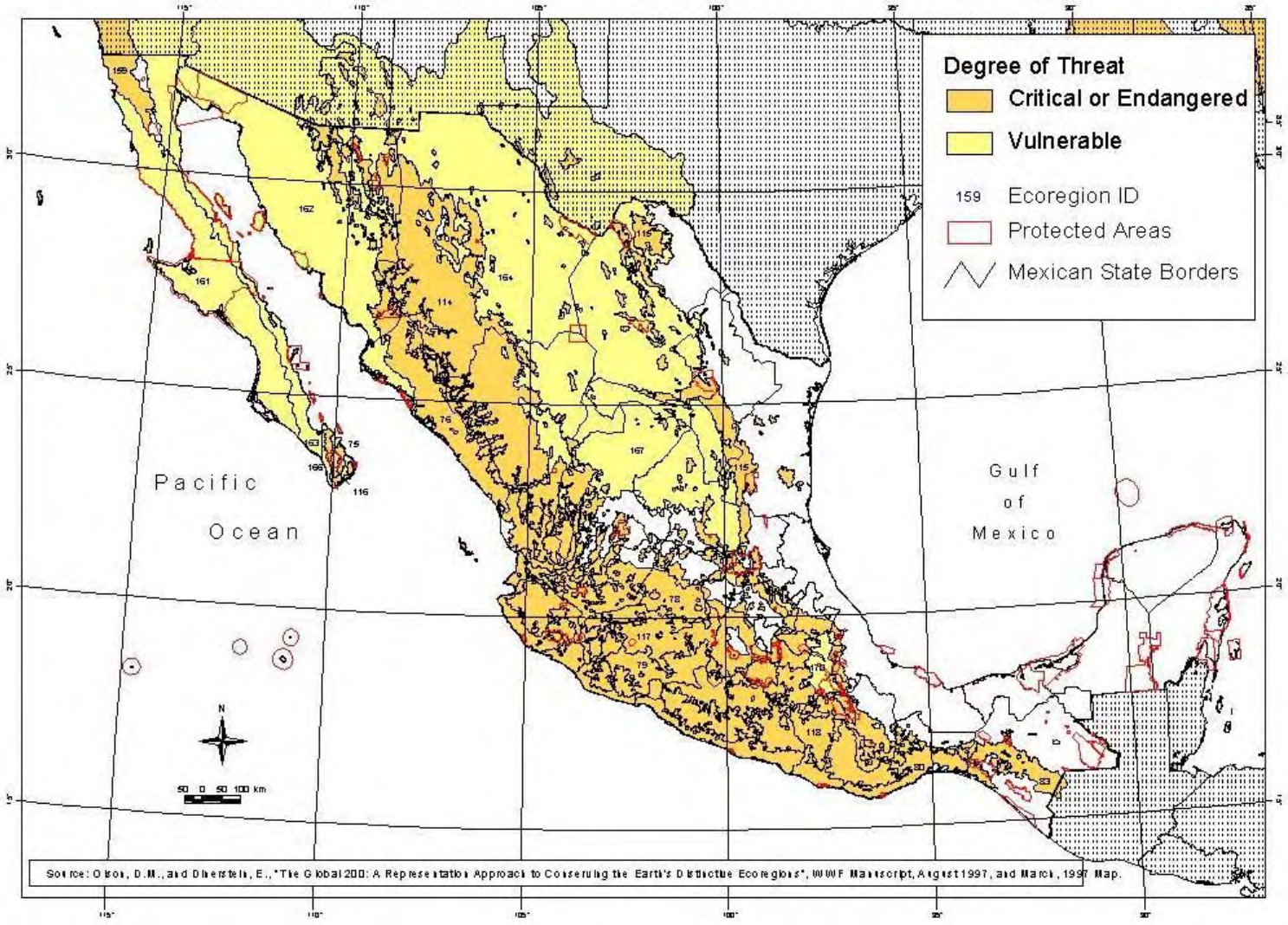
World Wildlife Fund, 1997 - Global 200 Aggregate Ecoregions



World Wildlife Fund Global 200, 1997 - Conservation Priority



World Wildlife Fund Global 200, 1997 - Degree of Threat



MARINE ECOREGIONS

5 out of 61 Global 200 marine ecoregions = 8.19%

LARGE DELTAS, MANGROVES & ESTUARIES

(173) Central American Mangroves - Belize, Mexico, Honduras , Nicaragua, El Salvador, Panama. [212, 213,214]
This ecoregion contains one of the most extensive mangrove complexes in Latin América. The mangroves play a critical role in stabilizing the shoreline and providing nursery areas for fish.

(176) Mexican Mangroves - Southern North America -Mexico [185,196,187,188,215,216,217,218]
This ecoregion represents critical migratory and feeding area for seabirds and shorebirds. In addition gray whales find their breeding and calving grounds in these waters. The San Ignacio Lagoon is the northern most reach of mangroves in the Pacific and the last pristine lagoon in the area.

CORAL REEFS & ASSOCIATED MARINE ECOSYSTEMS

(189) Belize Barrier Reef - Belize, Honduras, Mexico
With a length of 720 km., the Belize Barrier Reef is the second largest barrier reef in the world. Associated with the reef are extensive areas of relatively pristine coastal wetlands, lagoons, seagrass beds and mangrove forest.

COASTAL MARINE ECOSYSTEMS

(222) California Current - United States, Canada, Mexico
Like all upwelling zones, the area off California and Oregon supports huge marine mammal, seabird and fish populations. The area is best known, however, for the extensive kelp forests and for the sea otters (*Enhydra lutris*). Some endemism in invertebrates and fishes. Highly diverse and productive upwelling ecosystems of the Northeastern Pacific Ocean. (not mapped for Mexico in 1997 map, but included in the 1999 WWF Annual Report Map)

(223) Sea of Cortez - México
This was once an enormously rich region, with major nutrient influxes from the Colorado River. Highly productive subtropical sea with unusual endemism in vertebrates and invertebrates

Grand total for México of 13 out of the 232 Global 200 Ecorgegions = 5.6 %

SELECTED IMPORTANT STAGING, BREEDING, WINTERING & STEPPING-STONE SITES FOR LONG DISTANCE MIGRATORY BIRDS AND BUTTERFLIES

(Identified with the assistance of Birdlife International & Wetlands International)

N. Colorado Delta - Mexico
X. Marismas Nacionales - Mexico
Y. Veracruz - México
AA. Mexican Highlands Monarch Sites - Mexico
I. Petén - Mexico, Guatemala, Belize

TERRESTRIAL ECOREGIONS OF NORTH AMERICA

a Conservation Assessment

Word Wildlife Fund (Ricketts *et al.* 1999)

This exercise evaluates and ranks only ecoregions present in Canada and the United States. Nevertheless it provides information on ecoregions straddling the United States and Mexico border.

Major Habitat Type Ecoregion		Biological Distinctive.	Final Cons Status	Cons. Class
Temperate Coniferous Forests				
(114) Madrean Sky Islands Montane Forests	[47]	G (a)	S	III
Temperate Grasslands/Savanna/Shrub				
(126) Western Gulf Coastal Grasslands	[68]	R	C	II
Mediterranean Scrub and Savanna				
(113) California Montane Chaparral and Woodlands	[71]	G (b)	V	I
(159) California Coastal Sage and Chaparral	[72]	G (b)	C	I
Xeric Shrublands/Deserts				
(162) Sonoran Desert	[80]	G	S	III
(164) Chihuahuan Desert	[81]	G (c)	V	I
(163) Tamaulipan Mezquital	[82]	R	C	II

(n) = Number in modified WWF ecoregions. [n] Number in (Ricketts *et al.* 1999).

Biological Distinctiveness

G= Globally Outstanding, R =Regionally Outstanding, B =Bioregionally Outstanding, N =Nationally Important

(a) Ecoregion designated Globally Outstanding due to rare ecological or evolutionary phenomena because it's pronounced local endemism.
(b) Ecoregion designated Globally Outstanding due to rare habitat type because the global rarity of Mediterranean scrub and savanna habitat type.
(c) The Chihuahuan Desert together with the Namib-Karoo of Southern Africa are the most diverse warm deserts in the world, with the Chihuahuan Desert ranking globally outstanding in reptile, bird, mammal and cactus richness. (Olson and Dinerstein 1998)

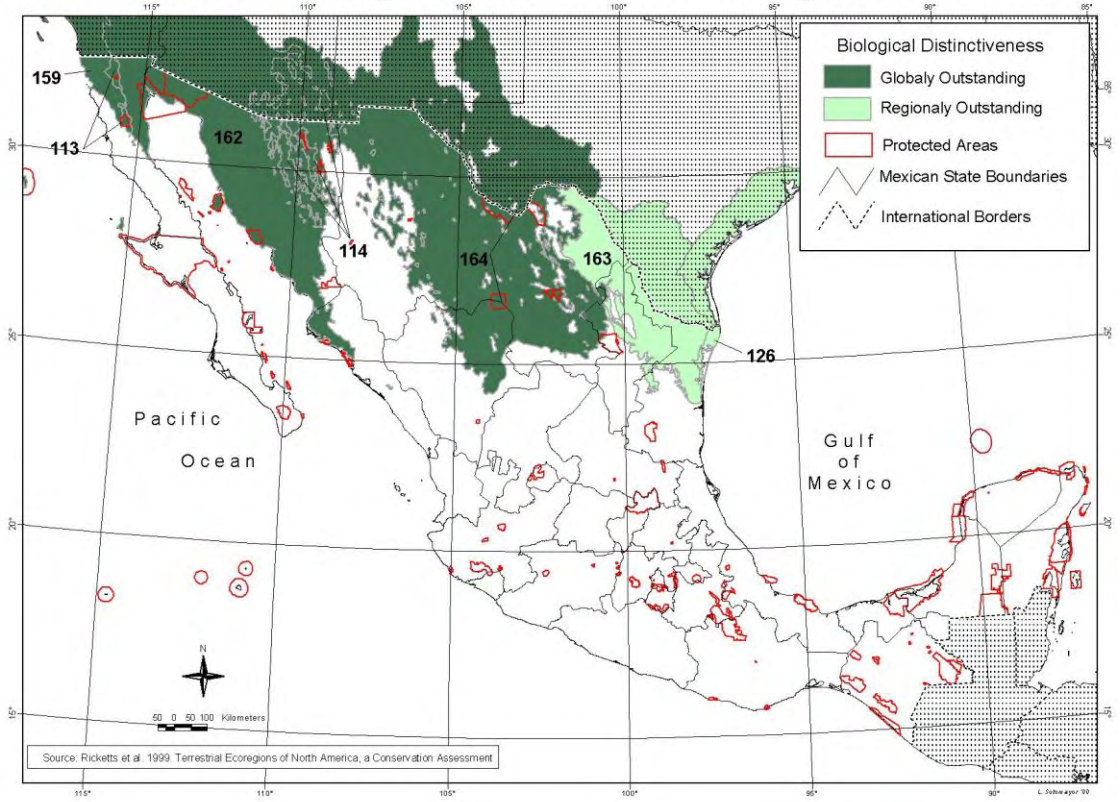
Final Conservation Status

C = Critical, E = Endangered, V = Vulnerable, S = Relatively Stable, I = Relatively Intact

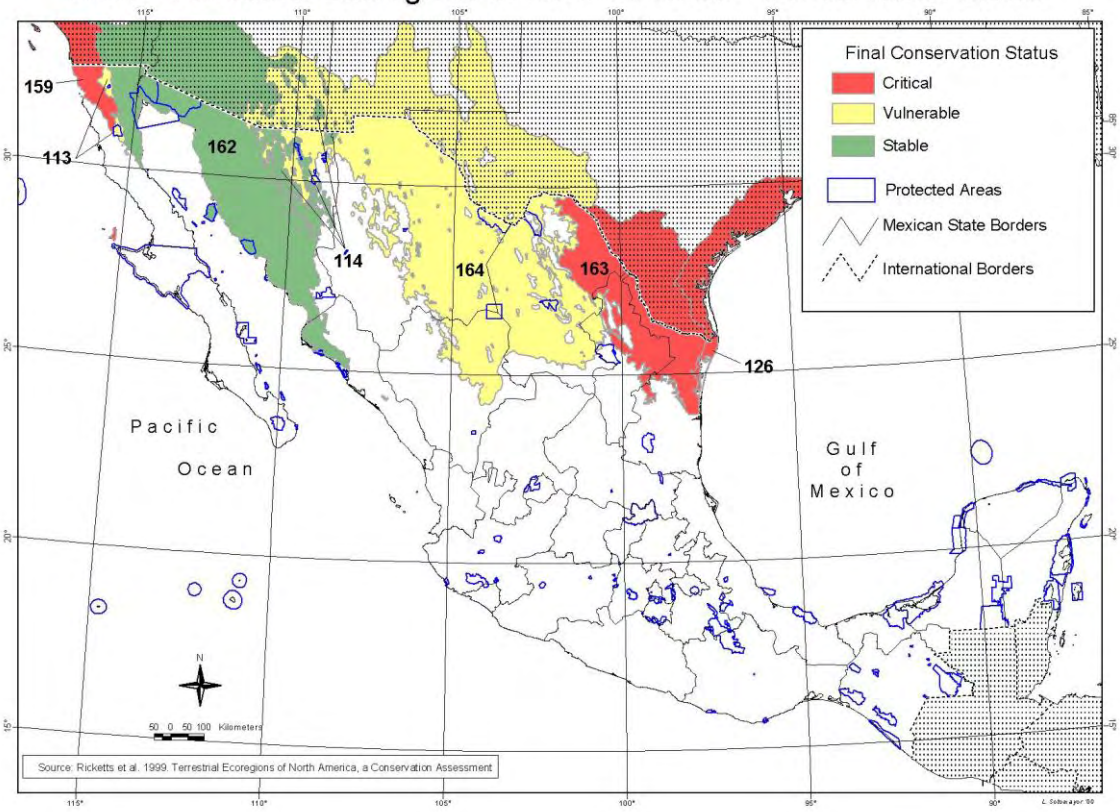
Conservation Classes and Recommended Conservation Action

Class I. Globally outstanding ecoregions requiring immediate protection of remaining habitat and extensive restoration.
Class II. Regionally outstanding ecoregions requiring immediate protection of remaining habitat and extensive restoration.
Class III. Globally or regionally outstanding ecoregions that present rare opportunities to conserve large blocks of intact habitat.
Class VI. Bioregionally and nationally important ecoregions requiring immediate protection of remaining habitat and extensive restoration.
Class V. Bioregionally and nationally important ecoregions requiring immediate protection of representative habitat blocks and proper management elsewhere for biodiversity conservation.

WWF - Terrestrial Ecoregions of North America - Biological Distinctiveness



WWF- Terrestrial Ecoregions of North America - Conservation Status



HOTSPOTS

Earth's Biologically Richest and Most Endangered Ecoregions

Conservation International (Mittermeier *et al.* 1999)

According to CI's hotspot analysis, first conducted in 1990, then reviewed and updated in 1996 and 1999, scientists have identified 25 priority biodiversity hotspots, based on two criteria: the number of endemic species an ecosystem contains and the degree of threat it faces. Strikingly, these hotspots occupy less than 2 percent of the Earth's land surface and contain a disproportionately large percentage of biodiversity.

Almost 40 percent of all terrestrial species and roughly 25 percent of terrestrial vertebrate species are endemic to these areas (i.e., are found nowhere else). When considering total species diversity in hotspot ecosystems, they claim more than 50 percent of Earth's terrestrial biodiversity and roughly two-thirds to three-quarters of the most endangered species of plants and animals.

MESOAMERICA

This hotspot has a total area of 1,154,912 Km² comprising 0.77% of the total land surface of planet earth. Out of these, 230,982 Km² (20%) remain intact, of which 138,437 Km² (12%) have protected area status. Out of the total hotspot area 57% equivalent to 662,286 Km² cover 33.9% of Mexico's total land surface.

Group/Biodivesity	Global Total	Hotspot	% Hot/Glob	Endemism	% End	E Rank
Birds	**9,881**	**1,193**	**12.07**	**251**	**21.0**	**2nd**
Mammals	**4,809**	**521**	**10.83**	**210**	**40.3**	**1st**
Reptiles	**7,828**	**685**	**8.75**	**391**	**57.1**	**2nd**
Amphibians	**4,780**	**460**	**9.62**	**307**	**66.7**	**19th**
Total Non Fish Vert.	**27,298**	**2,859**	**10.47**	**1,159**	**40.5**	**2nd**
Vascular Plants	**300,000**	**24,000**	**8.00**	**5,000**	**20.8**	**10th**

MAJOR ECOSYSTEM TYPE

Major Habitat Type

Ecoregion (n) = Number in Mittermeier *et al.* 1999 book. { n } = Number in Dinerstein *et al.* 1995 map

TROPICAL BROADLEAF FORESTS

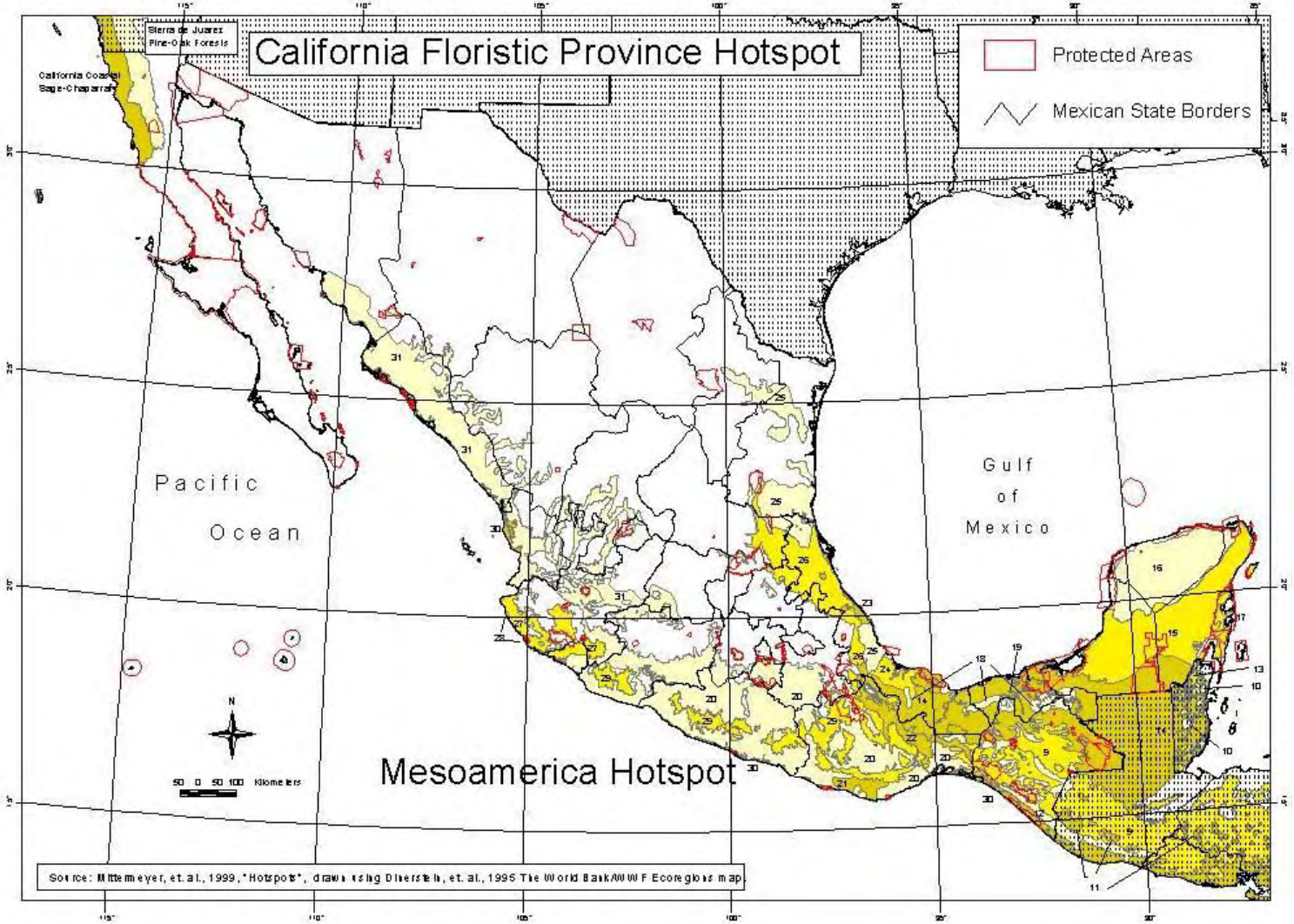
Tropical Moist Broadleaf Forests

(21) Oaxacan Moist Forests {7}
(15) Yucatan Moist Forests {9}
(14) Tehuantepec Moist Forests {8}
(13) Belizean Swamp Forests {12}
(marginally mapped for Mexico present in the Xcalak Península, Q. Roo)
(12) Sierra Madre Moist Forests {10}
(11) Central America Montane Forests {11}

Tropical Dry Broadleaf Forests

(31) Sinaloan Dry Forest {65}
(27) Jalisco Dry Forests {67}
(26) Veracruz Dry Forests {70}
(25) Tamaulipas/Veracruz Dry Forests {66}
(22) Oaxacan Dry Forests {69}
(20) Balsas Dry Forests {68}
(16) Yucatan Dry Forests {71}
(7) Central American Pacific Dry Forests {72}

Conservation International, 1999 - Global Biodiversity Hotspots: Mexico



CONIFER/TEMPERATE BROADLEAF FORESTS

(29) Sierra Madre del Sur Pine Oak Forests{101}
(23) Veracruz (Pine)-Oak Forests {98}
(10) Belizean Pine Forests {103}
(not mapped for Mexico present only in Savana el Jaguactal, Q.Roo)
(9) Central American Pine Oak Forests {96}

GRASSLANDS/SAVANNAS/SHRUBLANDS

Grasslands/Savannas/Shrublands

(19) Tehuantepec Savannas {109}
(18) Tabasco/Veracruz Savannas {198}

Flooded Grasslands

(28) Jalisco Palm Savannas {125}
(24) Veracruz Palm Savannas {126}
(17) Quintana Roo Wetlands {127}

MANGROVES

(30) Pacific Mexican Wetlands {A}

CALIFORNIA FLORISTIC PROVINCE

This hotspot has a total area of 324,000 comprising 0.21% of the total land surface of planet earth. Out of these, 80,000 Km² (24.7%) remain intact, of which 31,443 Km² (9.7%) have protected area status. Out of the total hotspot area 4.3 % equivalent to 14,000 Km² cover 0.7 of Mexico's total land surface.

Group/Biodivesity	Global Total	Hotspot	% Hot/Glob	Endemism	% End	E Rank
Birds	**9,881**	**341**	**3.45**	**8**	**2.3**	**21st**
Mammals	**4,809**	**145**	**3.01**	**30**	**20.7**	**16th**
Reptiles	**7,828**	**61**	**0.78**	**16**	**26.2**	**24th**
Amphibians	**4,780**	**37**	**0.77**	**12**	**46.0**	**19th**
Total Non Fish Vert.	**27,298**	**584**	**2.14**	**71**	**12.2**	**21st**
Vascular Plants	**300,000**	**4,426**	**1.47**	**2,125**	**48.0**	**19th**

Peninsular Ranges {Roughly equivalent to ecoregions 147 and 93}

CONIFER/TEMPERATE BROADLEAF FORESTS

93.- Sierra de Juárez pine-oak forests

XERIC FORMATIONS

Mediterranean Scrub

147.- California coastal sage- chaparral

Population threats to these hotspots were compiled on a recent publication by Population Action International (Cincotta & Engelman 2000).

Hotspot	Population, 1995	Density, 1995 (World average 42)	Growth Rate 1995-2000 (World average 1.3 %)
Mesoamerica	61,061,000	56 persons/ Km²	2.2 % per year
California Floristic Pr.	25,360,000	108 persons/Km²	1.2 % per year

2.1.2 TERRESTRIAL ECOREGIONAL EXERCISES COMPARATIVE ANALYSIS

Four basic ecoregional priority setting exercises were utilized for the present terrestrial ecoregions analysis. These can be classified by the two basic approaches they take. The first one includes the Biodiversity Support Program, The World Bank and WWF's Global 200 process, are part of the same family which embraces the representative approach, guided mainly but not exclusively by the efforts of Eric Dinerstein and David Olson from World Wildlife Fund (WWF). The second approach is based on uniqueness in species richness and is represented by the hotspots, whose paradigm has been developed mainly by Norman Meyers and Russell Mittermeier for Conservation International (CI). Both approaches offer distinct perspectives that enrich ecoregional priority setting needs mainly at the global scale, but can also be utilized on exercises focused smaller territories. Other efforts to define ecological analysis units or regions for Mexico are the ones developed by the Commission for Environmental Cooperation (CEC 1997), Ecological Regions Of North America and by the Mexican Biodiversity Commission (CONABIO 1999), Ecoregions of Mexico. Ecological regions resulting from these exercises have not yet been used for biodiversity priority setting, so they are not considered in this analysis. All freshwater and marine exercises utilized in this comparative analysis correspond to the representative approach. Some peculiarities of the two approaches and of the different exercises are detailed below, in order to facilitate their use according to their particular strengths and limits.

CI HOTSPOTS (Mittermeier *et al.* 1999 and Meyers *et al.* 2000)

Concentrating on areas where there is greatest need and where the payoff from safeguard measures would also be greatest, is the basis of the hotspots paradigm. It responds to the challenge of large-scale extinction that we are now facing and offers an objective answer to the question: of how can we protect the most species per dollar invested? The hotspots approach identifies areas featuring **exceptional concentration of endemic species and experiencing exceptional loss of habitat**. Hotspots focus on species rather than populations or other taxa as the most prominent and readily recognizable form of biodiversity. (Meyers *et al.* 2000)

The species dimension for hotspots is based in first instance on **vascular plants** (90% of all plants) and to qualify as such the area must contain at least **05% of the world's** 300,000 species as endemics. Vertebrates (excluding fish) serve as a backup support and also to determine congruence and to facilitate other comparisons among the hotspots. The analysis omits invertebrates, which are largely undocumented but probably make up at least 95% of all species. A second determinant of hotspots status, applied only after an area has met the "plants" criterion is the degree of threat through **habitat loss**, which should represent at least **70% of its primary vegetation**. Finally, the analysis is limited to the terrestrial realm, although CI is preparing an analysis of marine species and conservation priorities.. The resulting 25 hotspots contain the remaining habitat of 1333,149 plant species (44% of all plant species) and 9,645 vertebrate species (35% of all vertebrate species). These endemics are confined to an aggregate remaining expanse of 2.1 million square kilometers, or **1.4%** of the earth's land surface. (Meyers *et al.* 2000)

According to the authors of The Global 200 (Olson *et al.* 1997) the controversy between the representation approach and the hotspots approach is partly academic (Schmidt 1996, in Olson *et al.* 1997). The hotspots analysis focuses on those areas that have extraordinary concentration of species and high number of endemic species. Although these areas are important conservation targets, the danger of the hotspots approach is that it is often interpreted as a triage for the remaining habitats of the world. In the process, it places in jeopardy the half of all species that occur outside certain tropical moist forests and Mediterranean shrublands. The conservation of freshwater or marine biodiversity is also not addressed. (Olson *et al.* 1997)

Hotspots have been qualified as the “silver bullet” approach to conservation, since it targets unique species richness. They also suffer from what Kent Redford has referred to as the “tyranny of the rainforest”. This due mainly, on the fact that about two thirds of all species occur in the tropics, largely in tropical humid forests (Raven 1980, in Pimm and Raven 2000).

While the hotspots analysis is by itself a ranking exercise (hotspots over non hotspots) it further ranks hotspots utilizing numbers of endemics and endemic species/area ratios for both plant and vertebrates and habitat loss. This exercise which is acknowledged to be for “qualitative purposes in qualitative fashion” (Meyers *et al.* 2000), conflicts with the way ecoregions are ranked in the representative approach in which only ecoregions or Regional Habitat Units (BSP 1995) within the same Major Habitat Types are compared to determine their relative importance.

BIODIVERSITY SUPPORT PROGRAM (BSP 1995)

Regional geographic priorities in this exercise were determined by ranking the Regional Habitat Types within Major Habitat Types, based on the consideration and weighting of **biological value and conservation status**. Biological value of areas was determined through the definition of priority areas for: plants, insects, birds, herpetofauna, mammals and freshwater fish, the determination of respective taxonomic priority areas and their integration into biological priority areas. Conservation status was obtained from landscape-level features that included: presence/absence of large blocks of original habitat; percent of remaining original habitat; rate of conversion; degree of degradation and fragmentation, and; degree of protection. (BSP 1995)

The scale of the analysis is region-wide and thus is inappropriate to be used in making investment recommendations on a smaller subregional scale or country level. It also excludes marine, freshwater and mangrove ecosystems which limits its recommendations to terrestrial priorities. (BSP 1995). Furthermore it lacks data-driven rigor and necessarily reflects the unavoidably bias of the experts that were able to attend to the workshop.

Nevertheless the list resulting from this exercise contains a number of areas that have not received significant conservation attention in the past such as temperate forest (Mexico pine-oak and southern Chile, xeric (Caatinga in Brazil, Mexican xerics) and dry forests (Chaco Argentina, Paraguay and Bolivia and Cerrado of Brazil), which were determined of high priority for biodiversity conservation at the regional level.

THE WORLD BANK (Dinerstein *et al.* 1995).

This priority setting exercise (as well as the BSP and Global 200 that use the representative approach) elevates as a first principle, maintaining the representation of all ecosystem and habitat types in regional investment portfolios. Second it recognizes landscape-level features as an essential guide for effective conservation planning. This assessment integrates two distinct data layers: **biological distinctiveness** and **conservation status**. The biological distinctiveness of the ecoregions was assessed based on species richness, endemism, beta diversity, biological phenomena and relative rarity of habitat type. The conservation status was evaluated using the same parameters that were used in the BSP exercise (snapshot conservation assessment), but were further modified to final status after considering potential threats over the next 20 years to ecoregions based on their type, timeframe, spatial scale and intensity. (Dinerstein *et al.* 1995)

Of all four terrestrial priority setting exercises analyzed, this one is the most geographically detailed, since it was the only one developed at the ecoregion level (although the scale of the published map makes it difficult to use). An ecoregion is defined as a geographically distinct assemblage of natural communities that share a large majority of their species, ecological dynamics and similar environmental conditions and whose ecological interactions are critical for their long term persistence (Dinerstein *et al.* 1995).

This groundbreaking exercise pioneered planning at the ecoregional level. The analyses were undertaken with the help of a wide range of biodiversity specialists and conservation planners from the Latin America and Caribbean Region, but nevertheless it lacks data-driven rigor.

WWF GLOBAL 200 (Olson and Dinerstein 1997)

The Global 200 is an effective tool for targeting distinctive biogeographic units of biodiversity and providing a solid approach for promoting ecosystem-level representation at a global scale. The global 200 **broadens the goals of conservation from a primary focus on preserving species diversity to an encompassing view of habitat diversity in terms of structure, composition and ecological processes**. The Global 200 is a first step intended to provide a global context for the refinement and development of regional strategies, not replace them. It also does not try to identify particular sites within priority ecoregions for conservation action. (Olson *et al.* 1997) The Global 200 overlap partly or entirely in all 25 units of the hotspots analyses representing a total of 79 or 58.1 % of the 136 terrestrial ecoregions (Mittermeier *et al.* 1999).

The main critique to the Global 200 is that it lacks data-driven rigor (Mittermeier et al. 1999). This is now being approached through the development of the "Extinction Prone Ecoregions" exercise that will supplement previous efforts.

Other problems found in using the Global 200 in Latin America and the Caribbean for comparative purposes were: that the Global 200 Ecoregions are actually aggregated ecoregions and that these ecoregions are not the same ones that were used as the geographic base for all other terrestrial exercises, these being a more refined version that evolved from Dinerstein *et al.*, 1995. This situation results in the lumping together of ecoregions with different biological distinctiveness and conservation status within Major Habitat Types, that does not allow for a straightforward uniform geographic comparison. Finally even though the Global 200 Ecoregions are widely used, they are presently in a state of permanent flux and refinement.

WWF - TERRESTRIAL ECOREGIONS OF NORTH AMERICA (Ricketts *et al.* 1999)

This priority setting exercise deals only with the data rich ecoregions present in the United States and Canada, so its usefulness for Mexico is restricted to the Mexico - US shared crossborder ecoregions. This exercise represents an interesting contrast with The World Bank's exercise that was carried out within the Neotropical Realm, results from the development of this exercise within the framework of the Neartic Realm which constitutes a more appropriate biogeographical comparison field for northern Mexico. The most profound change resulting, is the emergence of the Chihuahuan Desert as a "Globally Outstanding Ecoregion" from its previous "Important at a National Scale" status.

Analysis

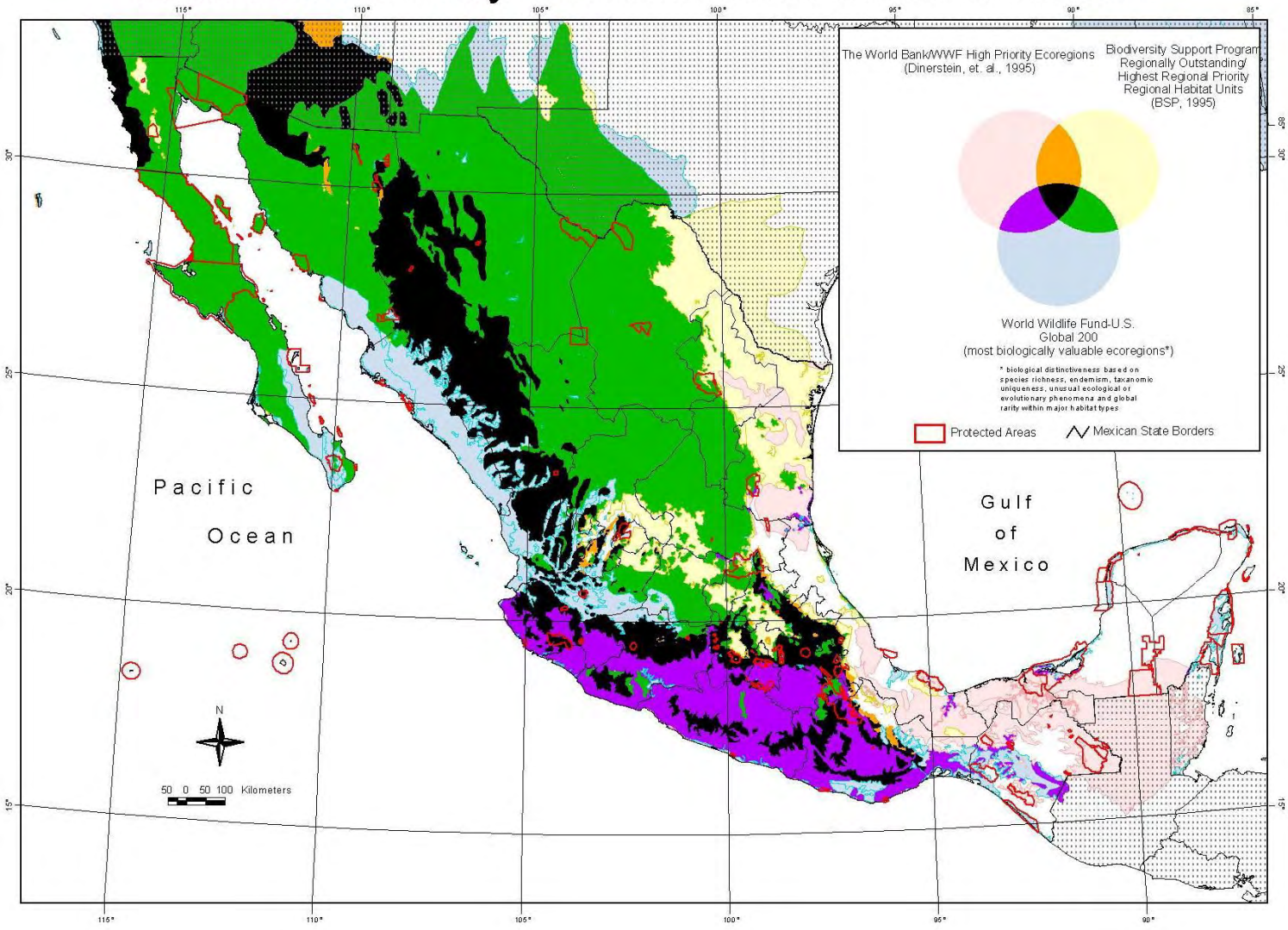
As above expressed most exercises analyzed, except the hotspots approach which emphasizes uniqueness in species richness, utilize a representative approach to determine biodiversity priority. The methodology used for the biodiversity priority setting exercises analyzed was the use of expert consultations, except for the three Biodiversity Support Program exercises that utilized expert workshops. It is highly probable that the amount and quality of the data used by the experts consultation, can be better analyzed that with the on the spot type of response that expert workshops require. On the other hand expert workshops provide for a joint on the spot feedback that allows for immediate and synergic feedback that enriches the exercise. Nevertheless most exercises lack data-driven rigor, except for the hotspots and the BSP marine exercises that utilize select biodiversity data, as shown in the following table:

TERRESTRIAL	Type of Approach	Methodology	Data
BSP, 1995	Representative	Experts workshop	Qualitative joint expert on the spot assessments, lacks data-driven rigor.
Word Bank / WWF, 1995	Representative	Experts consultation	Qualitative expert assessments, lacks data-driven rigor.
WWF The Global 200, 1997	Representative	Experts consultation	Qualitative expert assessments, lacks data-driven rigor.
WWF - Terrestrial Ecoregions of North America, 1999	Representative	Data mapping, experts consultation and experts workshops	Birds, mammals, butterflies, amphibians, reptiles, land snails and vascular plants, data driven
CI Hotspots, 1999	Uniqueness in species richness.	Experts consultation	Plant data driven with select vertebrate data as backup support.

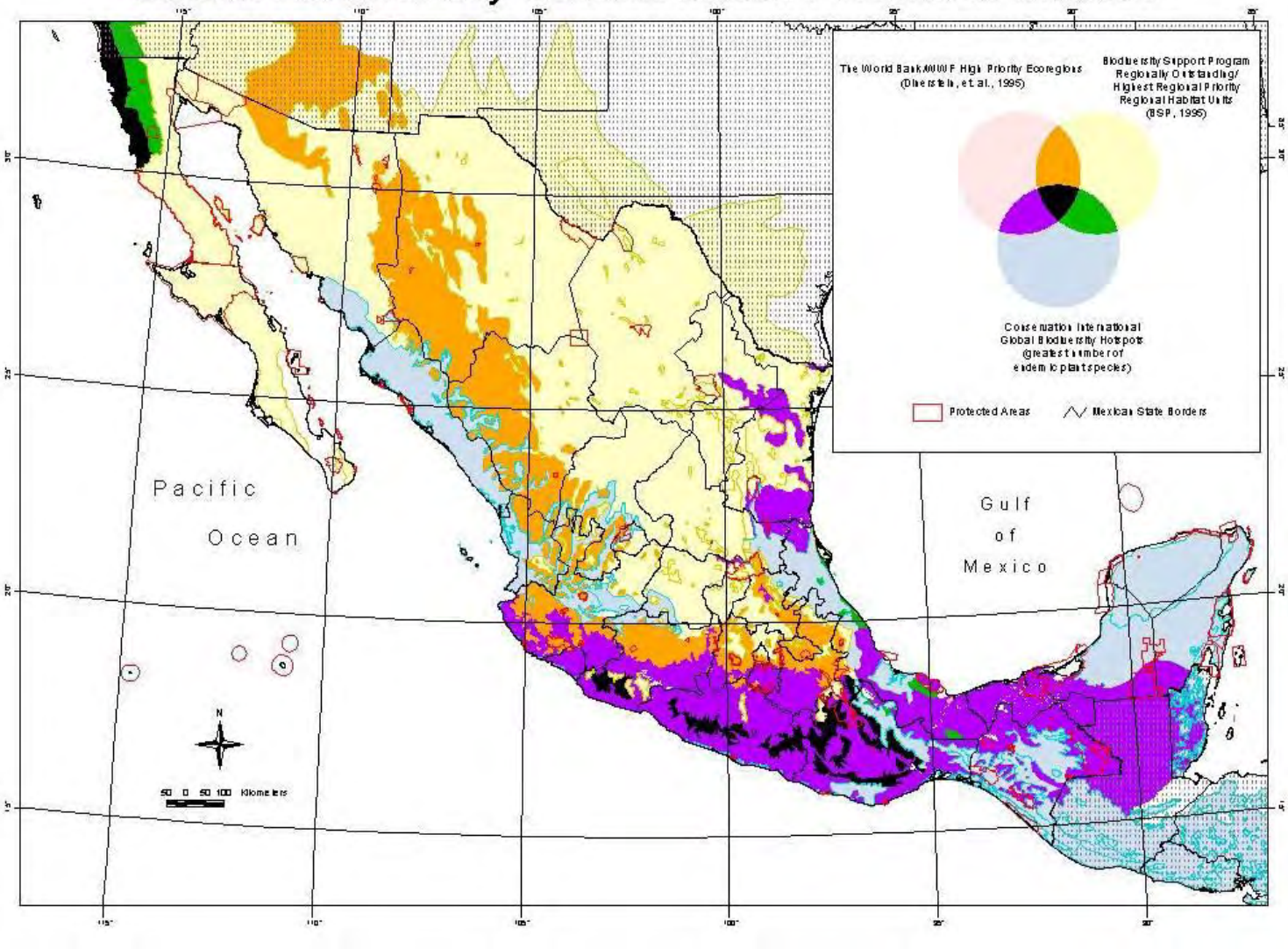
The different terrestrial biodiversity priority setting exercises analyzed can be reasonably assessed comparatively from an ecoregional perspective since they basically use the same ecoregional cartographic base for Latin America and the Caribbean. Nevertheless, the Global 200 utilizes updated ecoregions (Olson and Dinerstein 1997) which do not match precisely the The World Bank's ecoregions (Dinerstein 1995) utilized in all other exercises. The major difference amongst them resides in the level at which the prioritization exercise was carried out, which provides the best detail in the World Bank exercise.

TERRESTRIAL	Ecoregional Cartographic Base	Biogeographic Hierarchy (n) number of units for Mexico	Level at which the prioritization was carried out.
BSP, 1995	Dinerstein *et al.,* 1995	Bioregion (9) Maj. Ecosystem Type (5) Major Habitat Type (11) Ecoregion (178 without mangroves)	Regional Habitat Units within Major Habitat Types.
Word Bank / WWF, 1995	Dinerstein *et al.,* 1995		Ecoregions
CI Hotspots, 1999	Dinerstein *et al.,* 1995		Hotspots integrated by aggregated ecoregions.
WWF The Global 200, 1997	Olson and Dinerstein, 1997	Realm (3) Maj. Habitat Type (12 in terrestrial, 3 in fresh water and 4 marine) Biogeographic Realm Ecoregions	Aggregated ecoregions.
WWF - Terrestrial Ecoregions of North America, 1999	Olson and Dinerstein, 1997		Aggregated ecoregions.

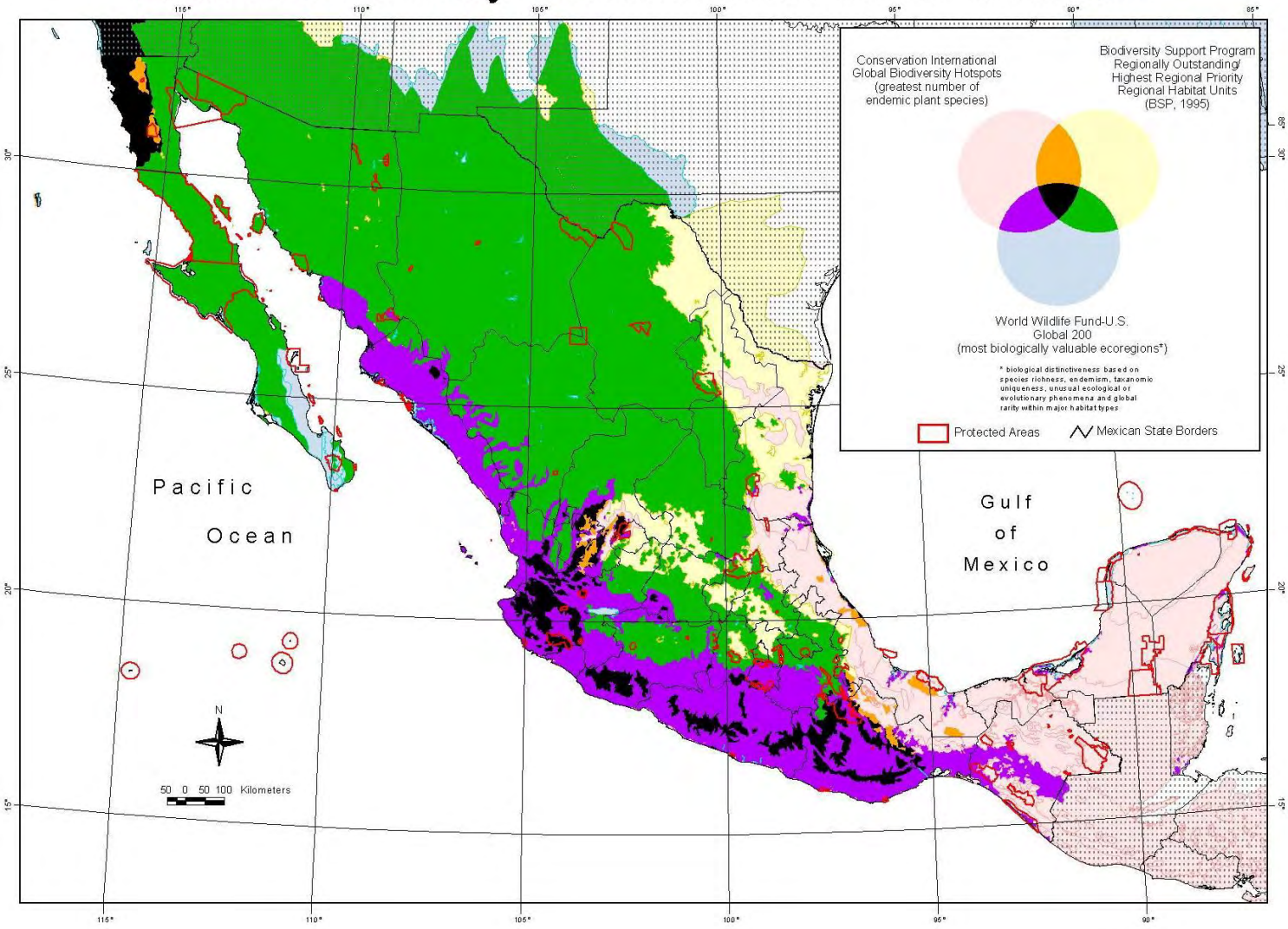
Global Biodiversity Conservation Priorities: Mexico



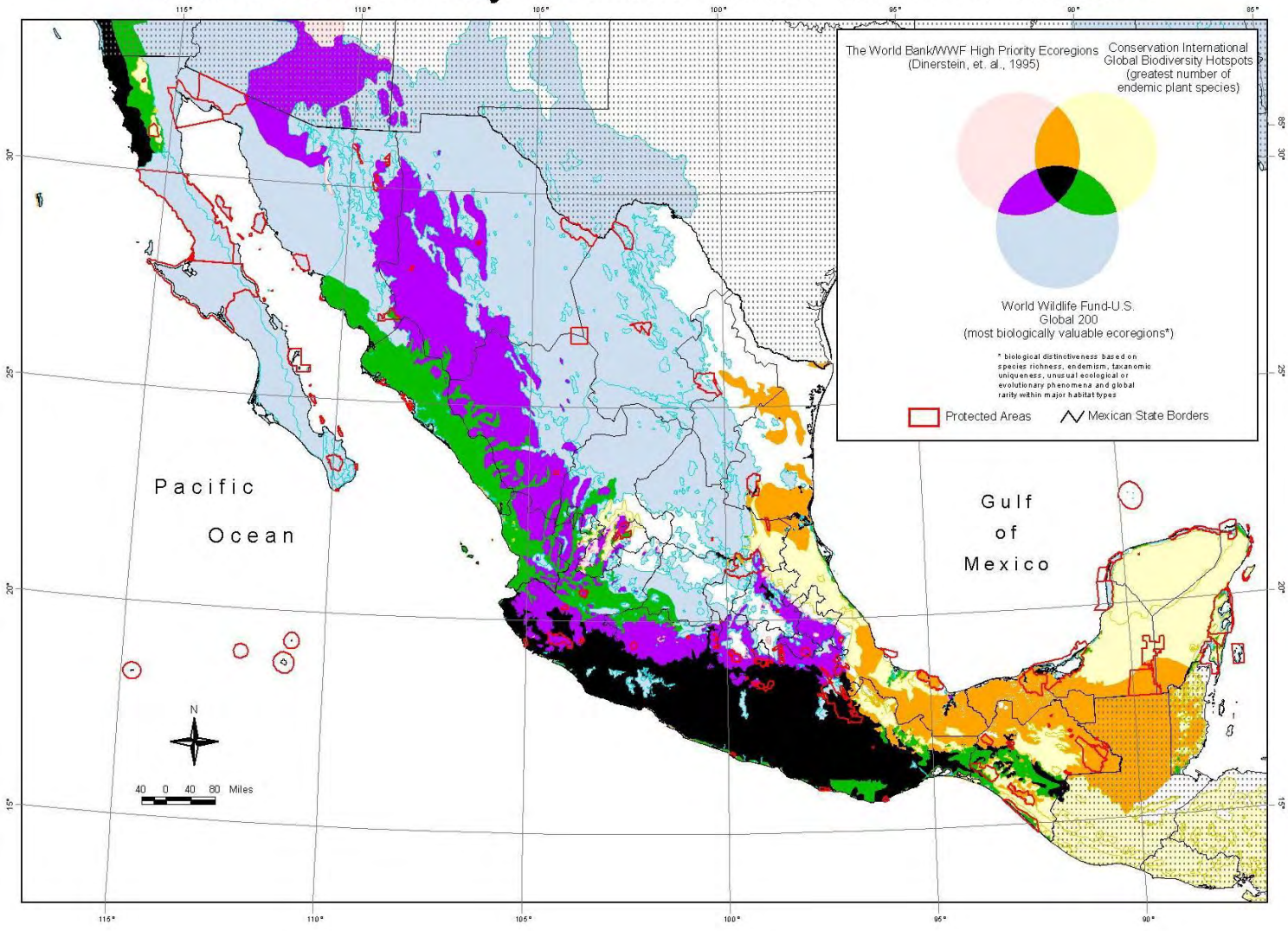
Global Biodiversity Conservation Priorities: Mexico



Global Biodiversity Conservation Priorities: Mexico



Global Biodiversity Conservation Priorities: Mexico



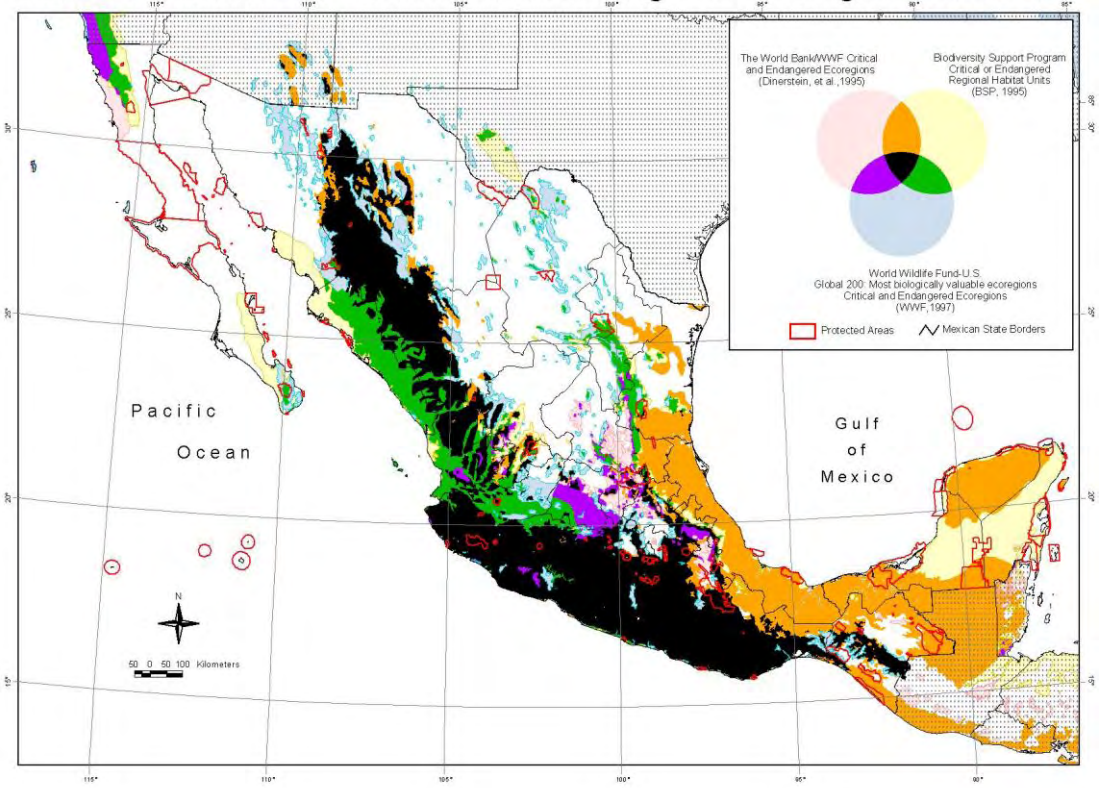
Global Biodiversity Conservation Priorities

TERRESTRIAL Major Habitat Type	Tropical Moist	Tropical Dry	Conifer & Temperate Broadleaf	Grasslands Wetlands	Xeric	(Medite-rranean)
BSP, 1995		**?**	Mexican Pine-Oak		Mexican Xeric	
Word Bank / WWF, 1995	Tehuantepec	-Tamps/Ver. -Jalisco -Balsas	-SM Occid. -S.Volc.T. -SM Sur	-Central Mex. Wet. -Tab./Ver. -Jalisco Palm -A.Tundra	- N.Sonora - Puebla	Coastal Sage Scrub
WWF The Global 200, 1997		Southern Mex-Dry	Mexican Pine-Oak		Sonoran & Baja, Chihuahuan & Tehuacán	California Chaparral
CI Hotspots, 1999	Tehuantepec -Oaxacan -Yucatan -SM Moist -C.America Montane -Belizean	-Sinaloan -Jalisco -Veracruz -Tamps/Ver -Oaxacan -Balsas -Yucatan -C.Americ. Pacific	-SM Sur Pine/Oak -Veracruz Pine/Oak -Belizean Pine -C.Americ. Pine/Oak	- Jalisco Palm - Veracruz Palm -Tehuantepec -Tab. / Ver. - Pacific Wet - Q. Roo Wet	**?**	Peninsular Ranges

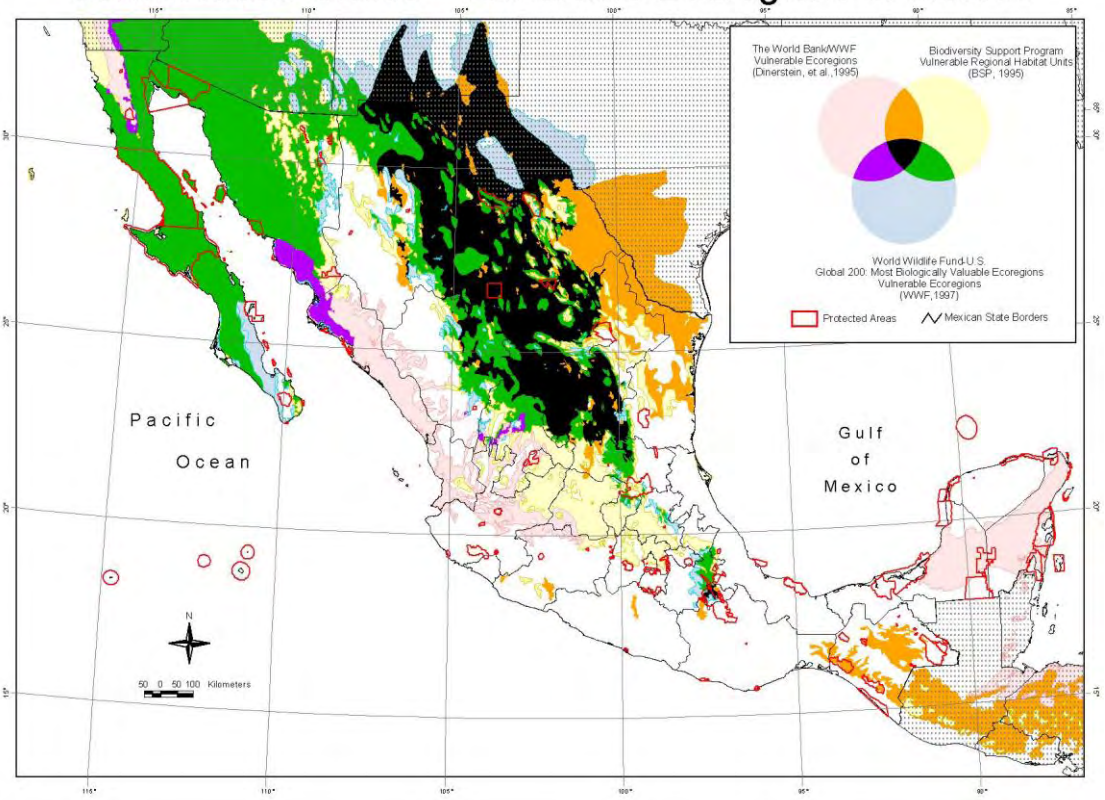
Ecoregional Conservation Status

TERRESTRIAL Major Habitat Type	Tropical Moist	Tropical Dry	Conifer & Temperate Broadleaf	Grasslands Wetlands	Xeric	(Medite-rranean)
BSP, 1995	**Endangered** (Lowland) **Vulnerable** (Montane)	**Endangered**	**Endangered**		**Vulnerable**	
Word Bank / WWF, 1995	**Vulnerable** Tehuantepec	**Endangered** (Tamps/Ver) (Jalisco) (Balsas)	**Critical** (SM Sur) **Endangered** (SM Occid.) (S.Volc.T.)	**Critical** (Central Mex. Wet) (Tab./Ver.) (Jalisco Palm) **Vulnerable** (A.Tundra)	**Critical** (Puebla) **Relatively Stable** (N.Sonora)	**Critical** (Coastal Sage Scrub)
WWF The Global 200, 1997		**Critical or Endangered** Southern Mex-Dry	**Critical or Endangered** Mexican Pine-Oak		**Vulnerable** Sonoran & Baja, Chihuahuan & Tehuacán	**Critical or Endangered** California Chaparral

Conservation Status - Critical and Endangered Ecoregions of Mexico



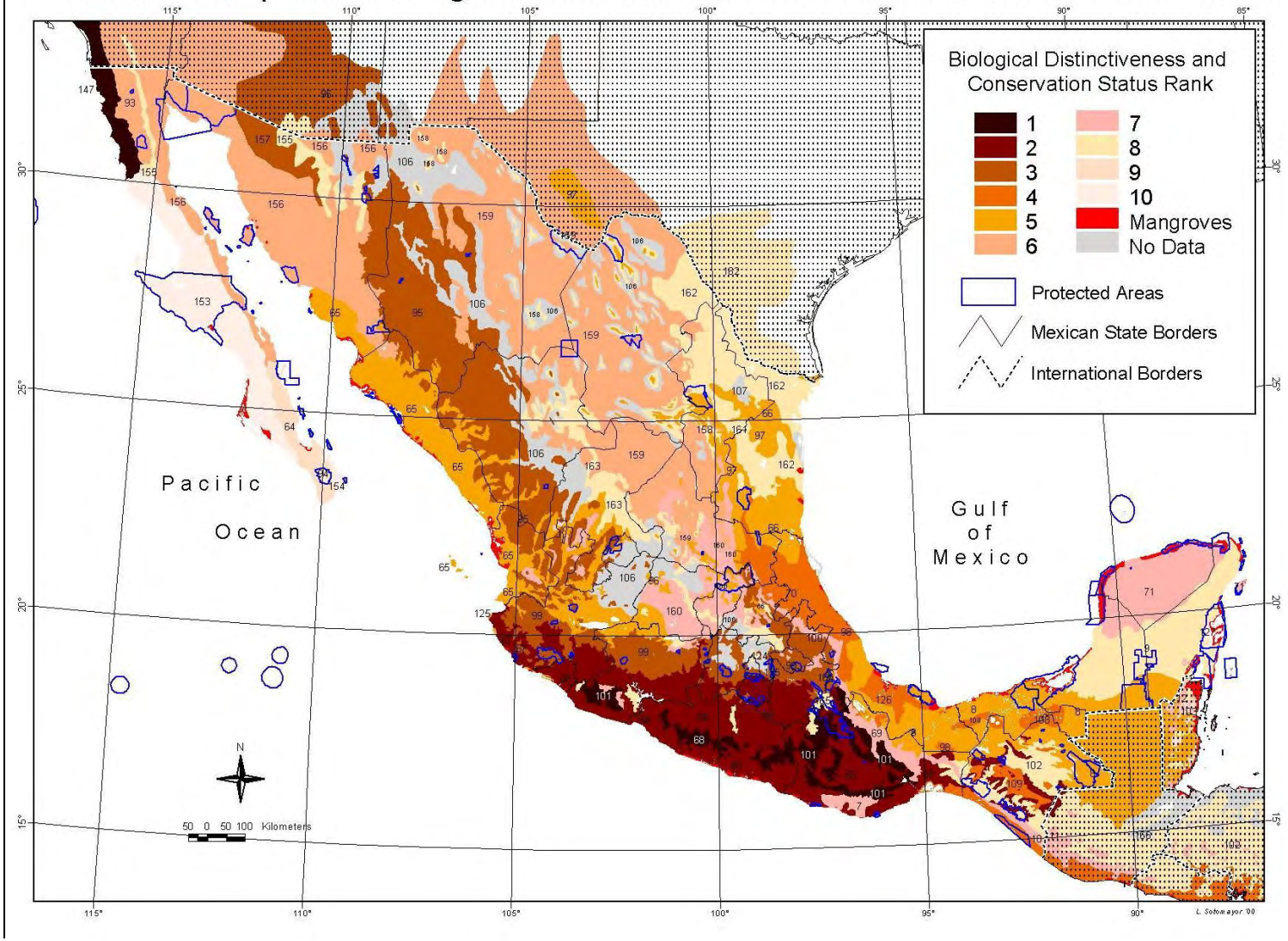
Conservation Status - Vulnerable Ecoregions of Mexico



TERRESTRIAL COMPOSITE BIOLOGICAL DISTINCTIVENESS AND CONSERVATION STATUS RANK

TERRESTRIAL ECOREGIONS PRESENT IN MEXICO	Biological Distinctiveness					Conservation Status				RANK
	BSP	WB	G200 WWF	HSP	PRIO	BSP	WB	G200 WWF	STAT	
California coastal sage-chaparral	X	X	X G	X	**4**	V	C	E C	C	**1**
Sierra Madre del Sur pine-oak forests	X	X	X	X	**4**	E	C	E	C	**1**
Balsas dry forests		X	X	X	**3**	E	E	E	E	**2**
Jalisco dry forests		X	X	X	**3**	E	E	E	E	**2**
S. Madre Occidental pine-oak forests	X	X	X G		3	E	E	E S	E	**3**
Mexican transvolcanic pine-oak forests	X	X	X		3	E	E	E	E	**3**
Pueblan Xeric Scrub	X	X	X		3	V	C	V	E	**3**
Northern Sonora cactus scrub	X	X	X G		3	V	S	- S	V	**3**
Tabasco/Veracruz savannas		X		X	**2**	-	C	-	C	**4**
Tehuantepec savannas			X	X	**2**	-	C	E	C	**4**
Veracruz oak forests	X			X	**2**	E	C	-	C	**4**
Veracruz dry forests				X	**1**	E	C	-	C	**[4]**
Central American Pacific dry forests				X	**1**	E	C	-	C	**[4]**
Veracruz palm savannas				X	**1**	-	C	-	C	**[4]**
Laguna Madre wetlands	-	-	- R	-	-	-	-	- C	C	**[4]**
Central Mexican wetlands		X			1	-	C	-	C	**[4]**
Tehuantepec moist forests		X		X	**2**	E	E	-	E	**5**
Tamaulipas/Veracruz dry forests		X		X	**2**	E	E	-	E	**5**
Oaxacan dry forests			X	X	**2**	E	E	-	E	**5**
Sinaloan dry forests			X	X	**2**	E	V	E	E	**5**
Central Mexican pine-oak forests	X			X	**2**	E	E	-	E	**5**
Sierra Madre Oriental pine-oak forests	X		X		2	E	S	E	E	**5**
Jalisco palm Savannas		X			1	-	E	-	E	**[5]**
Chihuahuan xeric scrub	X		X G		2	V	V	V V	V	**6**
Sierra de Juárez pine-oak forests	X		G	X	**2**	E	V	- V	V	**6**
Sonoran xeric scrub	X		X G		2	V	S	V S	V	**6**
Oaxacan moist forest				X	**1**	E	E	-	E	**7**
Sierra Madre moist forest				X	**1**	V	E	-	E	**7**
Central American montane forest				X	**1**	V	E	-	E	**7**
Belizean swamp forests				X	**1**	E	E	-	E	**7**
Yucatán dry forests				X	**1**	E	E	-	E	**7**
Veracruz montane forests.	X				1	E	S	-	E	**7**
Central Mexican mezquital	X				1	V	E	-	E	**7**
Central American pine-oak forests				X	**1**	V	V	-	V	**8**
Yucatan moist forests				X	**1**	E	V	-	V	**8**
Mexican Alpine Tundra		X			1	-	V	-	V	**8**
Western Mexican mezquital	X				1	V	-	-	V	**8**
Eastern Mexican mezquital	X		R		1	V	V	- C	V	**8**
Mexican Interior chaparral	X				1	V	-	-	V	**8**
Eastern Mexican matorral	X				1	V	-	-	V	**8**
Central Mexican cactus scrub	X				1	V	-	-	V	**8**
Guerreran cactus scrub	X				1	V	V	-	V	**8**
Belizean pine forests				X	**1**	V	S	-	S	**9**
Baja California dry forests			X		1	E	S	E	S	**9**
San Lucan pine-oak forests	X		X		2	E	I	E	I	**10**
Baja California xeric scrub	X		X		2	V	I	V	I	**10**
Quintana Roo wetlands				X	**1**	-	I	-	I	**10**
San Lucan mezquital	X				1	V	I	-	I	**10**
Central Mexican grasslans					0	-	-	-	-	**N/A**
Eastern Mexican grasslands					0	-	-	-	-	**N/A**

Terrestrial Composite Biological Distinctiveness and Conservation Status Rank



Biological Distinctiveness

For each X: BSP =Regionally Outstanding, WB = Highest Priority at a Regional Scale, G200 = All G200 ecoregions and Hotspots = All ecoregions within Hotspot. WWF = Globally (G) and Regionally (R) Outstanding,

Final Conservation Status

C = Critical, E = Endangered, V = Vulnerable, S = Relatively Stable, I = Relatively Intact

In ranking added Conservation Status, the precautionary approach is used and the higher or the intermediate status is assigned if results from different exercises show different results.

TERRESTRIAL ECOREGIONS RANKING CRITERIA

[n] = Upgraded for Urgency at the National Level

Global Priority

1.- Critical, identified by all representative exercises + hotspots.
2.- Endangered, identified by two representative exercises + hotspots.
3.- Endangered or vulnerable, identified by all three representative exercises.

Globally Important or Nationally Urgent

4.- Critical, identified by two exercises or upgraded for urgency at the National level.
5.- Endangered, identified by two exercises or upgraded for urgency at the National level.
6.- Vulnerable, identified by two exercises.

Regionally or Nationally Important

7.- Endangered, identified by only one exercise.
8.- Vulnerable, identified by only one exercise.
9.- Stable, identified by only one exercise.
10.- Intact, identified by two or one exercises.

WWF (1999) Terrestrial Ecoregions of North America, were not added to the above mentioned total of priority setting exercises, since they are only available for the US-Mexico border ecoregions.

The authors recognize inherent problems in adding up and comparing results of different priority setting exercises and acknowledge that resulting priorities, could drastically change by using different criteria or additional data.

2.2.1 FRESHWATER ECOREGIONAL EXERCISES

FRESHWATER BIODIVERSITY OF LATIN AMERICA AND THE CARIBBEAN

A Conservation Assessment Biodiversity Support Program (Olson *et al.* 1998)

Present in Mexico - 28 (24 %) of a Total of 117 freshwater ecoregions, 2 of highest priority.

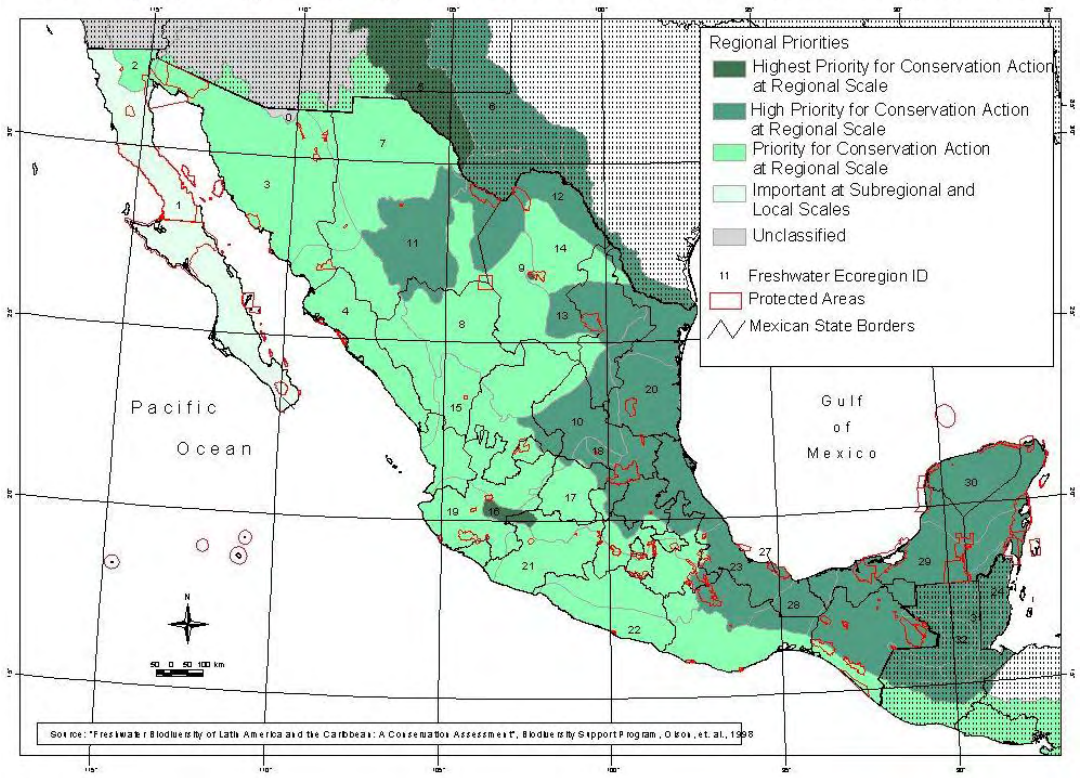
	Freshwater Ecoregion	Major Habitat Type	Biological Distinctiveness	Conservation Status	Priority Status
BAJA CALIFORNIA COMPLEX					
1	Baja California	5	Locally Important	Vulnerable	4
COLORADO RIVER COMPLEX					
0	Upper San Pedro (Gila)	-	-	-	-
2	Colorado Delta	2	Regionally Outstanding	Critical	3
3	Sonoran	5	Locally Important	Endangered	3
SINALOAN COASTAL COMPLEX					
4	Sinaloan Coastal	4	Regionally Important	Critical	3
RÍO BRAVO COMPLEX					
5	**Río Bravo** (not in Mex.)	**1**	**Globally Outstanding**	**Endangered**	**1**
6	Pecos (not in Mexico)	5	Regionally Outstanding	Endangered	2
7	Guzmán	6	Regionally Important	Endangered	3
8	Mapimí	6	Regionally Important	Endangered	3
9	**Cuatro Ciénegas**	**6**	**Globally Outstanding**	**Vulnerable**	**1**
10	Llanos El Salado	6	Regionally Outstanding	Endangered	2
11	Conchos	5	Regionally Outstanding	Endangered	2
12	Lower Río Bravo	1	Regionally Outstanding	Endangered	2
13	Río San Juan	5	Regionally Outstanding	Endangered	2
14	Río Salado	5	Regionally Important	Endangered	3
LERMA/SANTIAGO COMPLEX					
15	Santiago	4	Regionally Important	Endangered	3
16	**Chapala**	**5 (3)**	**Globally Outstanding**	**Endangered**	**1**
17	Lerma	6 (4)	Regionally Outstanding	Critical	3
18	Rio Verde Headwaters	5	Regionally Outstanding	Endangered	2
19	Manantlan/Ameca	4	Regionally Important	Vulnerable	3
RÍO PANUCO COMPLEX					
20	Río Panuco	4	Regionally Outstanding	Endangered	2
BALSAS COMPLEX					
21	Balsas	4	Regionally Important	Endangered	3
PACIFIC CENTRAL COMPLEX					
22	Tehuantepec	4	Regionally Important	Endangered	2
ATLANTIC CENTRAL COMPLEX					
23	Southern Veracruz	4	Regionally Outstanding	Endangered	2
24	Belizean Lowlands	4	Regionally Outstanding	Vulnerable	2
27	Catemaco	3	Regionally Outstanding	Vulnerable	2
28	Coatzacoalcos	4	Regionally Outstanding	Endangered	2
29	Grijalva-Usumacinta	4	Regionally Outstanding	Vulnerable	2
30	Yucatán	4 (Karst)	Regionally Outstanding	Vulnerable	2
32	C. Am. Karst Highlands	4	Regionally Important	Endangered	3

Major Habitat Type
1 = Large Rivers
2 = Large River Deltas
3 = Large Lakes
4 = Wet-Region Rivers and Streams
5 = Xeric Region Rivers and Streams
6 = Xeric- Region Endorheic (closed) Basins

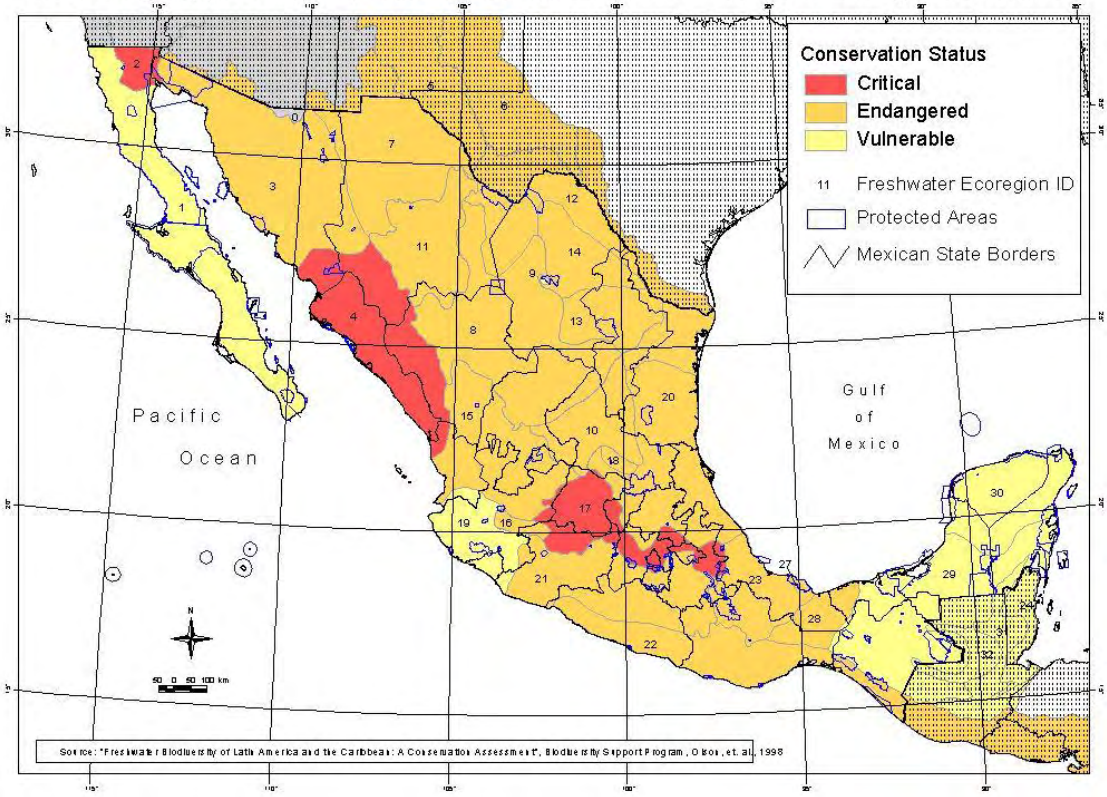
Priority Status
1 = Highest Priority for Conservation at Regional Scale
2 = High Priority for Conservation at Regional Scale
3 = Priority for Conservation at Regional Scale
4 = Important at Subregional and Local Scales

( ) = Modified for this analysis

Biodiversity Support Program, 1998 - Regional Priorities for Conservation Action of Freshwater Ecoregions of Mexico



Biodiversity Support Program, 1998 - Conservation Status of Freshwater Ecoregions of Mexico



FRESHWATER ECOREGIONS OF NORTH AMERICA

a Conservation Assessment

World Wildlife Fund (Abell *et al.* 2000)

In contrast with the BSP freshwater priority setting exercise which was carried out within the Neotropical Realm of which southern Mexico as part of this exercise is developed within the framework of the Neartic Realm which constitutes a more appropriate biogeographical comparision field for northern Mexico. In contrast to the BSP exercise, this one is based on best available quantitative data sets for: fish, crayfish and herpentofauna and mussels for Northern Mexico.

	Freshwater Ecoregion	Major Habitat Type	Biological Distinctiveness	Conserv. Status	Priority Status
PACIFIC BIOREGION - Coastal Complex					
1	South Pacific Coastal [7]	XRLS	**Continentally Outstanding** Southernmost populations of anadromous Pacific lamprey and steelhead; near-endemic fish genus (*Encyclogobius*), found in coastal lagoons.	Critical	III
PACIFIC BIOREGION - Colorado River Complex					
0	Gila [14] (Mex. Upper San Pedro)	XRLS	**Continentally Outstanding** Three endemic or near-endemic fish genera (*Meda, Plagopterus, Tiaroga*) US, Mex?	Critical	III
2	Colorado [12] (Mex. Colorado Delta)	LTR	**Continentally Outstanding** Endemic Fishes specially addapted to the high- flow large-river system (*Xyrauchen, Lepidomeda, Plagopterus*) US, Mex?	Critical	III
ARTIC - ATLANTIC BIOREGION - Río Grande Complex					
5	Upper Río Grande [15] (not in Mexico)	LTR	**Continentally Outstanding** One endemic fish and invertebrate endemism in thermal springs (*Fontellicella, Tryonia, Thermosphaeroma*)	Critical	III
6	Pecos [18] (not in Mexico)	XRLS	**Continentally Outstanding** High fish richness and endemism for the Rio Grande Complex, including three pupfish (*Cyprinodon*), *Etheostoma, Cichlasoma, Cyprinella and Gambusia*,	Endangered	II
7	Guzmán [16]	ERLS	**Continentally Outstanding** Endorheic habitats; high levels of endemism among fish; spring and subterranean habitats,	Critical	III
8	Mapimí [19]	ERLS	**Continentally Outstanding** Extinct monotypic fish genus (*Stypodon*) and extant endemic fish genus (*Megupsilon*)	Critical	III
9	**Cuatro Ciénegas [22]**	**XRLS**	**Globally Outstanding** Diverse complex of hundreds of geothermal springs, lakes and streams; high beta-diversity	**Vulnerable**	**I**
11	**Rio Conchos [17]**	**XRLS**	**Globally Outstanding** Only free-flowing river habitat left in Rio Grande catchment; high levels of endemism in cave and spring habitats**.**	**Critical**	**II (I)**
12	Lower Río Grande [20]	LTR	Continentally Outstanding	Critical	III
13	**Río San Juan [23]**	**XRLS**	**Globally Outstanding High levels of fish endemism and spring fauna.**	**Endangered**	**I**
14	Río Salado [21]	XRLS	**Continentally Outstanding** Outstanding fish endemism, including minnows, darters, mosquitofish and platyfish.	Endangered	II

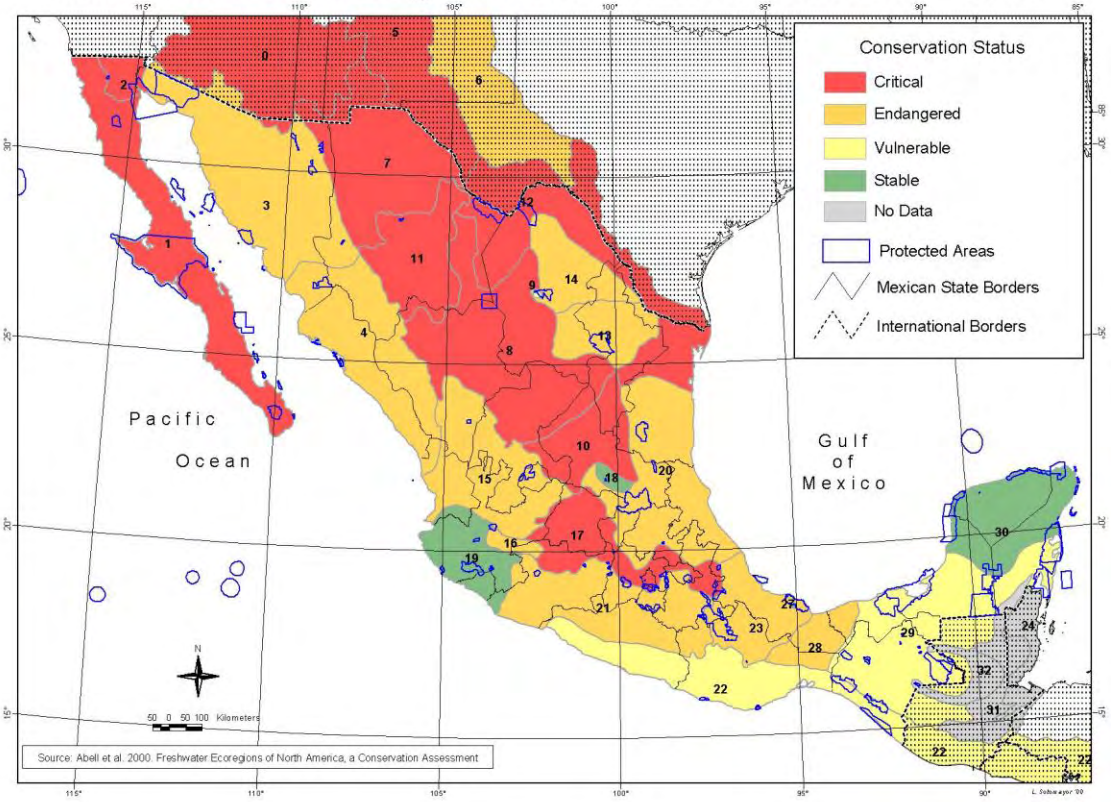
XRLS = Xeric-Regions Rivers, Lakes and Springs. LTR = Large Temperate Rivers
ERLS = Endorheic Rivers, Lakes and Springs. SCRL = Subtropical Coastal Rivers, Lakes and Springs
TCRL = Temperate Coastal Rivers, Lakes and Springs

	Freshwater Ecoregion	Major Habitat Type	Biological Distinctiveness	Conserv. Status	Priority Status
MEXICAN TRANSITION BIOREGION					
3	Sonoran [61]	TCRL	Continentally Outstanding Three endemic snails and eight endemic fish; adaptations to xeric freshwater conditions.	Endangered	II
4	Sinaloan Coastal [62]	SCRL	**Continentally Outstanding** Endemism among fish and crayfish; subtropical high gradient habitats.	Endangered	II
10	Llanos El Salado [66]	ERLS	**Continentally Outstanding** Very high endemism in fish, mostly pupfish; endorheic.	Critical	III
15	Santiago [63]	SCRL	**Continentally Outstanding** Endemic fish including (cichlids and catfish); warm springs habitats for aquatic microfauna.	Endangered	II
16	**Chapala [65]**	**XRLS**	**Globally Outstanding** **Two near endemic fish (***Chapalichthys, Skiffia).*	**Endangered**	**I**
17	**Lerma [69]**	**ERLS**	**Globally Outstanding** Four endemic or nerar endemic fish genera (*Hubbsina, Skiffia, Chapalichthys and Evarra* [all E. extinct]) and one near-endemic salamander genus (*Rhyacosiredon*).	**Critical**	**II (I)**
18	Rio Verde Hdwaters [67]	XRLS	**Globally Outstanding** La Media Luna; monotypic genera in Cyprinodontidae and Goodeidae.	Stable	II
19	Manantlan/Ameca [64]	SCRL	**Globally Outstanding** Five endemic or near-endemic fish genera (*Allodontichthys, Xenotaenia, Ameca, Ilyodon, Skiffia*)	Stable	II
20	**Tamps.-Veracruz [69] (Río Pánuco)**	**SCRL**	Globally Outstanding **Two near endemic fish genera *(Prietella, Xenoophorus*)**	**Endangered**	**I**
21	Balsas [70]	SCRL	**Continentally Outstanding** Three near endemic fish genera (*Ameca, Chapalichthys, Ilyodon*) and one near-endemic salamander genus (*Rhyacosiredon*)	Endangered	II
22	Tehuantepec [74]	SCRL	**Continentally Outstanding** Outstanding fish endemism (29%) and extraordinary richness and endemism in aquatic herpentofauna.	Vulnerable	II
23	Papaloapan [71]	SCRL	**Continentally Outstanding** 17% fish endemism, including Priapella, Gambusia and Heterandia; high levels of endemism (26%) for aquatic herpentofauna.	Endangered	II
24	Belizean Lowlands [ND]		-	-	
27	Catemaco [72]	SCRL	**Globally Outstanding** Ancient volcanic crater; 44% fish endemism.	Stable	II
28	Coatzacoalcos [73]	SCRL	**Continentally Outstanding** Very high fish endemism (29%) and extraordinary richness and endemism in aquatic herpentofauna.	Endangered	II
29	Grijalva-Usumacinta [75]	SCRL	Continentally Outstanding Large variety of habitats, including large rivers, endorheic basins and large wetlands; 41% fish endemism.	Vulnerable	II
30	Yucatán [76]	SCRL	**Continentally Outstanding** Subtropical karst habitats, including springs and aquifers.	Stable	III
32	C.Am. Karst Highland [ND]		-	-	

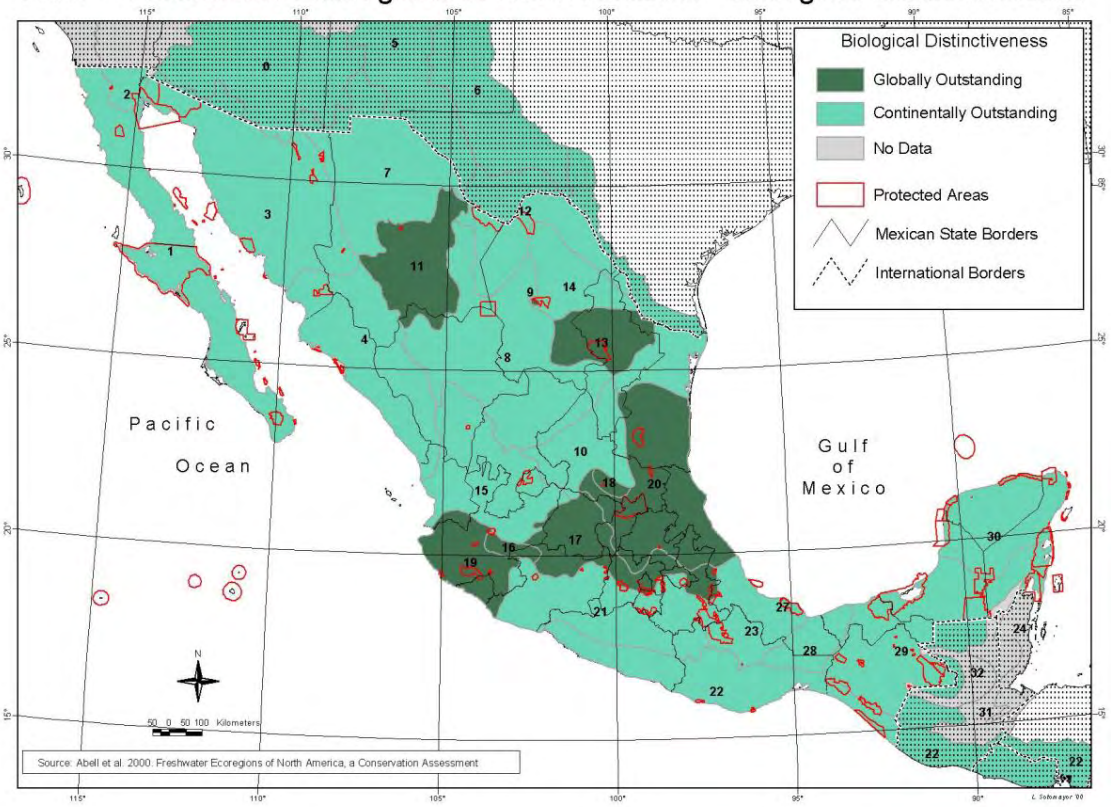
Priority status classes from I to V integrate biological distinctiveness and conservation status to indicate order of conservation intervention attention.

II (I) ecoregions are upgraded to priority I status using the "Snapshot Assessment" due to the fact that the integrated assessment disfavors critical conservation status ecoregions, as suggested by expert opinions.

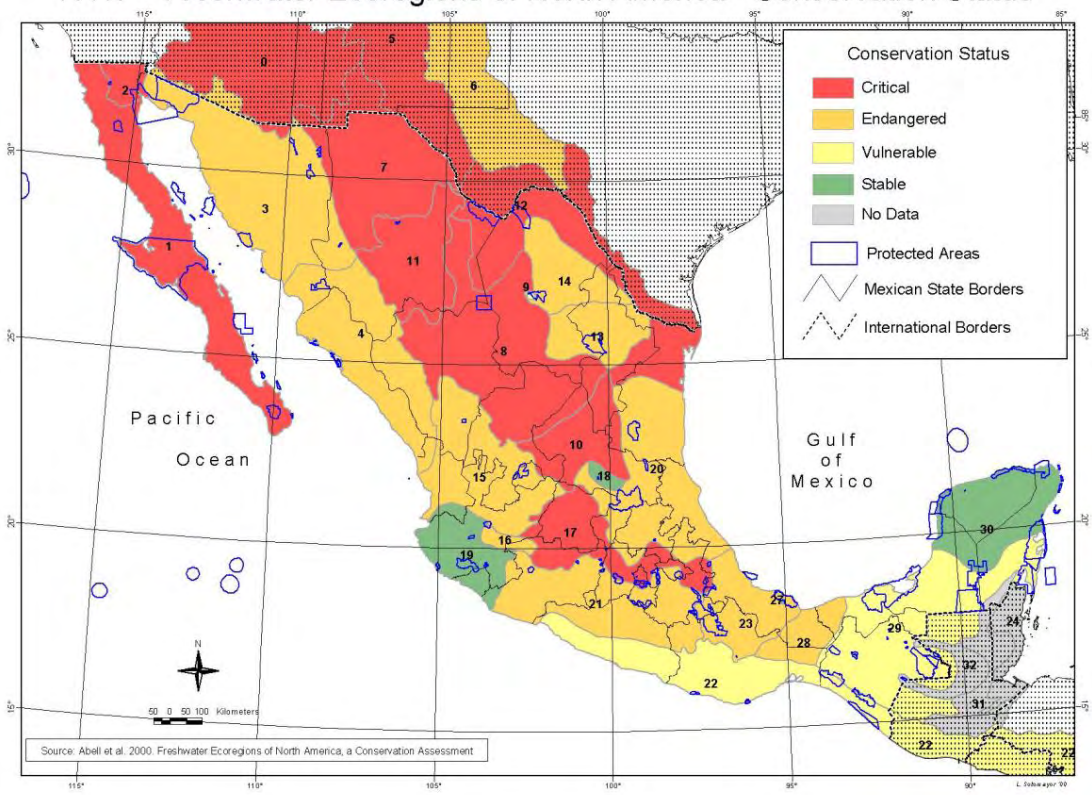
WWF - Freshwater Ecoregions of North America - Conservation Status



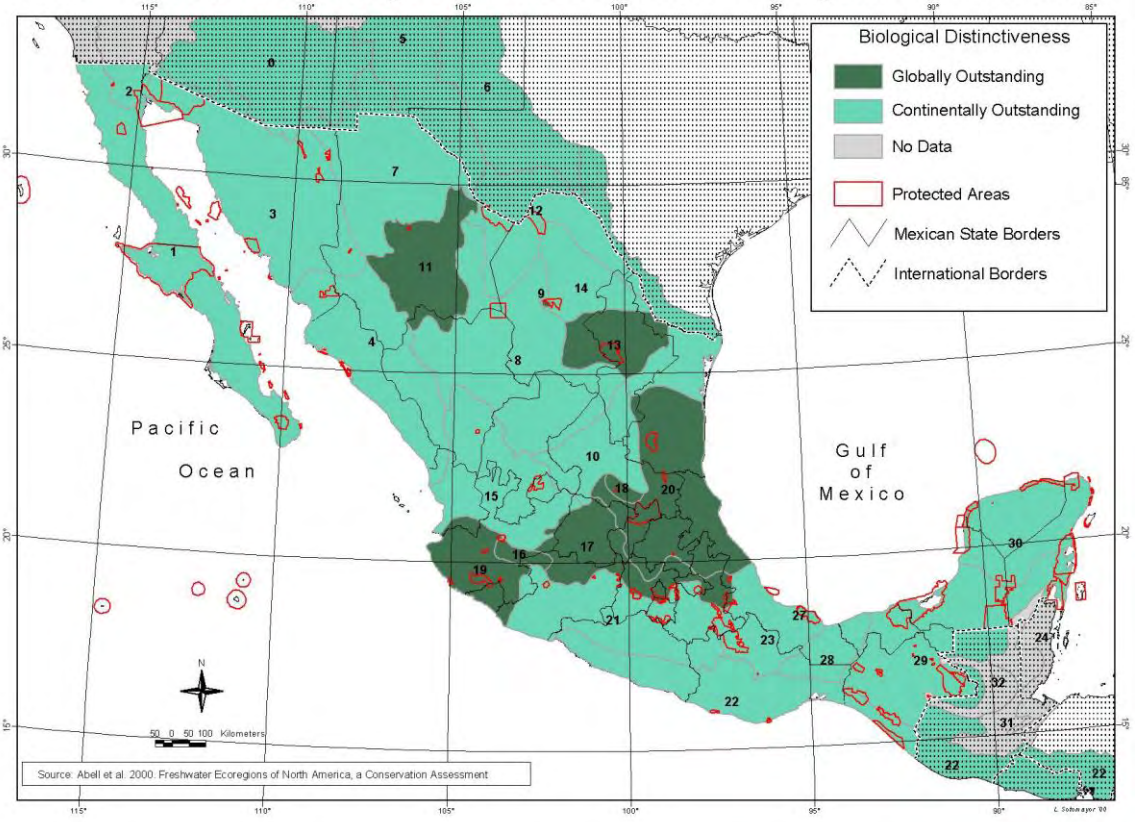
WWF - Freshwater Ecoregions of North America - Biological Distinctiveness



WWF - Freshwater Ecoregions of North America - Conservation Status



WWF - Freshwater Ecoregions of North America - Biological Distinctiveness



2.2.2 FRESHWATER ECOREGIONAL EXERCISES COMPARATIVE ANALYSIS

BIODIVERSITY SUPPORT PROGRAM (Olson *et al.* 1997 and 1999)

Forty-two freshwater ecoregion complexes were identified for Latin America and the Caribbean, within which 117 ecoregions were delineated. Ecoregions were classified according to their major habitat type, ranging from large rivers to closed basins in dry regions. Ecoregions were assessed using two principal discriminators. (Olson *et al.* 1999)

Biological distinctiveness was assessed through the analysis of species richness, endemism, ecosystem diversity and special considerations (rarity of major habitat type and unusual ecological or evolutionary phenomena) and point scores were assigned for each characteristic to define ecoregional priorities. (Olson *et al.* 1999)

Conservation status is an estimate of current and future ability of an ecoregion to maintain viable species populations, sustain ecological processes and be responsive to short and long term change. Determinants of an ecoregion's conservation status include: habitat loss, water quality and hydrographic integrity, with which they were classified. Globally outstanding ecoregions that are relatively intact were not identified as highest priority because of the urgency of more threatened ecoregions. Globally and regionally outstanding ecoregions whose final conservation status was critical were ranked as second and third priority respectively for conservation action. This due in part, for the extreme difficulty of restoring critical freshwater ecosystems, in contrast to the selection methods for terrestrial ecoregions which give highest priority to this combined set of criteria. (Olson *et al.* 1999)

WWF GLOBAL 200 (Olson and Dinerstein 1997)

The Global 200 freshwater ecoregions are composite ecoregions based on the BSP ecoregions. These have been mapped for Mexico in different forms in Olson and Dinerstein, 1997 and in WWF, 2000, and thus are not used in the composite comparative analysis.

WWF - FRESHWATER ECOREGIONS OF NORTH AMERICA (Abell *et al.* 2000)

In contrast with the BSP freshwater priority setting exercise which was carried out within the Neotropical Realm of which southern Mexico is part of, this exercise is developed within the framework of the Neartic Realm which constitutes a more appropriate biogeographical comparison field for northern Mexico. In contrast to the BSP exercise, this one is based on best available quantitative data sets for: fish, crayfish and herpentofauna for Mexico.

The assignment of freshwater priorities differs substantially from that proposed for North American terrestrial Ecoregions (Ricketts *et al.* 1999 in Abell *et al.* 2000) but is similar to that offered for freshwater ecoregions of Latin America and the Caribbean (Olson *et al.* 1997 in Abell *et al.* 2000). Freshwater ecoregions differ from their terrestrial counterparts in two important and related ways. First, because the connectedness of freshwater habitats, spatial and functional linkages across large distances are strong, with upstream activities manifested in downstream effects. Second, conservation of a given freshwater site must nearly always occur at the watershed scale. Considering that entire ecoregions must be the focus of any ambitious conservation action, North American freshwater experts agreed that critically imperiled ecoregions are likely beyond repair, and that the greatest biodiversity conservation may be achieved by focusing on endangered and vulnerable ecoregions with globally outstanding biodiversity. (Abell *et al.* 2000)

Analysis

All three exercises belong to the same family and track the evolution of the freshwater priority setting exercise.

FRESHWATER	Type of Approach	Methodology	Data
BSP, 1999	Representative	Experts workshop	Qualitative joint expert on the spot assessments, lacks data-driven rigor.
WWF The Global 200, 1997	Representative	Experts consultation	Qualitative expert assessments, lacks data-driven rigor.
WWF - Freshwater Ecoregions of North America, 2000	Representative	Data mapping, experts consultation and experts workshops	Quantitative data sets for: fish, crayfish and herpentofauna.

Limited comparatives can be made within freshwater exercises due to the lack of other ecoregional cartography based similar works. Nevertheless the use of priorities based in comparisons with two different sets of ecoregions (Latin America and the Caribbean - North America) produces interesting results.

FRESHWATER	Ecoregional Cartographic Base	Biogeographic Hierarchy (n) number of units for Mexico	Level at which the prioritization was carried out.
BSP, 1999	Olson *et al.*, 1999	Ecoregion Complex (9) Major Habitat Type (6) FW Ecoregion (32 + 1)	FW Ecoregion Latin America & the Caribbean
WWF The Global 200, 1997	Olson and Dinerstein, 1997	Composite freshwater ecoregions (4 Olson and Dinerstein, 1997in 3 in WWF, 2000)	Composite Marine Ecoregion
WWF - Freshwater Ecoregions of North America, 2000	Olson *et al.*, 1999	Major Habitat Type (5) FW Ecoregion (32 + 1)	FW Ecoregion North America

FRESHWATER COMPOSITE BIOLOGICAL DISTINCTIVENESS AND CONSERVATION STATUS RANK

	FRESHWATER ECOREGIONS PRESENT IN MEXICO	Biological Distinctiveness				Conservation Status			Priority Class		
		BSP	Glob 200	FEW NA WWF	Prior.	BSP	FWE NA WWF	Stat.	BSP	FEW NA WWF	RANK
16	Chapala	**GO**	X	**GO**	G	E	E	E	1	Isf	**1**
9	Cuatro Ciénegas	**GO**	X	**GO**	G	V	V	V	1	IIs If	**1**
13	Río San Juan	RO	X	**GO**	G	E	E	E	2	Isf	**2**
20	Río Panuco Tamps. Ver.	RO	X	**GO**	G	E	E	E	2	Isf	**2**
27	Catemaco	RO	X	**GO**	G	V	S	V	2	IIsf	**3**
18	Rio Verde Headwaters	RO	X	**GO**	G	E	S	V	2	IIsf	**3**
19	Manantlan/Ameca		X	**GO**	G	V	S	V	3	IIsf	**3**
11	Conchos	RO	X	**GO**	G	E	C	C	2	Is-IIf	**4**
17	Lerma		X	**GO**	G	C	C	C	3	Is-IIf	**4**
6	Pecos (not in Mexico)	RO	X	CO		E	E	E	2	II	**5**
22	Tehuantepec	RO		CO		E	V	E	2	II	**5**
23	Southern Veracruz	RO	X	CO		E	E	E	2	II	**5**
28	Coatzacoalcos	RO		CO		E	E	E	2	II	**5**
29	Grijalva-Usumacinta	RO		CO		V	V	V	2	II	**5**
14	Río Salado		X	CO		E	E	E	3	II	**6**
3	Sonoran			CO		E	E	E	3	II	**6**
15	Santiago			CO		E	E	E	3	II	**6**
21	Balsas			CO		E	E	E	3	II	**6**
4	Sinaloan Coastal			CO		C	E	C	3	II	**6**
30	Yucatán	RO		CO		V	S	V	2	III	**7**
5	Río Bravo (not in Mexico)	**GO**	X	CO		E	C	C	1	III	**7**
12	Lower Río Bravo	RO	X	CO		E	C	C	2	III	**7**
10	Llanos El Salado	RO		CO		E	C	C	2	III	**7**
0	Rio San Pedro (Gila)	-	X	CO		-	C	C	-	III	**7**
2	Colorado Delta		X	CO		C	C	C	3	III	**7**
7	Guzmán		X	CO		E	C	C	3	III	**7**
8	Mapimí		X	CO		E	C	C	3	III	**7**
1	Baja California			CO		V	C	C	4	III	**7**
24	Belizean Lowlands	RO		-		V	-	V	2	-	**N/A**
32	C. Am. Karst Highlands			-		E	-	E	3	-	**N/A**

(s) Snapshot (f) Final

FRESHWATER ECOREGIONS RANKING CRITERIA

Global Priority

1.- Endangered or vulnerable, identified by all exercises as globally important.
2.- Endangered identified by BSP exercise as regionally and by WWF as globally important

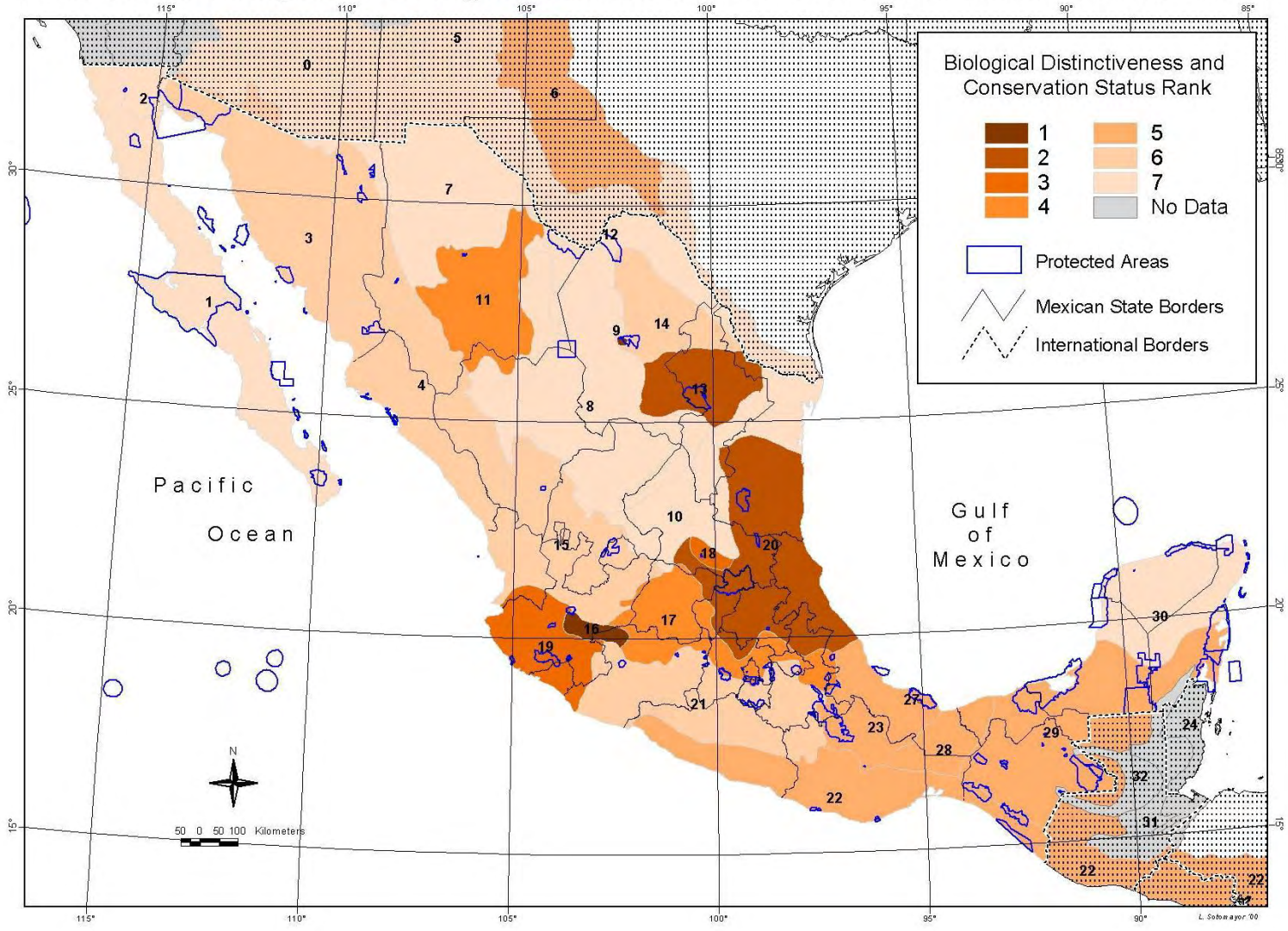
Globally Important or Nationally Urgent

3.- Vulnerable, identified by WWF globally important.

Regionally or Nationally Important

4.- Critical, identified by WWF globally important downgraded with consideration to threats.
5.- Endangered or Vulnerable, regionally important in BSP and priority class II in WWF.
6.- Endangered or Critical, priority class II in WWF.
7.- Vulnerable or Critical, III in WWF

Freshwater Composite Biological Distinctiveness and Conservation Status Rank



2.3.1 MARINE ECOREGIONAL EXERCISES

SETTING GEOGRAPHIC PRIORITIES FOR MARINE CONSERVATION IN LATIN AMERICA AND THE CARIBBEAN

Biodiversity Support Program (Sullivan & Bustamante 1999).

Nine "Coastal Biogeographic Provinces" were delineated in the Atlantic and Pacific Coasts of Latin America and the Caribbean based upon a number of biological, physical and geographic characteristics including features of the continental shelf and ocean currents, the water temperature regime and the occurrence of upwelling. Three Coastal Biogeographic Provinces or 33% of them, are represented within Mexico's Exclusive Economic Zone. Each Coastal Biogeographic Province consists of smaller geographic units called "Coastal Biogeographic Regions" or simply marine ecoregions. These were defined and delineated according to patterns of ocean circulation, coast geomorphology and distribution of major faunal populations. Eight out of a total of 38 marine ecoregions or 21% of them, are represented within Mexico's Exclusive Economic Zone. The study involved ranking ecoregions within each province according to biological value and urgency for conservation action. No comparison was made between ecoregions across provinces since there is no basis to this exercise due to the distinctiveness of one another.

Geographic Unit	Biological and Ecological Value	Urgency for Conservation
PACIFIC OCEAN	(L =Low, M = Medium, H =High)	
- Warm-temperate Northeastern Pacific Biogeographic Province		
Mexican Temperate Pacific Biogeographic Region	L	M
Magdalena Transition Biogeographic Region	M	H
Cortesian Biogeographic Region (Highest priority within Province)	**H**	**H**
- Tropical Eastern Pacific Biogeographic Province		
Clipperton and Revillagigedo Islands Biog. Region	L	L
Mexican Tropical Pacific Biogeographic Region	L	M
Chiapas Nicaragua Biogeographic Region	M	H
ATLANTIC OCEAN		
- Tropical Northwestern Atlantic Coastal Biogeographic Province		
Gulf of Mexico Biogeographic Region	M	M
Central Caribbean Biogeographic Region (Highest priority within Province)	**H**	**H**
- Temperate Northwestern Atlantic Coastal Biogeographic Province (Added)		
Northern Gulf of Mexico Biogeographic Region (Added for this analysis, based in Ray *et al.* 1982)	N/A	N/A

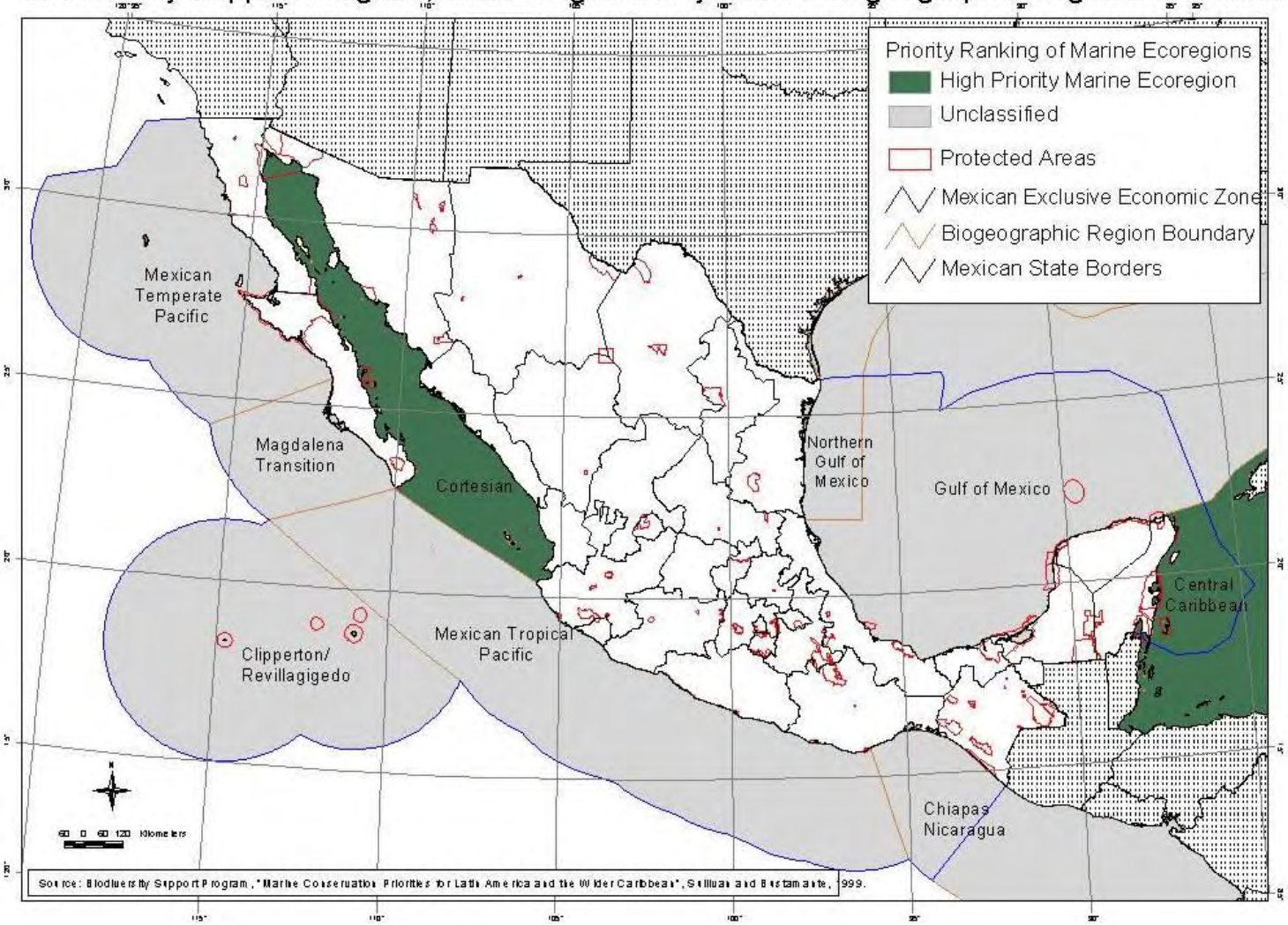
Biogeographic Regions or marine ecoregions are still generally too large to provide useful guidance to donors and policymakers about investing in specific areas. The Central Caribbean Biogeographic Region was divided in "Coastal Systems" to delineate smaller segments of the coastal shelf. The three coastal systems in the Central Caribbean present in Mexican waters are:

Coastal System	**Urgency for Conservation**	**Feasibility for Conservation Investment**	**Conservation Priority**
(Northern) Quintana Roo	High	High	High' (= **Medium***)
Eastern Yucatan Bays	Medium	High	Medium' (= **High***)
Belize and Mexican Atolls	High	High	High(= **High***)

' Errata in Sullivan & Bustamante, 1999.

* As originally defined by the Central Caribbean Ecoregional Plan Design Team (Randall *et al.* 1998)

Biodiversity Support Program, 1999 - High Priority Marine Biogeographic Regions of Mexico



2.3.2 MARINE ECOREGIONAL EXERCISES COMPARATIVE ANALYSIS

BIODIVERSITY SUPPORT PROGRAM (Sullivan and Bustamante 1999)

A hierarchical system for classification of marine and coastal areas consisting of Provinces, Marine and Coastal Biogeographic Regions and Coastal Systems was developed. The Central Caribbean Region was further divided in Coastal Systems.

This study uses the 200 mile Exclusive Economic Zone to delineate the outer confines of the provinces. The authors recognize that although the EEZ has little ecological significance, it allows for consistent representation of coastal features at the atlas scale. Furthermore, the EEZ delineates those areas in which national governments are responsible for the management of marine resources. Provinces and Biogeographic Regions were delineated considering: the continental shelf, sea surface temperatures, ocean currents (the location of major surface currents, particularly gyres define the boundaries of provinces) and the occurrence of upwellings. Out of each Province, one biogeographic Region (or ecoregion) was selected as of highest priority. (Sullivan and Bustamante 1999)

Coastal Systems are described as an area of coastline and shelf waters with similar geology, shelf morphology, runoff and coastal oceanography. Ideally, there would be sufficient information on the physiography and ecology of coastal areas to define units of that contain a discrete assemblage of natural communities and perhaps, discrete populations of natural communities. Coastal Systems were based on the dominant habitat type (For the Central Caribbean: seagrass, mangrove, coral reef, mixed, upwelling, beach and rocky platform), defined in terms of coastal morphology, hydrology, geology and dominant biological features and mapped extending from the coastal wetlands (mangroves) to the 1,000 meter isobath. (Sullivan and Bustamante 1999)

WWF GLOBAL 200 (Olson and Dinerstein 1997)

The Global 200 marine ecoregions are not the result of an ecoregional based analysis, but nevertheless have been described and mapped for Mexico in different forms in Olson and Dinerstein, 1997 and in WWF, 2000.

GBRMPA-The World Bank-IUCN (Kelleher *et al.* 1995)

Although not an ecoregional analysis, this publication provides a basis for development and implementation of a global system of marine protected areas to protect and manage representative examples of the world's rich marine biodiversity. It identifies priorities for establishing new marine protected areas and improving management of existing ones in each of the world's 18 major marine regions. The marine realm of the world were divided by the CNPPA (IUCN's Commission of National Parks and Protected Areas, currently WCPA World Commission of Protected Areas) largely on the basis of biogeographic criteria (Biogeographic Zones) but, for practical reasons, also considered political boundaries (CNPPA Marine Regions Boundaries). (Kelleher *et al.* 1995)

Within this system Mexico's Pacific coast is entirely included in the North East Pacific region and the Atlantic coast in the Wider Caribbean region. A Global Representative System of Marine Protected Areas as the title implies, is an exercise oriented towards identifying protected areas and not to determine relative importance and conservation action urgency between regions. Nevertheless, the areas selected by this exercise as regional priorities for Mexico in the Gulf of California and Gulf of Tehuantepec, plus the natural northern extension of the Belize reef system in the Caribbean, coincide with the results of the other ecoregional based exercises.

Analysis

Only limited comparatives can be made between these marine priority setting exercises, due to the lack of other ecoregional cartography based works. Nevertheless the Global 200 defines marine globally important ecoregions and some of the conclusions of the GBRMPA - The World Bank - IUCN, 1995 exercise (Kelleher *et al.* 1995) conclusions can be safely extrapolated to an ecoregional level.

MARINE	Type of Approach	Methodology	Data
BSP, 1999	Representative	Experts workshop	Basic quantitative data used where available, complemented by qualitative joint expert on the spot assessments.
WWF The Global 200, 1997	Representative	Experts consultation	Qualitative expert assessments, lacks data-driven rigor.
GBRMPA- The World Bank-IUCN, 1995	Non ecoregional based, but 18 marine biopolitical regions were defined. Seeks to define a global representative system of protected areas.	Expert working groups and regional workshops.	Available information on existing and proposed protected areas, lacks data-driven rigor.

Athough the different exercises are quite dissimilar, the large expanses covered by the marine ecoregions, results in a coherent result from the comparision.

MARINE	Ecoregional Cartographic Base	Biogeographic Hierarchy (n) number of units for Mexico	Level at which the prioritization was carried out.
BSP 1999	Sullivan & Bustamante 1999	Biogeographic Province (3) Biogeographic Region (8 + 1) Coastal System (3 for Caribbean)	Marine Biogeographic Region
WWF The Global 200 1997	Olson and Dinerstein 1997	Marine Ecoregions	Marine Ecoregion
GBRMPA- The World Bank-IUCN 1995	CNPPA (WCPA) Regions	CNPPA (WCPA) Regions (18)	CNPPA (WCPA) Regions

MARINE COMPOSITE BIOLOGICAL DISTINCTIVENESS AND CONSERVATION ACTION URGENCY STATUS RANK

MARINE BIOGEORAPHIC REGIONS PRESENT IN MEXICO	Biological Distinctiveness				Urgency Cons. Action	RANK
	BSP	G200	GBRMPA (Sites)	PRIORITY	BSP	
Cortesian	X	X	X	1	H	**1**
Central Caribbean	X	X	(X)	1	H	**2**
Chiapas Nicaragua			X	2	H	**3**
Mexican Temperate Pacific		X		2	M	**3**
Gulf of Mexico				3	M	**4**
Mexican Tropical Pacific				3	M	**4**
Magdalena Transition				3	L	**5**
Clipperton and Revillagigedo Islands				3	L	**5**
Northern Gulf of Mexico	-	-	-	N/R	-	**N/A**

MARINE ECOREGIONS RANKING CRITERIA

Global Priority

1.- Biological distinctiveness highlighted in all exercises, high urgency in conservation action identified by BSP, all of the region contained within Mexican waters.

2.- Biological distinctiveness highlighted in all exercises, high urgency in conservation action identified by BSP, only a portion of the Central Caribean Region is contained within Mexican waters.

Globally Important or Nationally Urgent

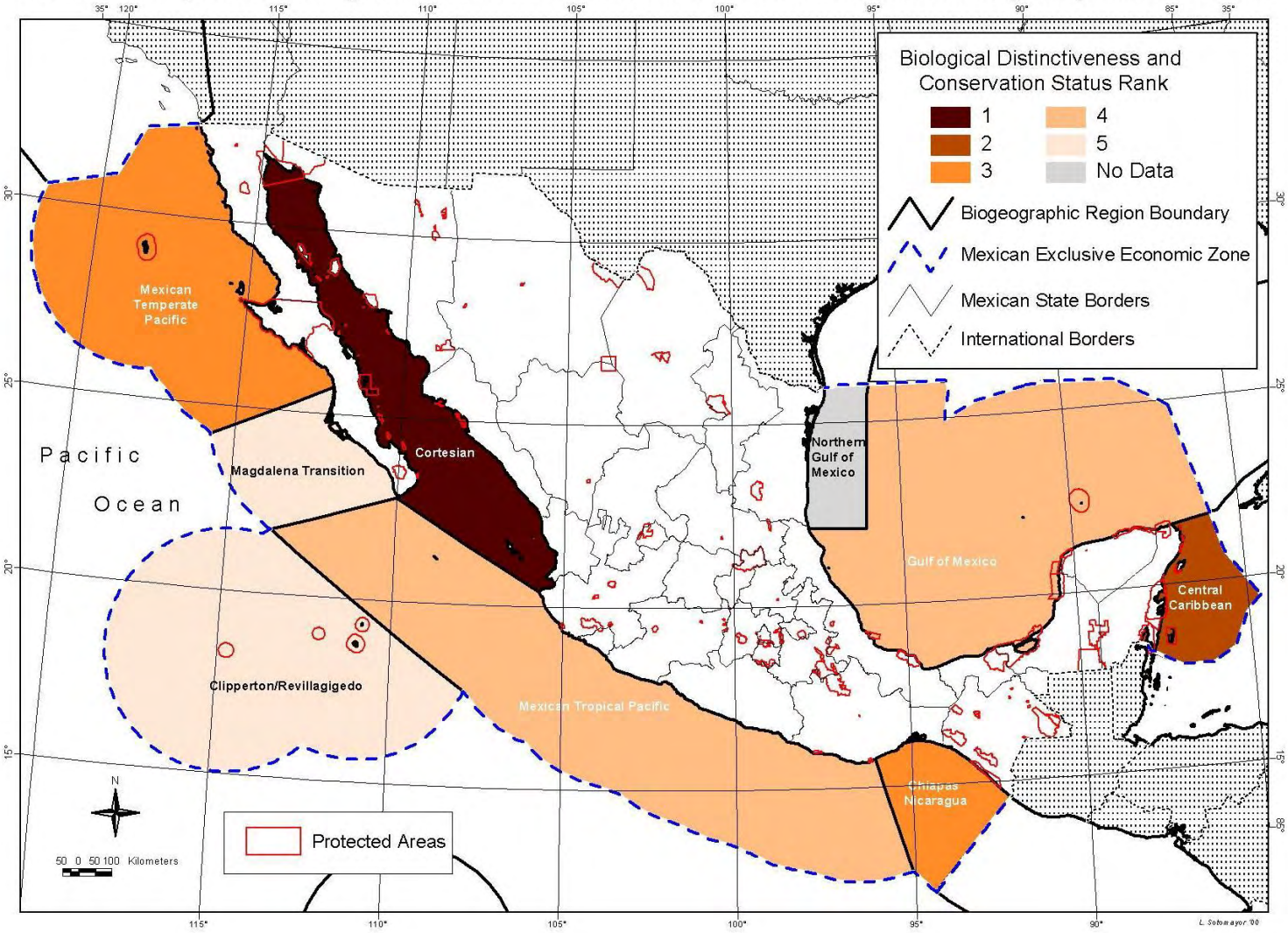
3.- Biological distinctiveness highlighted in only one exercise and high or medium urgency in conservation action identified by BSP.

Regionally or Nationally Important

4.- Biological distinctiveness not highlighted in any exercise, medium urgency in conservation action identified by BSP.

5.- Biological distinctiveness not highlighted in any exercise, low urgency in conservation action identified by BSP.

Marine Composite Biological Distinctiveness and Conservation Action Urgency Status Rank



2.4.1 MANGROVE ECOREGIONAL EXERCISES

A CONSERVATION ASSESMENT OF MANGROVE ECOSYSTEMS OF LATIN AMÉRICA AND THE CARIBBEAN

WWF (Olson *et al.* 1996)

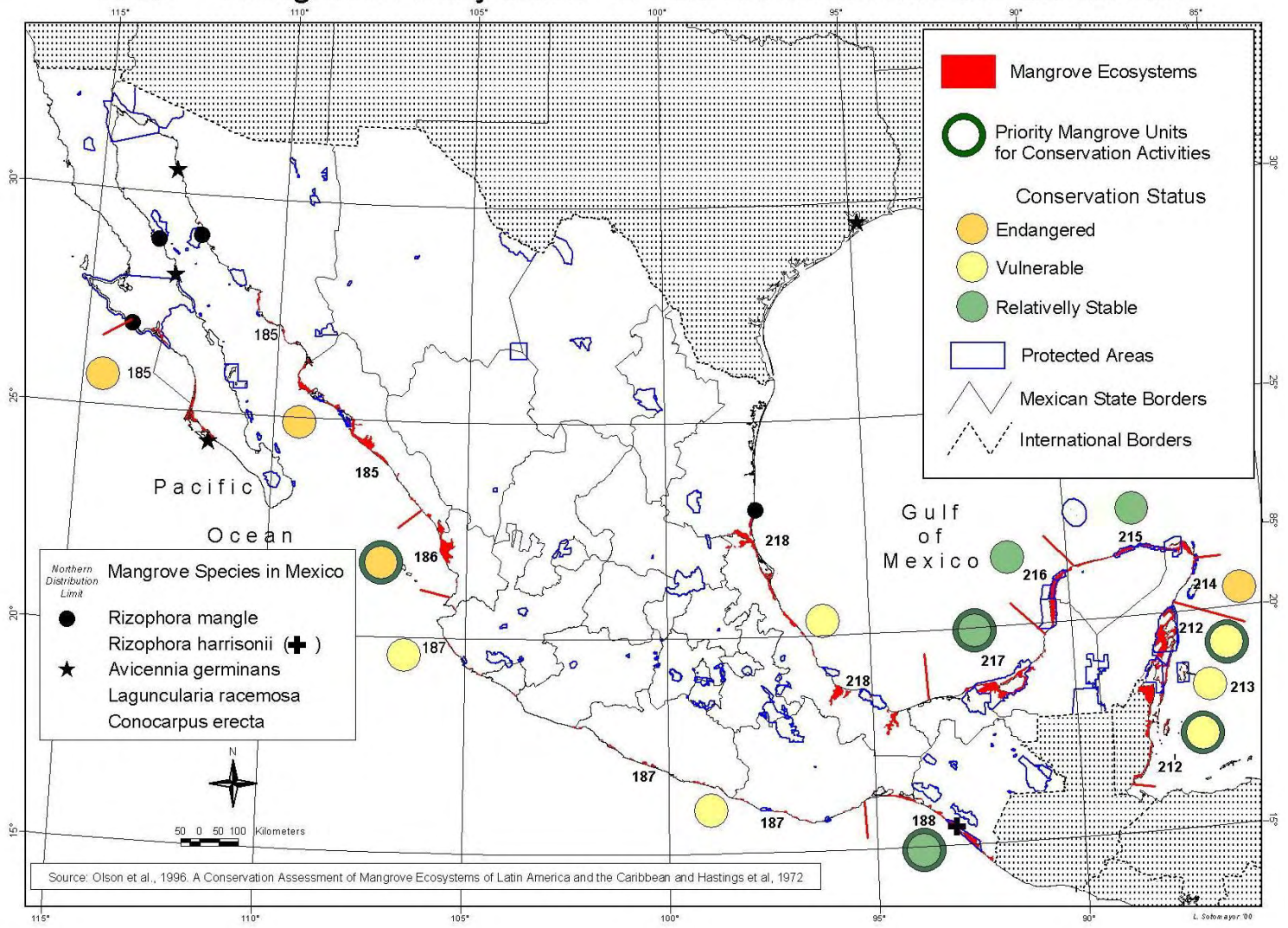
Mangroves have received insufficient attention from conservation donors and agencies in Latin America. Perhaps the major reason that mangroves are underrepresented in conservation programs is that they are of superficially similar appearance across regions, and mangroves as a forest type, consists of only a few tree species. However a mangrove ecosystem contains a wide diversity of aquatic and marine species and can rival any habitat types in terms of species richness when both terrestrial and aquatic species are counted. More importantly, mangroves are truly keystone ecosystems because their productivity and the ecological services they provide are critical for maintaining surrounding ecosystems.

	Threats	Final Conservat. Status	General Conservation Activity	Prio. (*)
Sea of Cortez Complex				
185.- Arid Northwest Mexican Coast	High	Endangered	Sustainable Use	
186.- Marismas Nacionales - San Blas	High	Endangered	Sustainable Use Restricted Access	**X**
Southern Mexico Complex				
187.-Southern Pacific Coast- Mexico	Medium	Vulnerable	Sustainable Use	
Pacífic Central America Complex				
188.-Tehuantepec - Manchón	Low	Relatively Stable	Sustainable Use Restricted Access	**X**
Gulf of Mexico Complex				
218.- Alvarado	Medium	Vulnerable	Sustainable Use	
217.- Usumacinta	Medium	Relatively Stable	Sustainable Use Restricted Access	**X**
Yucatan Complex				
216.- Petenes	Low	Relatively Stable	Sustainable Use	
215.- Ría Lagartos	Low	Relatively Stable	Restricted Access	
214.- Maya Corridor	High	Endangered	Sustainable Use	
213.- Belizean Reef	Medium	Vulnerable	Restricted Access	
212.- Belizean Coast	Medium	Vulnerable	Sustainable Use Restricted Access	**X**

(*) Priority mangrove units for conservation activities. Ecoregion's number in WWF 1998

The map shows the northernmost limit of distribution of two mangrove species Hastings *et al.* 1972) and indicates the presence of *Rizophora harrisonni* at La Encrucijada.

WWF - Mangrove Ecosystems of Latin America and the Caribbean



2.4.2 MANGROVE ECOREGIONAL EXERCISES COMPARATIVE ANALYSIS

WWF (Olson *et al.* 1996)

The conservation status of mangrove units were assessed through the following criteria: loss of habitat; large blocks of intact habitat; water quality and hydrographic integrity; rate of habitat conversion; degree of protection; degree of fragmentation; and the degree of alteration of the catchment basin (Dinerstein *et al.* 1995).

Although the workshop identified individual mangrove sites that had outstanding ecological or biological features, no attempt was made to rank mangrove units on the basis of their biological distinctiveness. Because of the important ecological role of mangroves, the workshop team stressed that that the conservation of all mangrove ecosystems should be a priority. (Dinerstein *et al.* 1995)

WWF GLOBAL 200 (Olson and Dinerstein 1997)

The Global 200 mangrove ecoregions are composite ecoregions based on the WWF (Olson *et al.*) mangrove ecosystem units. These have been mapped including all units within México in different forms in Olson and Dinerstein 1997 and in WWF 2000.

Analysis

Very limited comparatives can be made with mangrove exercises due to the lack of other similar works. The Global 200 includes all Mexican mangrove regions within two globally important marine ecoregions (WWF 2000).

MANGROVE	Type of Approach	Methodology	Data
WWF (Olson *et al.* 1996)	No ecological distinctiveness determined, only appropriate conservation activities.	Experts workshop	Qualitative joint expert on the spot assessments, lacks data-driven rigor.
WWF The Global 200, 1997	All inclusive	Experts consultation	Qualitative expert assessments, lacks data-driven rigor.

MANGROVE	Ecoregional Cartographic Base	Biogeographic Hierarchy (n) number of units for Mexico	Level at which the prioritization was carried out.
WWF (Olson *et al.* 1996)	Units characterized by distinctive landforms and processes.	Mangrove Complexes (5) Mangrove Units (11)	No ecological distinctiveness determined, only appropriate conservation activities.
WWF The Global 200, 1997	WWF (Olson *et al.* 1996)	2 aggregate mangrove ecoregions covering all Mexican units	All inclusive

MANGROVE ECOREGIONS COMPOSITE
CONSERVATION ACTION URGENCY STATUS RANK

	WWF G 200	WWF (Olson *et al.* 1996)				RANK
		Threats	Final Conservat. Status	General Conservation Activity	Prio (*)	
Marismas Nacionales - San Blas	**X**	High	Endangered	Sustainable Use Restricted Access	**X**	**1**
Belizean Coast	**X**	Medium	Vulnerable	Sustainable Use Restricted Access	**X**	**1**
Usumacinta	**X**	Medium	Relatively Stable	Sustainable Use Restricted Access	**X**	**1**
Tehuantepec - Manchón	**X**	Low	Relatively Stable	Sustainable Use Restricted Access	**X**	**1**
Arid Northwest Mexican Coast	**X**	High	Endangered	Sustainable Use		**2**
Maya Corridor	**X**	High	Endangered	Sustainable Use		**2**
Belizean Reef	**X**	Medium	Vulnerable	Restricted Access		**3**
Alvarado	**X**	Medium	Vulnerable	Sustainable Use		**3**
Southern Pacific Coast - Mexico	**X**	Medium	Vulnerable	Sustainable Use		**3**
Ría Lagartos	**X**	Low	Relatively Stable	Restricted Access		**4**
Petenes	**X**	Low	Relatively Stable	Sustainable Use		**4**

(*) Priority mangrove units for conservation activities.

MANGROVE ECOREGIONS RANKING CRITERIA

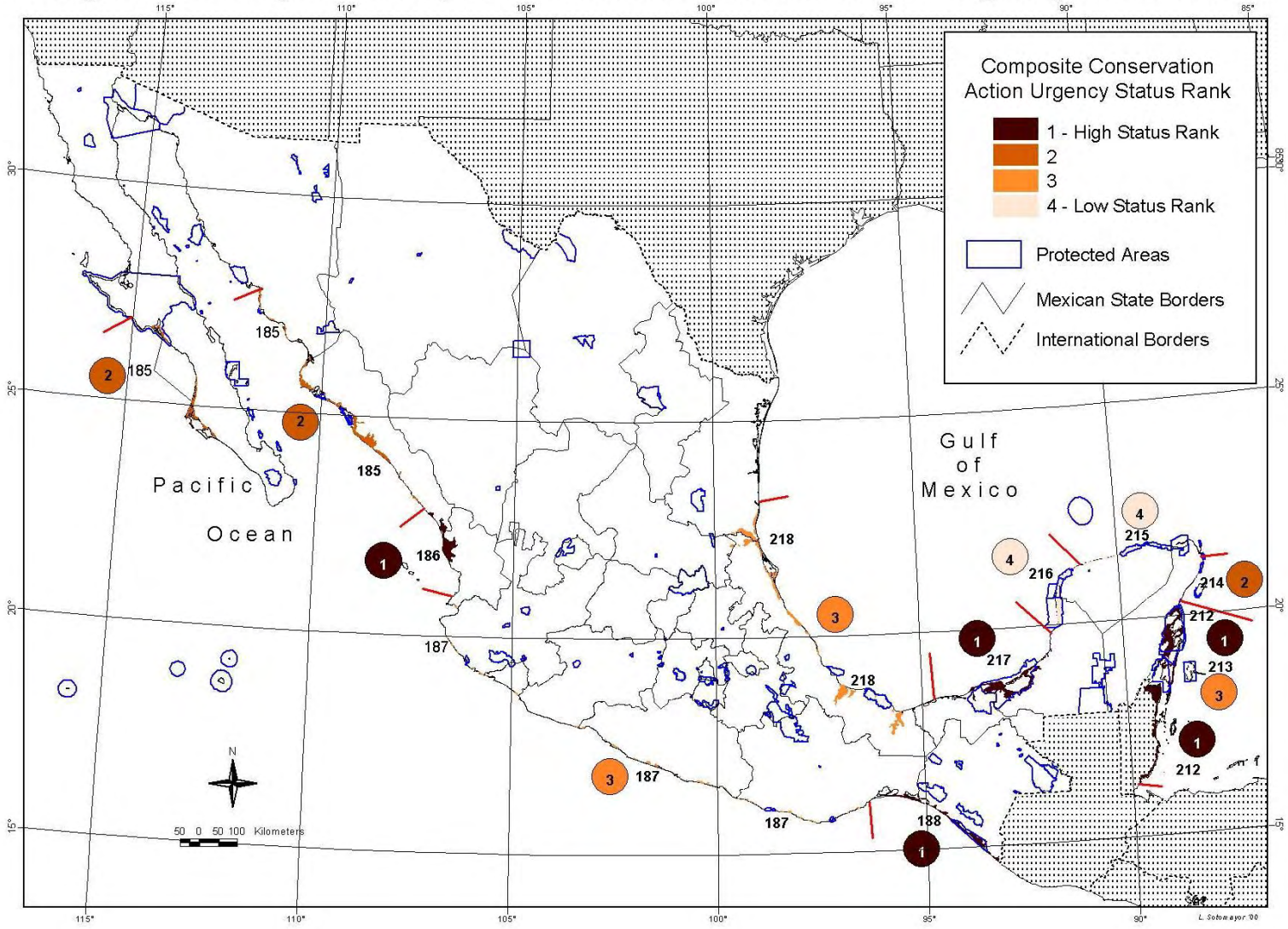
Global Priority

1.- Potential for a high level of conservation benefit from the proposed activity, or the existing ecological conditions within the unit confer a high potential for succesful application of the conservation activity (Olson *et al.* 1996).

Globally Important or Nationally Urgent

2.- Endangered with high level of threat.
3.- Vulnerable with medium level of threat.
4.- Relatively stable with low level of threat.

Mangrove Ecoregions Composite Conservation Action and Urgency Status Rank



2.5. FINAL ECOREGIONAL STATUS RANK

LEVEL I
Global or Regional Priority Ecoregions in Mexico
- 21 out of 98 ecoregions

Terrestrial - 8 ecoregions out of 50

The World Bank/WWF (Dinerstein *et al.* 1995) ecoregions
(WWF 1998 modified by TNC, 2000 ecoregions)

California coastal sage-chaparral - **I.1**
(Western half of 159 - California coastal sage and chaparral)
Sierra Madre del Sur pine-oak forests - **I.1**
(Basically equal to 118 - Sierra Madre del Sur pine oak - forests with reduced in surface area)
Balsas dry forests - **I.2**
(Includes 79 - Balsas dry forests, plus 80 - Southern Pacific dry forests, plus remaining part of 118 - Sierra Madre del Sur pine oak - forests)
Jalisco dry forests - **I.2**
(Central part of 77 - Jalisco dry forests without Eastern Colima, Michoacán and Nayarit portions)
S. Madre Occidental pine-oak forests - **I.3**
(Almost corresponding to 114 S. Madre Occidental pine-oak forests)
Mexican transvolcanic pine-oak forests - **I.3**
(Almost corresponding to 117- Trans Mexican Volcanic Belt pine-oak forests)
Pueblan Xeric Scrub - **I.3**
(Partially corresponding to 170 - Tehuacán Valley Matorral)
Northern Sonora cactus scrub - **I.3**
(Northeastern portion of 162 - Sonoran Desert)

Freshwater - 7 ecoregions out of 28

Chapala - **I.1**
Cuatro Ciénegas - **I.1**
Río San Juan - **I.2**
Río Panuco Tamps. Ver. - **I.2**
Catemaco - **I.3**
Rio Verde Headwaters - **I.3**
Manantlan/Ameca - **I.3**

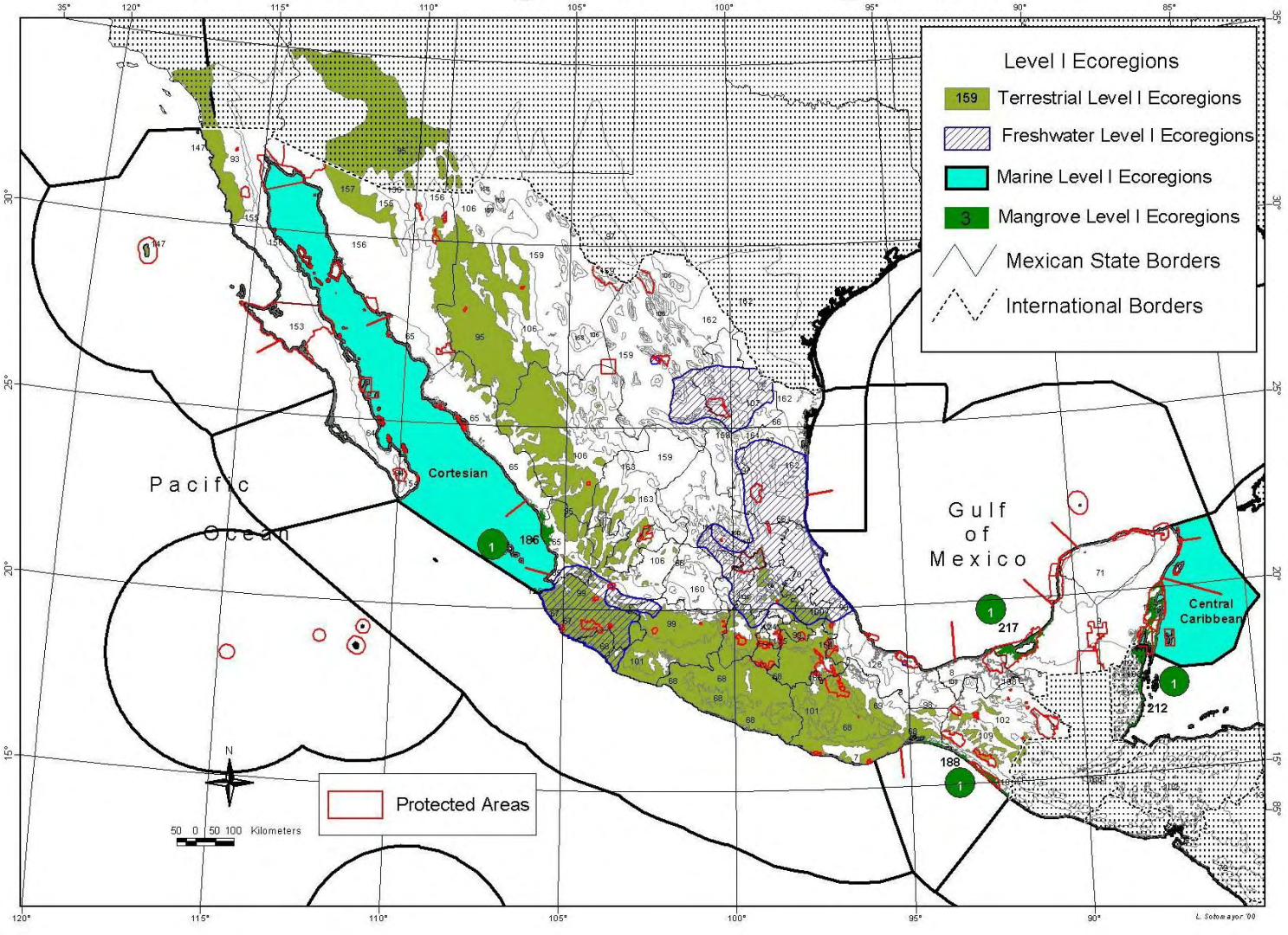
Marine - 2 ecoregions out of 9

Cortesian - **I.1**
Central Caribbean - **I.2**

Mangrove - 4 ecoregions out of 11

Marismas Nacionales - San Blas - **I.1**
Tehuantepec - Manchón - **I.1**
Usumacinta - **I.1**
Belizean Coast - **I.1**

Level I Global or Regional Priority Ecoregions in Mexico



LEVEL II

Globally Important or Nationally Urgent Ecoregions in Mexico

-28 out of 98 ecoregions

Terrestrial - 17 ecoregions out of 50

Tabasco/Veracruz savannas - **II.4**
(Immersed in 4 - Petén Veracruz moist forests)

Tehuantepec savannas - **II.4**
(Partially in 83 - Chiapas depression dry forests)

Veracruz oak forests - **II.4**
(Immersed by 4 - Petén Veracruz moist forests and 5 - Sierra de los Tuxtlas)

Veracruz dry forests - **II.[4]**
(Southern portion of 1 - Veracruz moist forests)

Central American Pacific dry forests - **II.[4]**
(In 84 - Central American Pacific dry forests and partially in Southern Pacific dry forests)

Veracruz palm savannas - **II.[4]**
(Immersed in 81 - Veracruz dry forests and 4 Petén Veracruz moist forests)

Laguna Madre wetlands - **II.[4]**
(Norheast corner of 126 - Tamaulipas Pastizal)

Central Mexican wetlands - **II.[4]**
(142- Central Mexican wetlands)

Tamaulipas/Veracruz dry forests - **II.5**
(Northern polygon basically in 165 - Tamaulipas mezquital, Central polygon in 1 - Veracruz moist forests, northern polygon in 81 - Veracruz dry forests)

Tehuantepec moist forests - **II.5**
(Basically 4 - Petén - Veracruz moist forests)

Sinaloan dry forests - **II.5**
(76 - Sinaloan dry forests. plus the southern portion of 223 Sonora /Sinaloan transition)

Central American pine-oak forests - **II.5**
(Basically 120 - Central American pine-oak forests)

Sierra Madre Oriental pine-oak forests - **II.5**
(Reduced version of 115 - Sierra Madre Oriental pine-oak forests)

Jalisco palm Savannas - **II.[5]**
(Inmmersed in 77 - Jalisco dry forests)

Chihuahuan xeric scrub - **II.6**
(Basically 164- Chihuahuan desert and 167 -Meseta Central matorral)

Sierra de Juárez pine-oak forests - **II.6**
(113 - Sierra de Juárez & San Pedro Mártir pine-oak forests and highland portion of 159 - California Coastal Sage and chaparral)

Sonoran xeric scrub - **II.6**
(Northeastern and southern portion of 162 - Sonoran Desert and northern portion of 163 - Gulf of California xeric scrub)

Freshwater - 2 ecoregions out of 28

Conchos - **II.4**

Lerma - **II.4**

Marine - 2 ecoregions out of 9

Chiapas Nicaragua -	**II.3**
Mexican Temperate Pacific -	**II.3**

Mangrove - 7 ecoregions out of 11

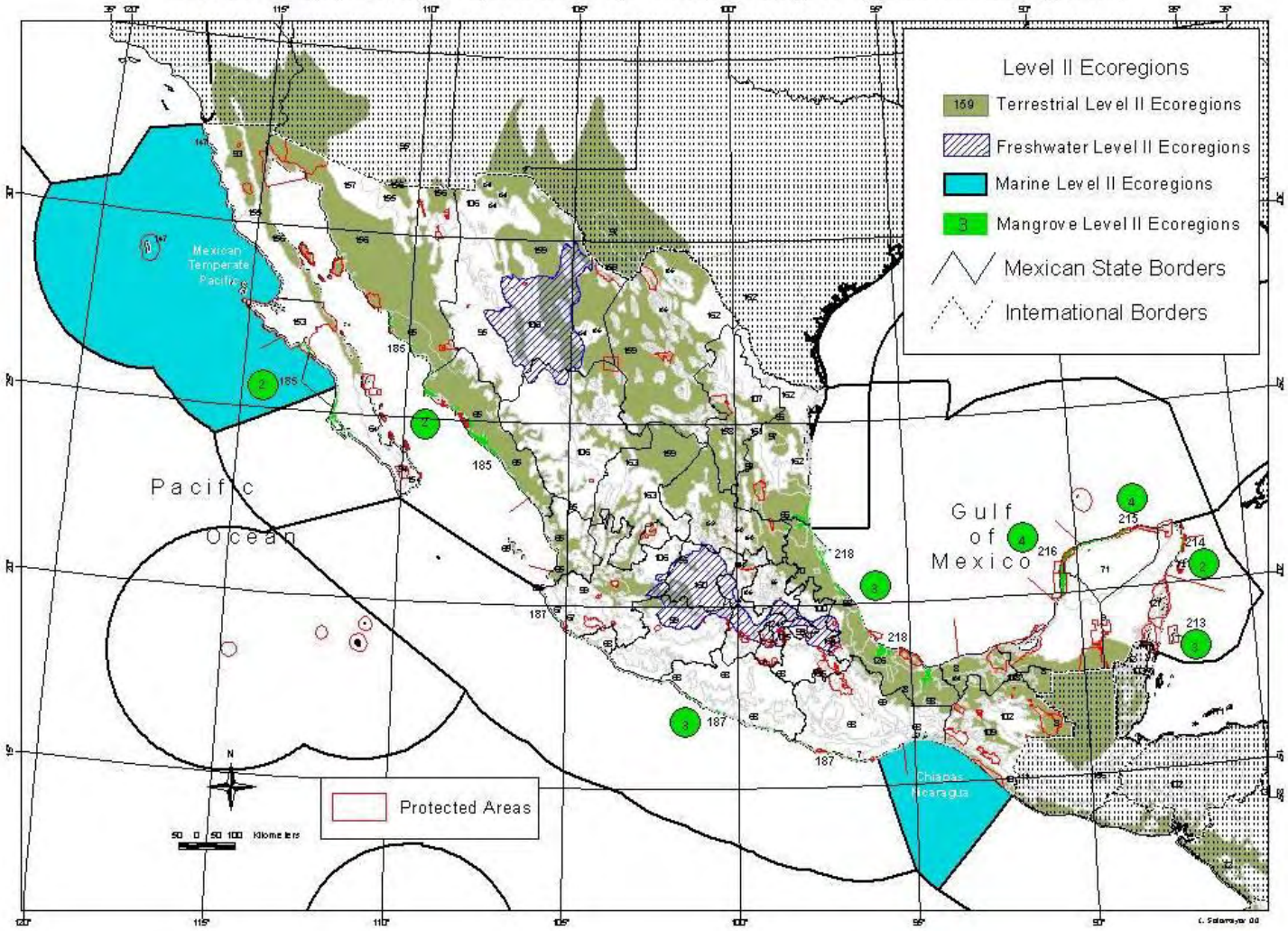
Arid Northwest Mexican Coast -	**II.2**
Maya Corridor -	**II.2**
Belizean Reef -	**II.3**
Alvarado -	**II.3**
Southern Pacific Coast - Mexico -	**II.3**
Ría Lagartos -	**II.4**
Petenes -	**II.4**

LEVEL III

Regionally or Nationally Important ecoregions in Mexico
- 50 out of 98 ecoregions

Terrestrial -	24 ecoregions out of 50
Freshwater -	21 ecoregions out of 98
Marine -	5 ecoregions out of 9

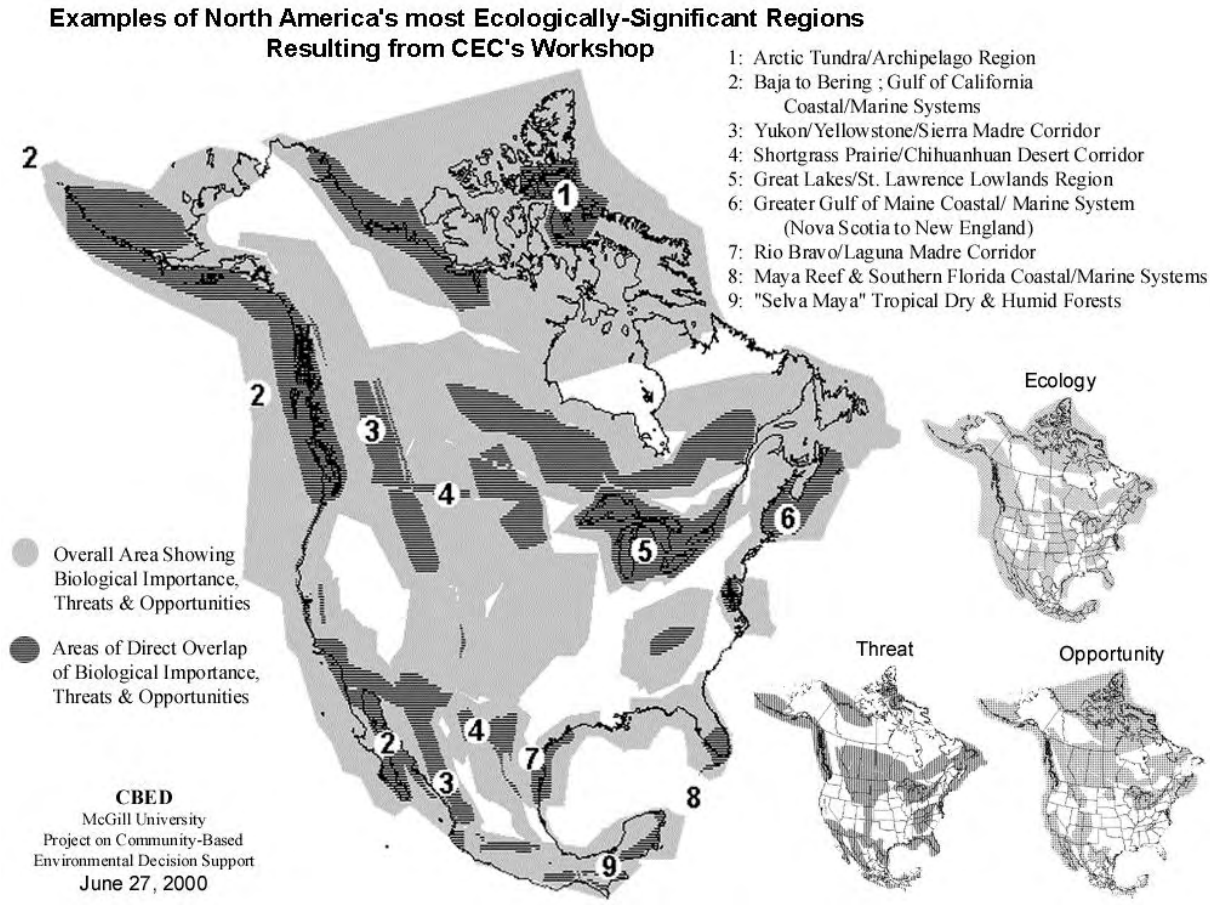
Level II Globally Important or Nationally Urgent Ecoregions



2.6 NORTH AMERICA'S MOST ECOLOGICALLY SIGNIFICANT REGIONS CEC'S STRATEGIC PLAN FOR BIODIVERSITY CONSERVATION

Commission for Environmental Cooperation 2000 - Draft

The purpose of this exercise was to identify conservation priority regions in North America that will benefit from CEC intervention. To this end, a workshop with the participation of experts in the fields of ecology, conservation biology and environmental studies from Canada, Mexico and the United States was convened. Priority regions for North America were selected in terms of: ecological significance, conservation threat and opportunities present. To help achieve this objective, a group decision making GIS software, Active Response GIS (a software that combines GIS functionality with a state-of-the-art "groupware" product) was used.



3. CONSERVATION TARGET PRIORITIES

An ecoregional approach for conservation planning requires a clear identification of specific conservation targets that encompass the biodiversity of each ecoregion. An analysis of the presence and viability of these targets within specific sites, becomes one of the main discriminators that is used to identify and select, an effective ecoregional site portfolio that can be used for the long term protection of its biodiversity.

3.1.1 STATE LEVEL BIOLOGICAL DIVERSITY CONSERVATION TARGETS

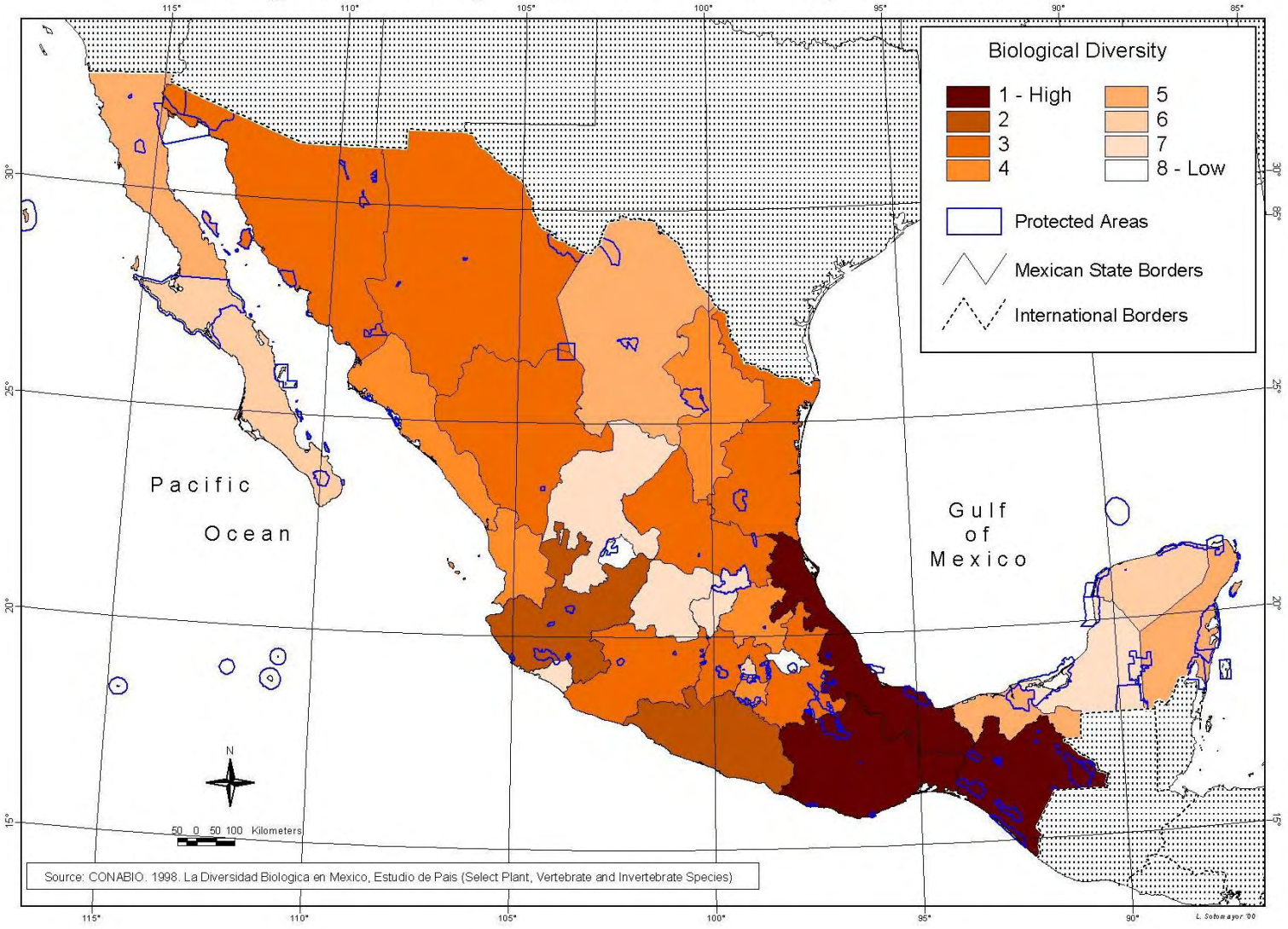
Knowledge of Mexico's biodiversity is still incomplete, although important advances have so far been achieved. Biodiversity and endemicity has mainly been recorded using political or very broad geographical boundaries and not at an ecoregional level. For this first target identification exercise gross biodiversity within political boundaries of Mexican States will be used as a surrogate for ecoregional diversity and endemicity.

BIOLOGICAL DIVERSITY IN MEXICO - COUNTRY STUDY

Select species richness registered at the State Level. CONABIO 1998

State	Position /Rank for (a) (1)	(a)Spp. Plants Select Vertebrate & Invert.	Com-posite Plants	Birds	Terrest Mamm.	Marine Mamm.	Total Mamm.
Veracruz	1o./1	6,177	390	664	93	8	101
Chiapas	2o./1	5,762	598	628	85	5	90
Oaxaca	3o./1	5,294	600	687	108	8	116
Jalisco	4o./2	3,758	644	481	93	14	107
Guerrero	5o./2	3,493	397	476	63	9	72
Puebla	6o./3	2,721	403	367	76	0	76
San Luis Potosí	7o./3	2,498	393	469	93	0	93
Michoacán	8o./3	2,485	519	460	73	6	79
Chihuahua	9o./3	2,429	423	329	95	0	95
Edo. México	10o./3	2,420	530	281	55	0	55
Tamaulipas	11o./3	2,339	252	444	85	5	90
Sonora	12o./3	2,315	322	456	88	12	100
Durango	13o./3	2,305	467	308	81	0	81
Nayarit	14o./4	2,179	369	407	54	18	72
Nuevo León	15o./4	2,174	275	252	63	0	63
Hidalgo	16o./4	2,066	336	236	59	0	59
Morelos	17o./4	1,957	288	274	46	0	46
Sinaloa	18o./4	1,871	270	460	58	11	69
Coahuila	19o./5	1,745	366	275	80	0	80
Tabasco	20o./5	1,643	99	370	38	9	47
Baja California	21o./5	1,611	319	292	67	28	95
Quintana Roo	22o./5	1,549	91	340	43	8	51
Distrito Federal	23o./6	1,351	320	222	44	0	44
Yucatán	24o./6	1,341	102	343	51	7	58
Baja California Sur	25o./6	1,277	193	258	45	32	77
Colima	26o./7	1,035	120	318	40	11	51
Zacatecas	27o./7	1,015	246	154	75	0	75
Guanajuato	28o./7	941	215	256	45	0	45
Campeche	29o./7	936	75	281	42	8	50
Querétaro	30o./7	810	200	181	36	0	36
Aguascalientes	31o./8	584	178	89	33	0	33
Tlaxcala	32o./8	432	48	89	21	0	21

Biological Diversity in Mexico - Select Species Richness



Vertebrates and Flora

Mesoamerican Endemisms per State

CONABIO-UNAM, (Flores-Villela y Gerez 1994)

State	Pos. / Rank	Number of vertebrate endemisms at a Mesoamerican level (M)						Number of terrestrial vertebrates endemisms at the State Level (E)						% (E) de (M)	Flora
		Tot	Pec	Anf	Rep	Ave	Ma	Tot	Pec	Anf	Rep	Ave	Ma		
Oaxaca	1o./1	598	38	98	184	204	74	95	5	36	44	1	9	16	9,000
Chiapas	2o./1	550	58	79	159	188	66	50	17	10	16	1	6	14	8,248
Veracruz	3o./1	475	62	64	132	159	58	49	14	13	17	1	4	10	8,000
Guerrero	4o./2	363	14	46	114	137	53	35	3	11	19	1	1	10	s.d.
Michoacán	5o./2	353	38	36	114	112	53	38	19	6	11	0	2	11	s.d.
Jalisco	6o./2	334	46	30	90	101	67	27	19	2	3	0	0	8	7,500
Puebla	7o./2	296	14	40	81	111	50	15	7	3	4	0	1	5	s.d.
Colima	8o./3	227	6	15	58	113	35	11	2	0	4	4	1	5	7,500
Nayarit	9o./3	227	15	20	52	100	40	9	2	1	1	0	5	4	s.d.
San Luis Potosí	10o./3	225	29	23	62	75	36	15	11	0	4	0	0	7	s.d.
Edo. México	11o./3	223	8	26	44	117	28	10	4	5	0	1	0	4	s.d.
Sinaloa	12o/3	222	16	24	54	97	31	6	4	1	1	0	0	3	s.d
Morelos	13o./4	195	6	21	56	79	33	5	3	2	0	0	0	2	s.d.
Hidalgo	14o./4	188	7	22	44	86	29	2	0	1	1	0	0	1	s.d.
Tamaulipas	15o./4	187	26	15	44	70	32	14	6	3	2	2	1	7	5,000?
Durango	16o./5	186	23	11	41	83	28	10	8	0	2	0	0	5	3,630
Sonora	17o./5	185	28	11	43	75	28	12	3	0	6	0	3	6	4,000
Yucatán	18o./5	179	24	9	62	61	23	4	3	0	1	0	0	2	2,100
Quintana Roo	19o./5	175	16	11	53	72	23	9	5	0	1	1	2	5	1,257
Chihuahua	20o./5	168	35	7	33	67	26	11	9	0	2	0	0	8	s.d.
Campeche	21o./5	166	17	12	58	60	19	0	0	0	0	0	0	0	2,100
Tabasco	22o./5	162	26	11	45	58	22	2	2	0	0	0	0	1	2,200
Distrito Federal	23o./6	137	9	12	31	62	23	3	1	2	0	0	0	2	2,065?
Querétaro	24o./6	136	4	11	37	58	26	2	0	0	1	0	1	1	2,334
Nuevo León	25o./6	124	22	8	28	45	21	7	2	2	3	0	0	6	5,000?
Coahuila	26o./6	110	35	3	24	29	19	22	17	0	5	0	0	20	s.d.
Zacatecas	27o./6	102	8	7	28	25	34	0	0	0	0	0	0	0	s.d.
Guanajuato	28o./6	98	8	6	31	39	14	3	3	0	0	0	0	3	s.d.
B. California Sur	29o./7	65	4	0	32	8	21	42	1	0	26	1	15	65	2,705
Tlaxcala	30o./7	54	0	8	21	18	7	0	0	0	0	0	0	0	s.d.
Baja California	31o./7	53	4	0	28	8	13	26	1	0	15	2	8	49	2,705
Aguascalientes	32o./7	52	3	6	28	6	9	1	1	0	0	0	0	2	1,200

Mesoamerican endemism = Presence only in Mexico and Central America

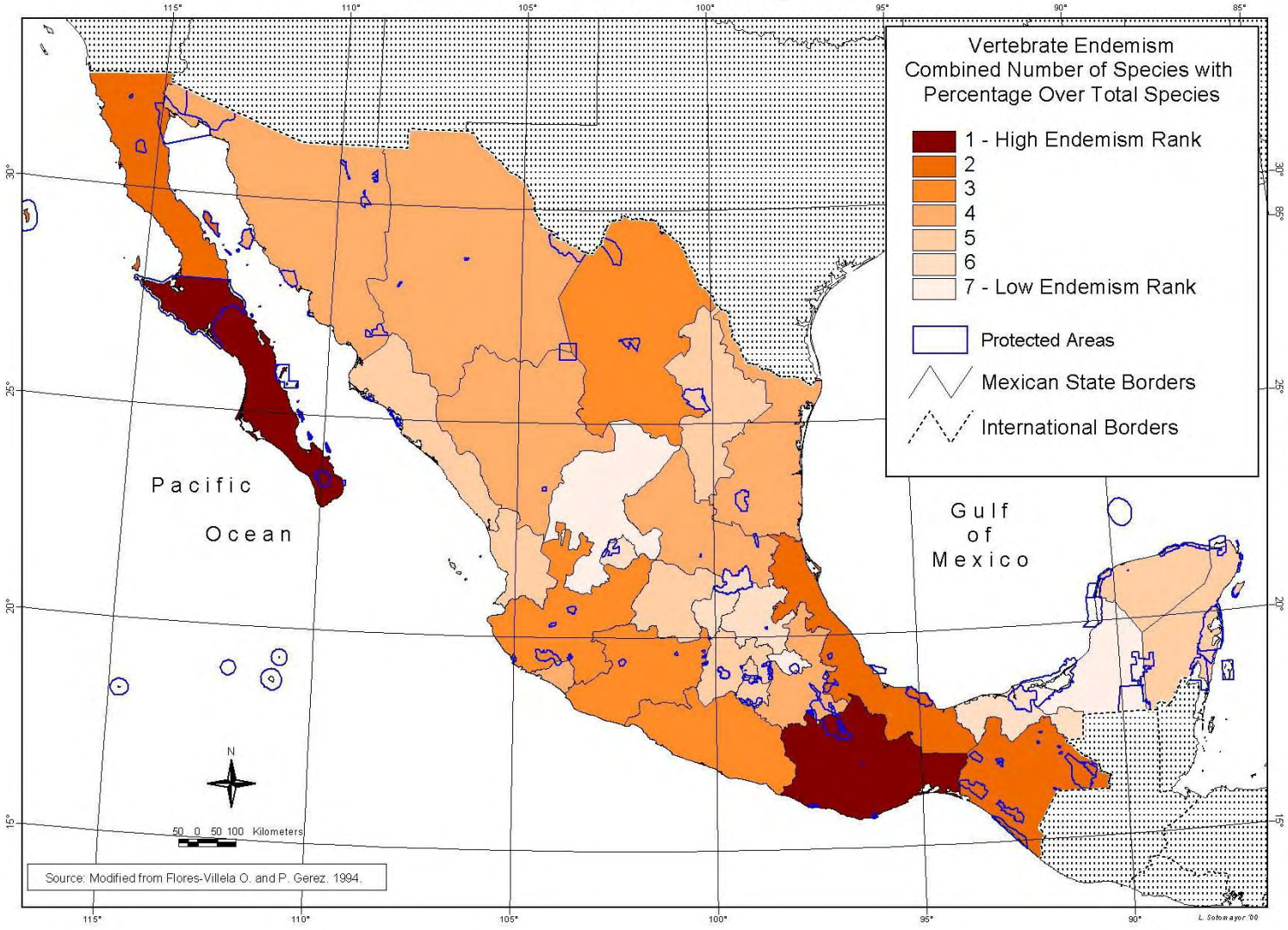
VERTEBRATE ENDEMISM RANKING BY STATE

CONABIO-UNAM, (Flores-Villela y Gerez 1994)

Vertebrates	Overall Ende-mism.	Number of Mesoamerican Endemic		Percentage of Endemism		Number of Mesoamerican Species (2)	
STATE	Pos./ Rank (3)	Posi-tion	No.	Pos.	%	Pos.	No.
Oaxaca	1o./1	1o.	95	4o.	16	1o.	598
B. California Sur	2o./1	4o.	42	1o.	65	29o.	65
Chiapas	3o./2	2o.	50	5o.	14	2o.	550
Veracruz	4o./2	3o.	49	7o.	10	3o.	475
Baja California	5o./2	8o.	26	2o.	49	31o.	53
Michoacán	6o./3	5o.	38	6o.	11	5o.	353
Coahuila	7o./3	9o.	22	3o.	20	26o.	110
Guerrero	8o./3	6o.	35	7o.	10	4o.	363
Jalisco	9o./3	7o.	27	9o.	8	6o.	334
San Luis Potosí	10o./4	10o.	15	11o.	7	10o.	225
Chihuahua	11o./4	14o.	11	9o.	8	20o.	168
Tamaulipas	12o./4	12o.	14	12o.	7	15o.	187
Puebla	13o./4	10o.	15	15o.	5	7o.	296
Sonora	14o./4	13o.	12	13o.	6	17o.	185
Colima	15o./4	14o.	11	15o.	5	8o.	227
Durango	16o./4	16o.	10	15o.	5	16o.	186
Nuevo León	17o./5	20o.	7	13o.	6	25o.	124
Edo. México	18o./5	16o.	10	19o.	4	11o.	223
Quintana Roo	19o./5	18o.	9	18o.	5	19o.	175
Nayarit	20o./5	18o.	9	19o.	4	8o.	227
Sinaloa	21o./5	21o.	6	21o	3	12o	222
Morelos	22o./5	22o.	5	22o.	2	13o.	195
Yucatán	23o./5	23o	4	22o.	2	18o.	179
Guanajuato	24o./5	24o.	3	21o.	3	28o.	98
Distrito Federal	25o./5	24o.	3	22o.	2	23o.	137
Aguascalientes	26o./6	29o.	1	22o.	2	32o.	52
Hidalgo	27o./6	26o.	2	26o.	1	14o.	188
Tabasco	28o./6	26o.	2	26o.	1	22o.	162
Querétaro	29o./6	26o.	2	26o.	1	24o.	136
Campeche	30o./7	29o.	0	29o.	0	21o.	166
Zacatecas	31o./7	29o.	0	29o.	0	27o.	102
Tlaxcala	32o./7	29o.	0	29o.	0	30o.	54

The overall endemism rank was estimated by averaging the rank of the number Mesoamerican endemics and the rank of the percentage of Mesoamerican endemism. In order to help untie rank averages the total number of Mesoamerican endemics was used.

Vertebrate Endemism by State



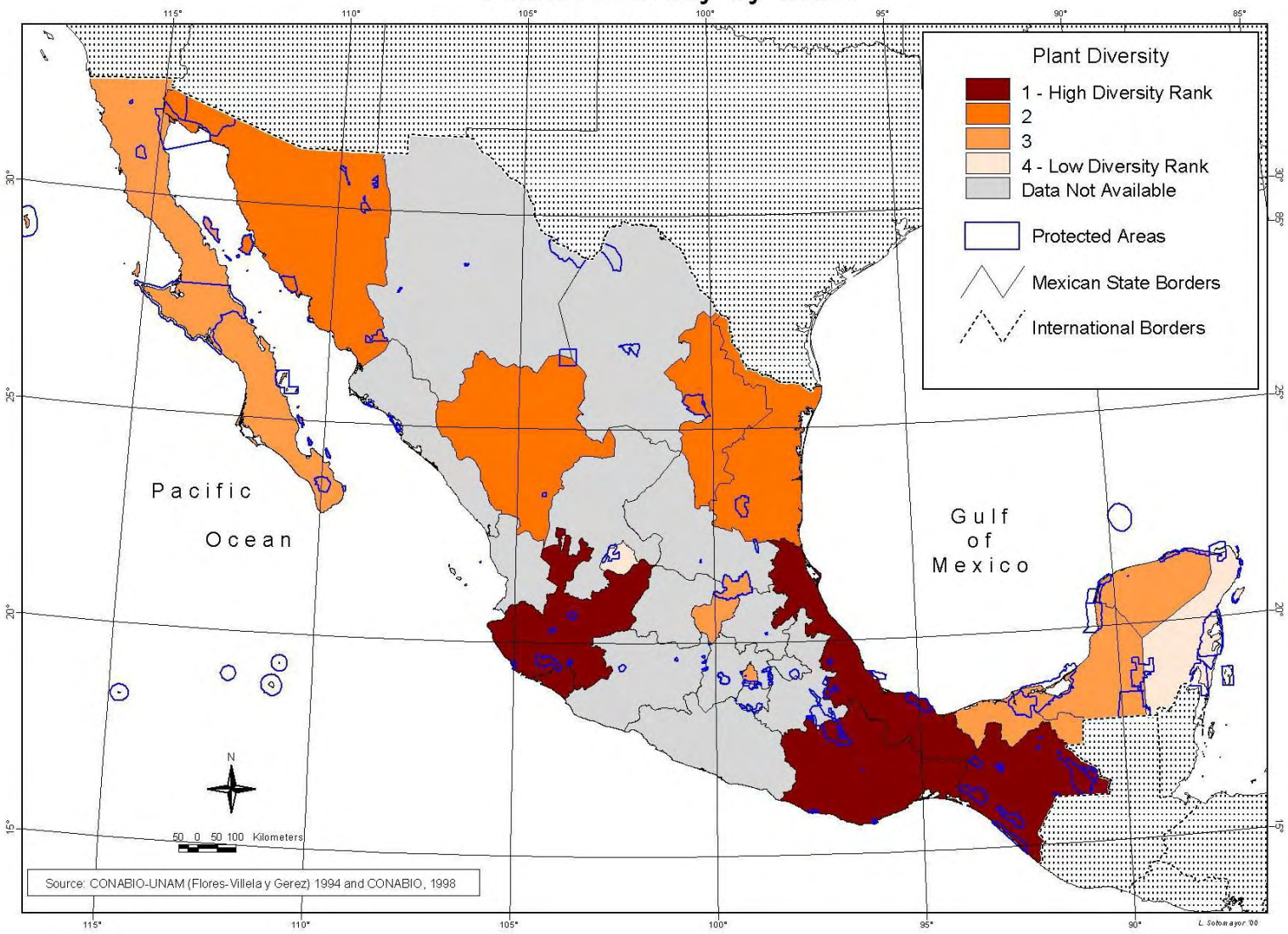
PLANT DIVERSITY BY STATE

(a) CONABIO-UNAM, (Flores-Villela y Gerez 1994)
(b) CONABIO 1998

	Pos./ Rank	Plants (a)	Posi-tion	Comp. (b)
Oaxaca	1o./1	9,000	2o.	600
Chiapas	2o./1	8,248	3o.	598
Veracruz	3o./1	8,000	11o.	390
Jalisco	4o./1	7,500	1o.	644
Colima	4o./1	7,500	26o.	120
Nuevo León	6o./2	5,000	19o.	275
Tamaulipas	6o./2	5,000	21o.	252
Sonora	8o./2	4,000	15o.	322
Durango	9o./2	3,630	6o.	467
Baja California	10o./3	2,705	17o.	319
B. California Sur	10o./3	2,705	27o.	120
Querétaro	12o./3	2,334	24o.	200
Tabasco	13o./3	2,200	29o.	99
Yucatán	14o./3	2,100	28o.	102
Campeche	14o./3	2,100	31o.	75
Distrito Federal	16o./3	2,065	16o.	320
Quintana Roo	17o./4	1,257	30o.	91
Aguascalientes	18o./4	1,200	25o.	178
Edo. México	n.a.	s.d.	4o.	530
Michoacán	n.a.	s.d.	5o.	519
Chihuahua	n.a.	s.d.	7o.	423
Puebla	n.a.	s.d.	8o.	403
Guerrero	n.a.	s.d.	9o.	397
San Luis Potosí	n.a.	s.d.	10o.	393
Nayarit	n.a.	s.d.	12o.	369
Coahuila	n.a.	s.d.	13o.	366
Hidalgo	n.a.	s.d.	14o.	336
Morelos	n.a.	s.d.	18o.	288
Sinaloa	n.a.	s.d	20o.	270
Zacatecas	n.a.	s.d.	22o.	246
Guanajuato	n.a.	s.d.	23o.	215
Tlaxcala	n.a.	s.d.	32o.	48

(a) Fanerógamic Flora
(b) Composite Plants

Plant Diversity by State

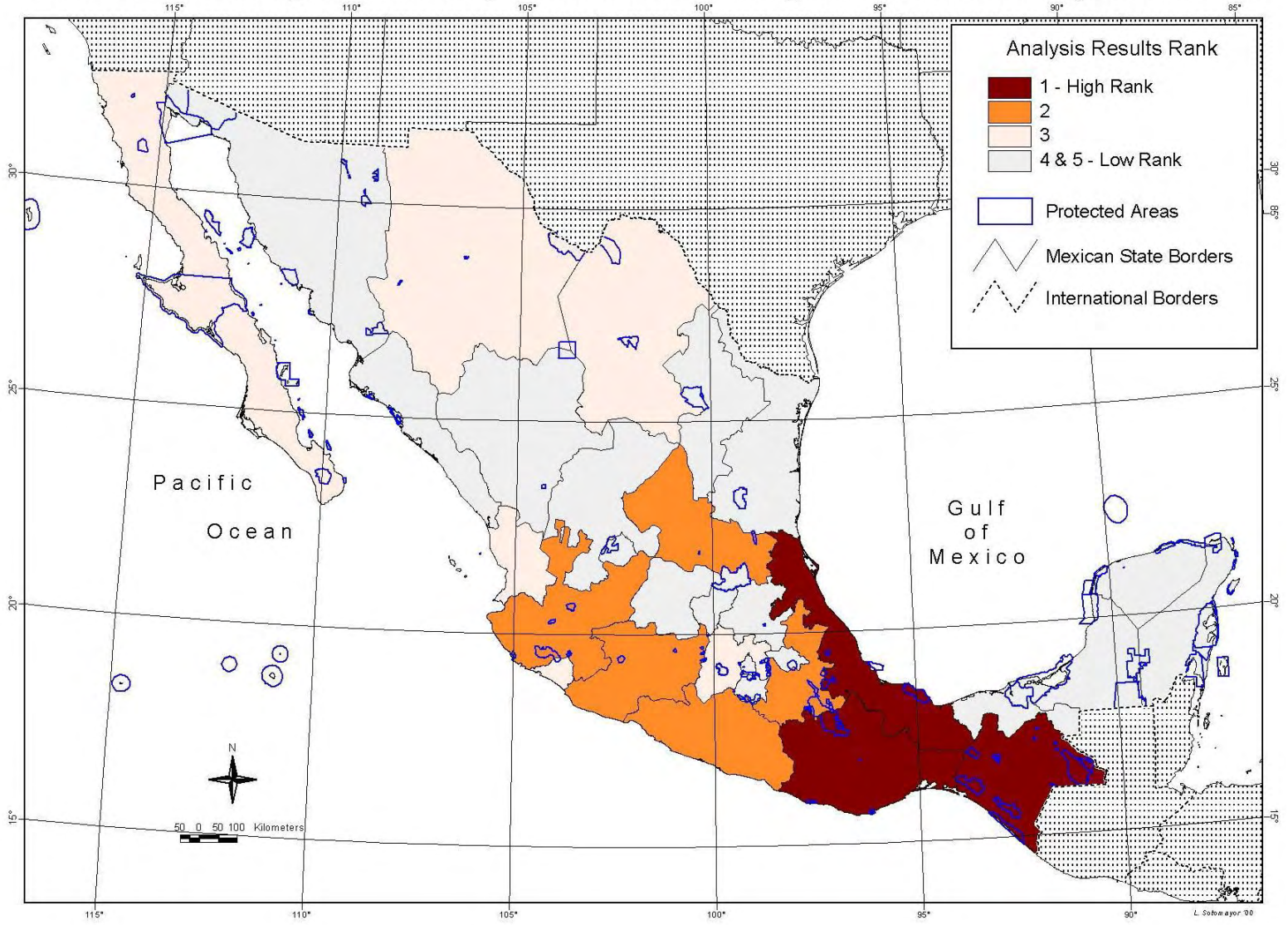


3.1.2 STATE LEVEL BIOLOGICAL DIVERSITY CONSERVATION TARGETS ANALYSIS

Comparison of aggregate available incomplete and many times incommensurable data on species diversity and endemism for Mexico, is preliminary and only of indicative value. To integrate an arbitrary but illustrative composite diversity and endemism rank, the highest ten positions of States in each of the following three categories were tabulated: CONABIO's select species aggregate count; Flores-Villela y Gerez, (CONABIO-UNAM 1994) aggregate number and overall endemism of Mesoamerican terrestrial vertebrates. Mesoamerican endemism is defined as species only present in Mexico and Central America (Flores-Villela y Gerez 1994). Plants were not used in this ranking due to the incompleteness of the data. Existing information was not compensated by State size ratio, which could better indicate the real biodiversity value per unit area.

	CONABIO 1998 Select Sp. Diversity Position (1)	CONABIO-UNAM, 1994			1+2+3	Hot Spots (for reference only)	RANK
		Number Mesoam. Terrestrial Vertebrat. Position (2)	Endemic Mesoam. Terrestrial. Vertebrat. Position (3)	Higher Plants Position (Incomplete)			
Oaxaca	3o.	1o.	1o.	1o.	5	HS	1
Chiapas	2o.	2o.	3o.	2o.	7	HS	1
Veracruz	1o.	3o.	4o.	3o.	7	HS	1
Guerrero	5o.	4o.	8o.	n.a.	17	HS	2
Jalisco	4o.	6o.	9o.	4o.	19	1/2 HS	2
Michoacán	8o.	5o.	6o.	n.a.	19	3/4 HS	2
Puebla	6o.	7o.	13o.	n.a.	26	1/2 HS	2
San Luis Potosí	7o.	10o.	10o.	n.a.	27	1/4 HS	2
Tamaulipas	11o.	15o.	12o.	6o.	38	174 Hs	4
Edo. México	10o.	11o.	18o.	n.a.	39	1/4 HS	3
Chihuahua	9o.	20o.	11o.	n.a.	40		3
Sonora	12o.	17o.	14o.	8o.	43	1/8 Hs	4
Nayarit	14o.	8o.	20o.	n.a.	43	1/2 HS	3
Durango	13o.	16o.	16o.	9o.	45	1/8 HS	4
Colima	26o.	8o.	15o.	4o.	49	HS	3
Sinaloa	18o.	12o.	21o.	n.a.	51	HS	4
Coahuila	19o.	26o.	7o.	n.a.	52		3
Morelos	17o.	13o.	22o.	n.a.	52	HS	4
B. California Sur	25o.	29o.	2o.	10o.	56		3
Baja California	21o.	31o.	5o.	10o.	57	1/4 HS	3
Nuevo Leon	15o.	25o.	17o.	6o.	57	1/8 HS	4
Hidalgo	16o.	14o.	27o.	n.a.	57	1/8 HS	4
Quintana Roo	22o.	19o.	19o.	17o.	60	HS	5
Yucatán	24o.	18o.	23o.	14o.	65	HS	5
Tabasco	20o.	22o.	28o.	13o.	70	HS	5
Distrito Federal	23o.	23o.	25o.	16o.	71	1/8 HS	5
Campeche	29o.	21o.	30o.	14o.	80	HS	5
Guanajuato	28o.	28o.	24o.	n.a.	80	1/8 HS	5
Queretaro	30o.	24o.	29o.	12o.	83		5
Zacatecas	27o.	27o.	31o.	n.a.	85	1/8 HS	5
Aguascalientes	31o.	32o.	26o.	18o.	89	1/8 HS	5
Tlaxcala	32o.	30o.	32o.	n.a.	94		5

State Level Biological Diversity Conservation Targets Exercise Analysis Results



3.2 NATIONAL LEVEL SELECT BIOGROUPS CONSERVATION TARGETS

In contrast with the previous section that deals with biodiversity and endemicity targets in a quantitative and very general level, this section deals with qualitative aspects of the better documented biological groups, specifying in some instances particular sites, in others broader areas and where available, specific species and their conservation status, which will allow for further identification of conservation targets at an ecoregional level.

3.2.1 BIRDS

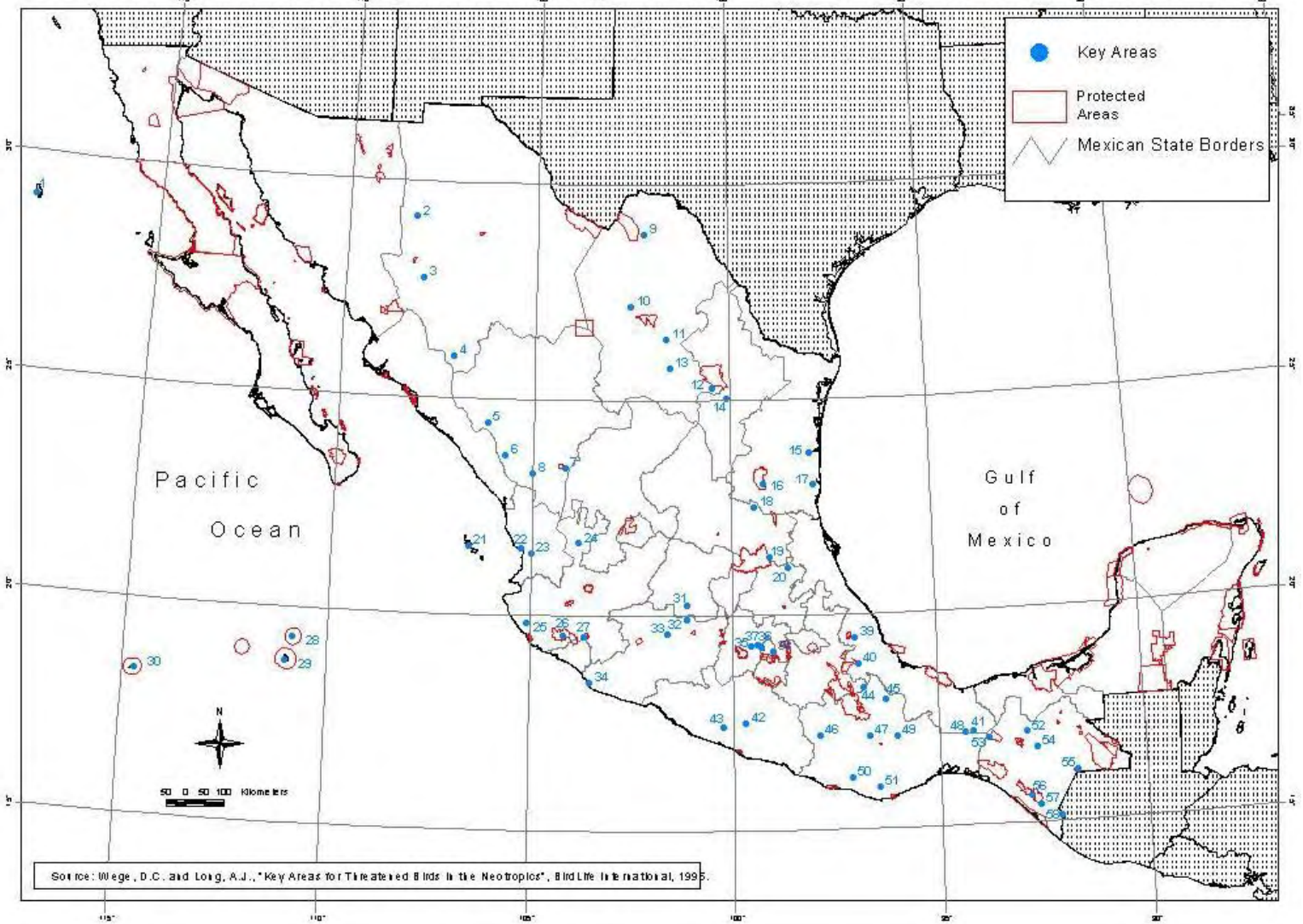
KEY AREAS FOR THREATENED BIRDS IN THE NEOTROPICS

Birdlife International (Wege D.C., A.J. Long 1995)

According to the authors, Key Areas are the most important places currently known for globally threatened bird species of the Neotropics. These areas are important for the conservation of 280 threatened birds in the region where 596 Key Areas were identified. Fifty eight or 9.7% of all Neotropical Key Areas are present in Mexico. If adequately protected, these areas would help to ensure the conservation of 27 species which comprise 96% of Mexico's threatened species including all those that are endemic to the country.

Key Areas	**Top Key Areas in Mexico**	**Top Key Areas in the Neotropics**
01	**Isla Guadalupe**	30 Isla Clarión
02	**Mesa de Huaracán**	31 Lago Yuriria
03	Barranca del Cobre	32 Lago Cuitzeo
04	Cerro Mohinora	33 Logo Pátzcuaro
05	Las Bufas y San Blas	34 La Placita
06	Mexiquillo	**35 Upper Río Lerma**
07	La Michilía	36 Los Dinamos
08	Monte Obscuro	**37 El Capulín - La Cima**
09	Serranías del Burro	38 Santa Ana Tlacotenco
10	Sierra Madera	**39 Coatepec**
11	Sierra San Marcos	40 Córdoba
12	San Antonio de las Alazanas	41 Uxpanapa
13	**Cumbres de Monterrey**	42 Omiltemi
14	Cerro del Potosí	**43 Atoyac de Alvarez - Teotepec road**
15	Soto la Marina - La Pesca	44 Cuasimulco
16	**Gómez Farías**	45 Cerro de Oro
17	Los Colorados ranch	46 San Andres Chicahuaxtla
18	Río El Naranjo	**47 Cerro San Felipe**
19	Xilitla	48 Chimalapas
20	Tlanchinol	49 Cerro Zeompoaltepec
21	**Islas Marías**	50 Puerto Escondido - Oaxaca City road
22	San Blas	51 Puerto Angel - Oaxaca City road
23	Cerro San Juan	52 Selva Negra
24	**El Carricito del Huichol**	53 Río la Venta - El Ocote
25	Chamela Cuixmala	54 San Cristobal de las Casas
26	Manantlán	55 Lagunas de Montebello
27	**Nevado de Colima**	**56 El Triunfo**
28	Isla San Benedicto	57 Monte Ovando
29	**Isla Socorro**	58 Volcán Tacaná

BirdLife International, 1995 - Key Areas for Threatened Birds in Mexico



ENDEMIC BIRD AREAS OF THE WORLD

Priorities For Biodiversity Conservation

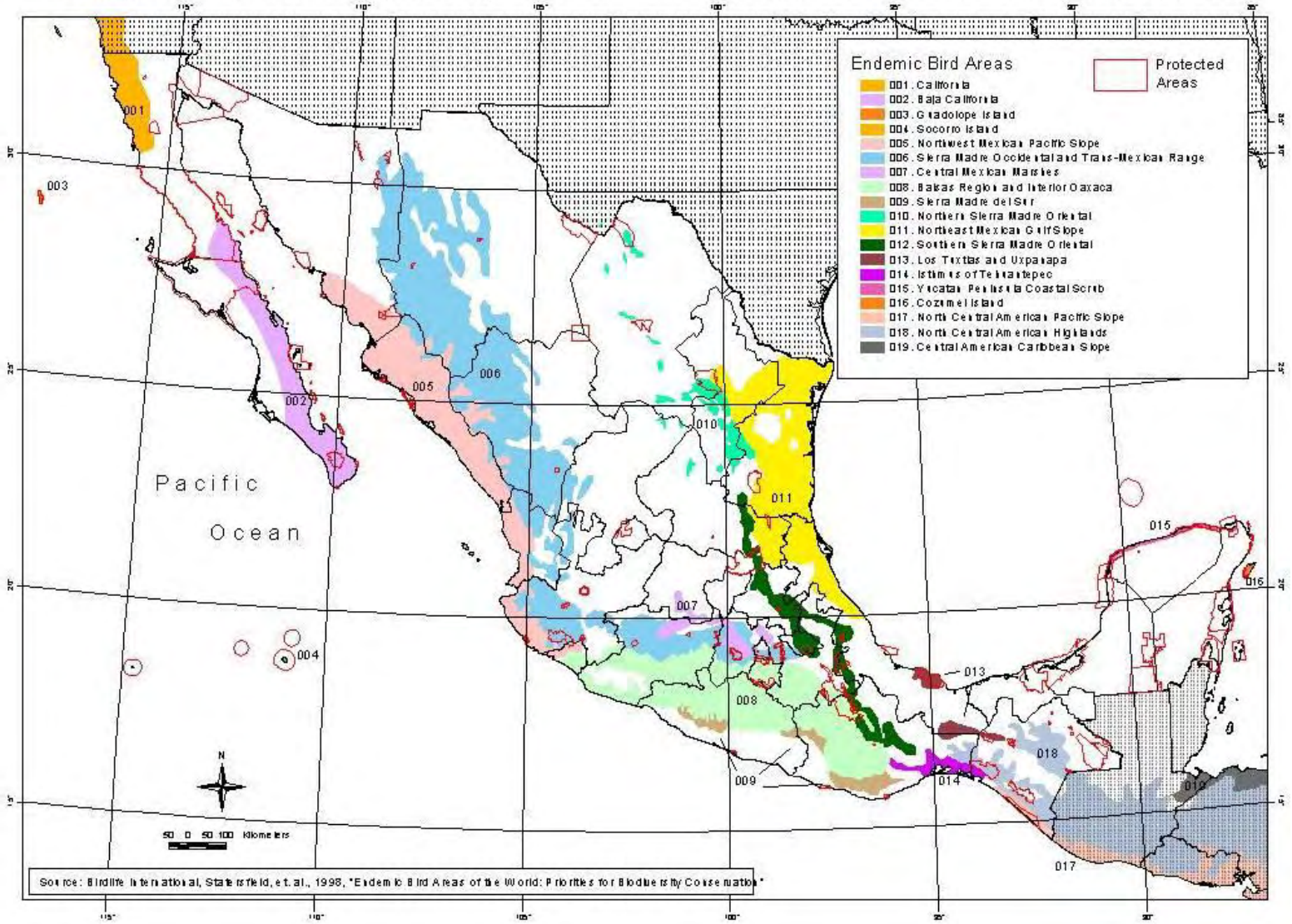
Birdlife International 1998

Among the various animal and plant groups, birds can serve as effective indicators to identify areas important for overall biodiversity conservation. Birds are much easier to observe and census than most other groups, and are much better known taxonomically. In a recent publication, Birdlife International (formerly known as the International Council for Bird Preservation) analyzed the distributions of birds on a global scale and found that centers of endemism for birds corresponded well with those for other groups that were more difficult to study, including mammals, reptiles, amphibians, and butterflies.

1) Over 25% of all birds (2,561 species) have restricted ranges, being confined to areas of less than 50,000 Km2
2) These small areas overlap to form Endemic Bird Areas (EBAs), such that the majority of restricted-range species (93% of them) are encompassed by 218 EBAs.
3) EBAs are found around the world, but most (77%) of them are located in the tropics and subtropics.

EBA Number & Name	Area Km²	Rate of Hab. Loss	Knowledge	Importance	Threat	Priority
001 California (Mex-USA)	180,000	Major	Good	2	1	High
002 Baja California	43,000	Moderate	Incomplete	1	1	High
003 Guadalupe Island	280	Severe	Good	1	3	Critical
004 Socorro Island	150	Major	Good	3	3	Critical
005 North-west Mexican Pacific slope	93,000	Moderate	Incomplete	1	1	High
006 Sierra Madre Occidental and Trans-Mexican Range	230,000	Major	Incomplete	1	3	Critical
007 Central Mexican marshes	10,000	Severe	Good	1	2	Urgent
008 Balsas region and interior Oaxaca	110,000	Moderate	Good	2	1	High
009 Sierra Madre del Sur	12,000	Major	Incomplete	1	3	Critical
010 Northern Sierra Madre Oriental (Mex-USA)	15,000	Moderate	Good	1	1	High
011 North-east Mexican Gulf slope	100,000	Major	Good	1	2	Urgent
012 Southern Sierra Madre Oriental	31,000	Major	Incomplete	1	3	Critical
013 Los Tuxtlas and Uxpanapa	14,000	Major	Incomplete	1	3	Critical
014 Isthmus of Tehuantepec	6,700	Moderate	Incomplete	1	1	High
015 Yucatan Peninsula coastal scrub	3,400	Major	Good	1	1	High
016 Cozumel Island	490	Moderate	Good	3	1	Urgent
017 North Central American Pacific slope (Mex-CA)	30,000	Major	Incomplete	1	1	High
018 North Central American highlands (Mex-CA)	150,000	Moderate	Incomplete	3	1	Urgent
Secondary Areas						
s005 South Veracruz coast scrub		Central Veracruz				
s006 South Mexican karst forest		Between Córdova, Veracruz and Cerro de Oro, Oaxaca.				
s007 Eastern Yucatán		East coast incl. Belize and Bay Islands, Honduras				
s008 Clarión	24.4	Part of the Revillagigedo Archipelago				

BirdLife International, 1998 - Endemic Bird Areas: Mexico



HUMEDALES PRIORITARIOS PARA LA CONSERVACIÓN DE LAS AVES ACUÁTICAS MIGRATORIAS EN MÉXICO

DUMAC 1999 - Con base en los conteos de medio-invierno del USFWS

Ruta Migratoria del Pacífico

A.- Bahía de San Quintín, B.C.
B.- Laguna Ojo de Liebre, B.C.S.
C.- Bahía de San Ignacio, B.C.S.
CH.- Bahía Magdalena, B.C.S.
D.- Bahía Lobos, Son
E.- Isla Tobari, Son.
F.- Santa Bárbara, Son.
G- Agiabampo, Son.
H.- Topolobampo, Sin.
I.- Bahía Santa María, Sin.
J.- Pabellón, Sin.
K.- El Dorado, Sin.
L.- Laguna Caimanero, Sin.
M.- Marismas Nacionales, Nay.

Ruta Migratoria del Centro

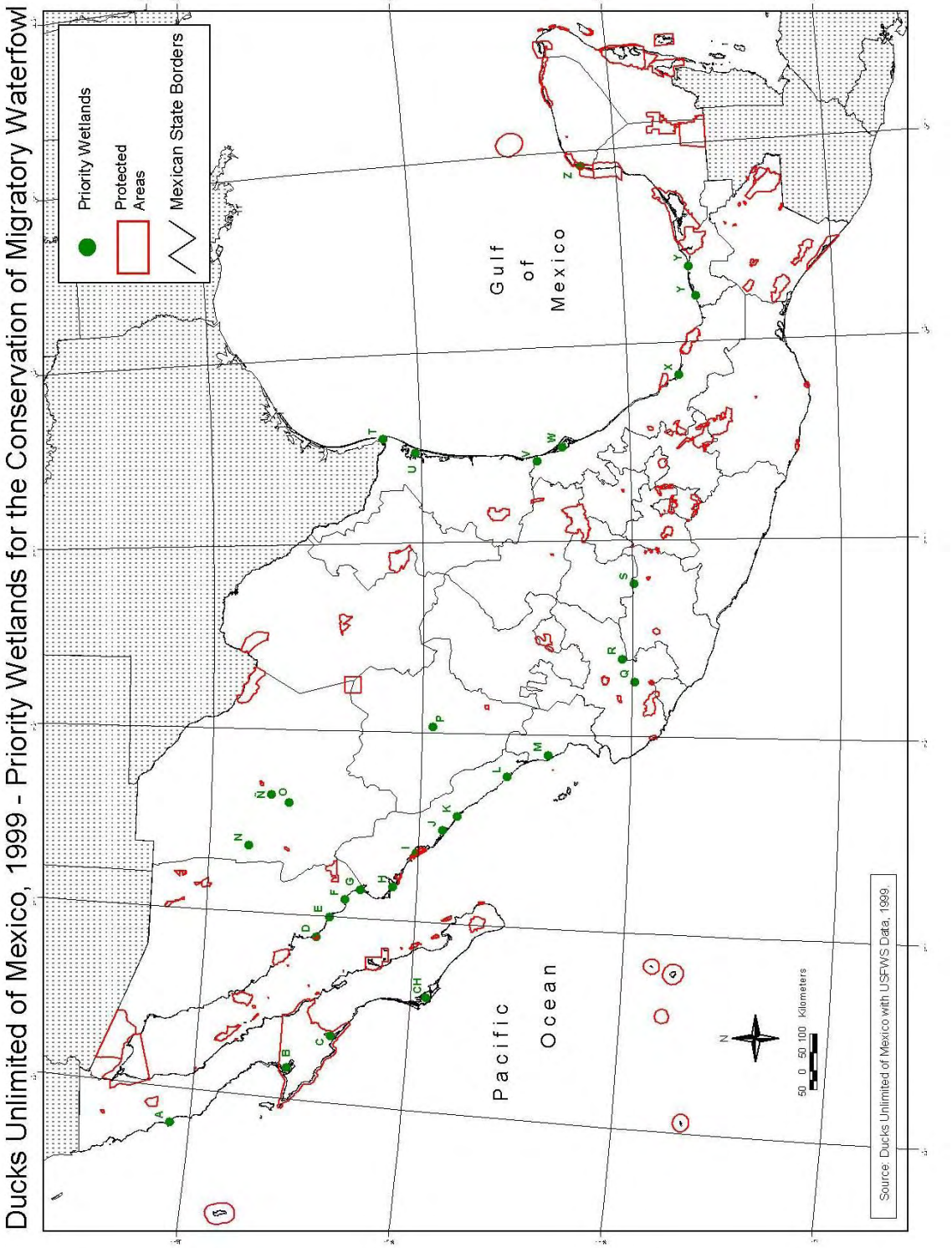
N.- Babícora, Chih.
Ñ.- Bustillos, Chih.
O.- Mexicanos, Chih.
P.- Santiaguillo, Dgo.
Q.- Laguna Sayula, Jal.
R.- Lago Chapala, Jal.
S.- Lago Cuitzeo, Mich.

Ruta Migratoria del Golfo

T.- Delta del Río Bravo, Tamps.
U.- Laguna Madre, Tamps.
V.- Delta del Río Támesi /Pánuco, Tamps. Ver.
W.- Laguna de Tamiahua, Ver.
X- Lagunas de Alvarado, Ver
Y.- Lagunas de Tabasco, Tab.
Z.- Lagunas de Campeche / Yucatán, Camp. Yuc.

En estos 28 humedales se concentran la mayor parte de las aves acuáticas migratorias incluyendo el:

83.4% de las aves acuáticas migratorias distribuidas en México durante los años promedio en las décadas de los 60'', 70' y 80´.
92% de los pijijes de ala blanca y de ala negra (*Dendrocygna autumnalis y D. bicolor*)
91% de los patos cabeza roja (*Aythya americana*)
84% de las cercetas de alas azules (*Anas discors*)
77% de los patos calvos (*Anas americana*)
76% de los patos pintos (*Anas strepera*)
69% de los patos golondrinos (*Anas acuta*)
68% de los patos cucharones (*Anas clypeata*)
65% de las cercetas de alas verdes (*Anas crecca*)
63% de los patos boludos (*Aythya affinis*)


Ducks Unlimited of Mexico, 1999 - Priority Wetlands for the Conservation of Migratory Waterfowl
Priority Wetlands
Protected Areas
Mexican State Borders
Gulf of Mexico
Pacific Ocean
A
B
C
D
E
F
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50 0 50 100 Kilometers
N
Source: Ducks Unlimited of Mexico with USFWS Data, 1999.

WESTERN HEMISPHERE SHOREBIRD RESERVE NETWORK (WHSRN)

WHSRN sites are those staging areas that are of highest priority in the hemispheric conservation of shorebirds. Current biological criteria identify 3 levels of habitat use believed to represent sites where shorebirds concentrate and are at high vulnerability. Additionally, as a voluntary, nonregulatory program, WHSRN requires that sites have full support of all stakeholders, including public and private land owners, local communities and organizations.

- Hemispheric Sites - Area hosts at least 500,000 shorebirds annually or 30% of the species flyway population based on peak species counts.

- International Sites - Area hosts at least 100,000 shorebirds annually or 10% of the species flyway population based on peak species counts.

- Regional Sites - Area hosts at least 20,000 shorebirds annually or 5% of the species flyway population based on peak species counts.

Current review of these criteria is considering a method for including vital breeding and wintering areas where shorebirds may not be highly concentrated and relatively dispersed staging areas such as complexes of smaller inland wetlands (prairie potholes, etc.).
(http://www.manomet.org/Wetlands/criteria.htm, 04/2000)

The following list includes registered sites and projects based on data produced by Guy Morrison's surveys, which is also being used by DUMAC for their Mexican Shorebird Conservation Plan (Jim Corven pers. com.).

Marismas Nacionales, Nay., Sin	(International WHSRN site)
Estuario del Rio Colorado B.C. Son.	(International WHSRN site)
Laguna Madre (first Bi-National Site) Tex. Tamps.	(International WHSRN site)
Guerrero Negro, B.C.S.	(International WHSRN site)
Bahia de Santa Maria, Sin	(Site of current WHSRN project)

MEXICAN SHOREBIRD CONSERVATION PLAN - DRAFT
Wetland Complexes with Substantial Numbers of Shorebirds

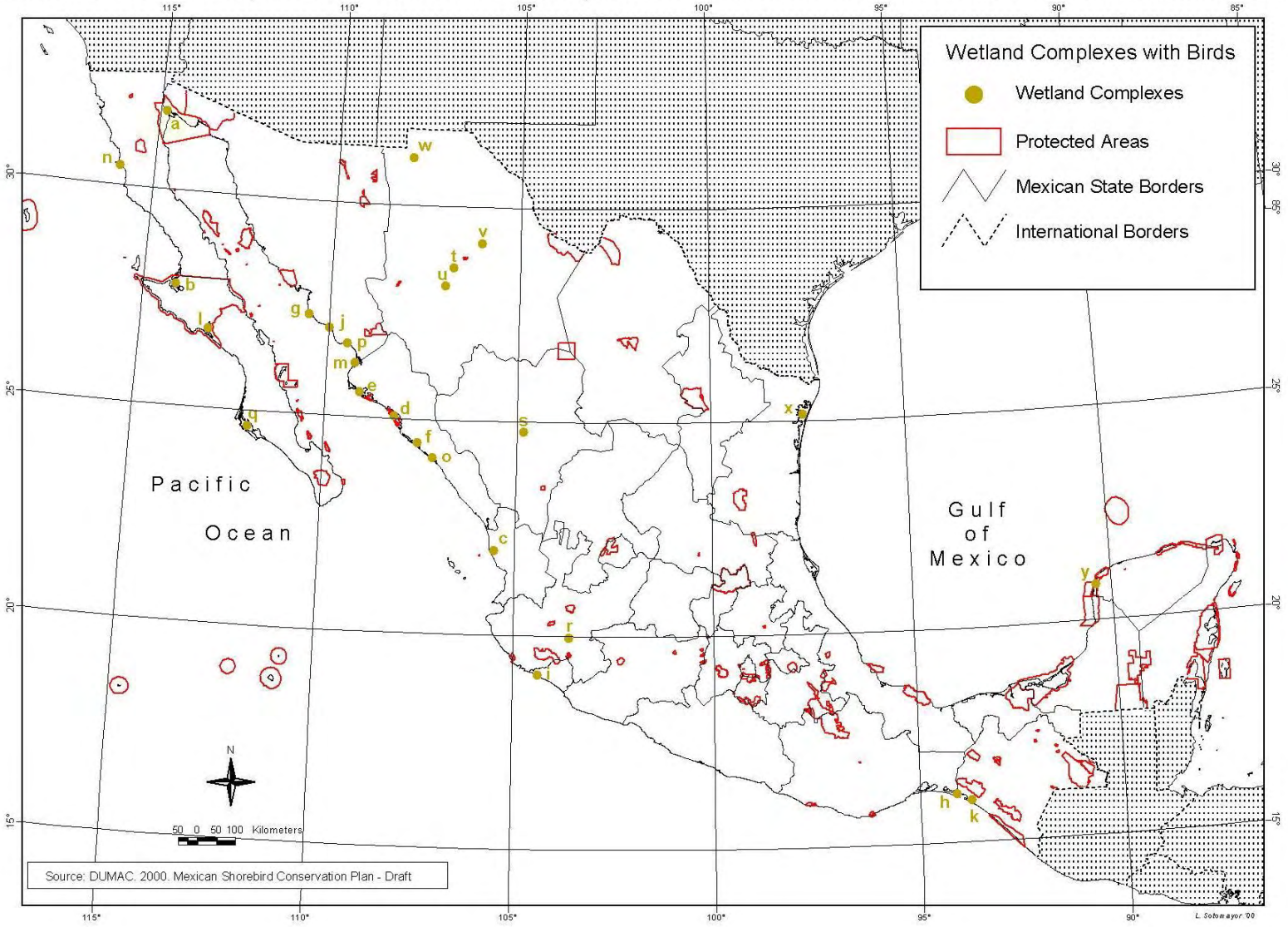
DUMAC

Shorebirds are a relatively diverse group that utilizes habitats as varied as shallow estuaries, emergent marsh, mudflats, wet meadows, flooded agricultural fields and pastures. Only the deepest (>20 cm) and most densely vegetated wetlands are little used by most shorebirds. Populations of many shorebirds species are declining. In fact, 21 of the approximately 50 species of shorebird commonly occurring in North America have documented population declines.

For the following "**Highly Imperiled**" and "High Concern" shorebird species, habitats in Mexico constitute an important proportion of the species range: ***Charadrius alexandrinus*** **(Snowy Plover),** ***Charadrius montanus*** **(Mountain Plover),** *Charadrius wilsonia* (Wilson's Plover), *Aphriza virgata* (Surfbird), *Limosa fedoa* (Marbled Godwit), *Haematopus palliatus* (American Oystercatcher*), Arenaria melanocephala* (Black Turnstone).

For the following "**Highly Imperiled**" and "High Concern" shorebird species, habitats in Mexico constitute a substantial proportion of the species range: ***Charadrius melodus*** **(Piping Plover),** ***Numenius americanus*** **(Long-billed Curlew),** *Numenius phaeopus* (Whimbrel), *Arenaria interpres* (Rudy Turnstone), *Phalaropus tricolor* (Wilson's Phalarope), *Calidris alba* (Sanderling), *Haematopus bachmani* (Black Oystercatcher), *Limosa haemastica* (Hudsonian Godwit).

Ducks Unlimited, 2000 - Wetland Complexes with Substantial Numbers of Shorebirds



	Wetland Complex	Total Count Shorebirds Winter Surveys	RANK	Potential Number of Species or Richness	RANK	Mean Priority on Value of Potential Species	RANK	Overall Priority Mean Rank	RANK
Pacífic Migratory Route		(A)		(B)		(C)		A+B+C	
a	Estuario del Río Colorado, B.C. y Son.	163,744	3o.	37	2o.	3.35	1o.	2.00	1o.
b	Laguna Ojo de Liebre / Guerrero Negro, B.C.S. (a)	267,983	1o.	34	5o.	3.26	3o.	3.00	2o.
c	Marismas Nacionales, Nay.	206,038	2o.	38	1o.	3.18	7o.	3.33	3o.
d	Bahía Santa María, Sin.	134,827	4o.	32	7o.	3.22	5o.	5.33	5o.
e	Bahía Topolobampo, Sin.	91,016	5o.	32	7o.	3.22	5o.	5.67	6o.
f	Ensenada Pabellones, Sin.	72,946	7o.	34	5o.	3.18	7o.	6.33	7o.
g	Estero Lobos, Son.	69,187	9o.	33	6o.	3.24	4o.	6.33	7o.
h	Mar Muerto, Oax.	57,182	10o.	38	1o.	3.13	9o.	6.67	8o.
i	Manzanillo, Col.	42,079	11o.	36	3o.	3.14	8o.	7.33	9o.
j	Estero Tobari, Son.	41,205	12o.	33	6o.	3.24	4o.	7.33	9o.
k	Laguna la Joya, Chis.	25,421	13o.	37	2o.	3.14	8o.	7.67	10o.
l	Laguna San Ignacio, B.C.S. (a)	16,402	16o.	35	4o.	3.26	3o.	8.00	11o.
m	Estero Agiabampo / Bahía Jitzamuri, Sin.	19,597	15o.	33	6o.	3.24	4o.	8.33	12o.
n	Bahía de San Quintín, B.C. (a)	4,379	19o.	35	4o.	3.29	2o.	8.33	12o.
o	Bahía Guadalupana, Sin.	20,633	14o.	36	3o.	3.11	10o.	9.00	13o.
p	Bahía Yábaros, Son.	14,388	17o.	33	6o.	3.24	4o.	9.00	13o.
q	Bahía Magdalena, B.C.S. (a)	2,389	23o.	33	6o.	3.24	4o.	11.00	14o.
Central Migratory Route									
r	Laguna Sayula / Zacoalco / San Marcos, Jal.	72,003	8o.	25	8o.	3.04	11o.	9.00	13o.
s	Laguna Santiaguillo, Dgo. (c)	3,142	20o.	20	9o.	3.00	12o.	13.67	15o.
t	Laguna de Bustillos, Chih. (c)	2,887	21o.	18	11o.	3.00	12o.	14.67	16o.
u	Laguna Mexicanos, Chih. (c)	2,520	22o.	18	11o.	3.00	12o.	15.00	17o.
v	Laguna el Cuervo, Chih. (c)	-	25o.	19	10o.	3.00	12o.	15.67	18o.
w	Laguna Asención / Ojo Federico, Chih. (c)	1,944	24o.	18	11o.	3.00	12o.	15.67	18o.
Gulf Migratory Route									
x	Laguna Madre, Tamps. (b)	83,338	6o.	36	3o.	3.19	6o.	5.00	4o.
y	Campeche / Puerto Progreso Camp. Yuc.	11,689	18o.	35	4o.	3.29	2o.	8.00	11o.

(A) Shorebird species potentially present based on distribution maps in Howell and Webb (1995).

(B) Central Migratory Route aerial surveys, September 1994 from A. Lafon and J. Taylor (1994). All other data from Morrison *et al.* (1992, 1993, 1994).

(C) Mean priority scores of shorebird species potentially present, utilizes "Species Priority Matrix" from U.S. Shorebird Conservation Plan which ranks: population trend, relative abundance, threats to breeding and non breeding habitat, breeding and non breeding distribution.

A+B+C As a result of inclusion of the winter count, this prioritization scheme is biased towards habitat use during winter vs. breeding habitat.

(a) Estimated 50% of N.A. Pacific coast *Charadrius alexandrinus* (Snowy Plover), nest in Baja California.

(b) Laguna Madre from Mezquital to Boca Barra Chica (83 km) held 368 *Charadrius melodus* (Piping Plover) in December 1997, which represent 8% of the total breeding population.

(c) These wetlands largely reflect biologists opinion with regards to potential as shorebird habitat. Data during wet years are lacking.

ÁREAS DE IMPORTANCIA PARA LA CONSERVACIÓN DE LAS AVES (AICAS)

CIPAMEX, CONABIO, FMCN y CCA (Benítez, H., C. Arizmendi y L. Marquez 1999)

El programa de las AICAS surgió como una idea conjunta de la Sección Mexicana del Consejo Internacional para la preservación de las aves (CIPAMEX) y BirdLife International. Inició con apoyo de la Comisión para la Cooperación Ambiental de Norteamérica (CCA) con el propósito de crear una redregional de áreas importantes para la conservación de las aves.

Para identificar las AICAS en el territorio mexicano, se invitó a especialistas e interesados en la conservación de las aves a un primer taller que se llevó a cabo en Huatulco, Oaxaca del 5 al 9 de junio, de 1996 en donde se reunieron alrededor de 40 especialistas, representantes de universidades y organizaciones no gubernamentales de diferentes regiones en México para proponer de manera regional Áreas de Importancia para la Conservación de las Aves en México. En este Taller se identificaron 170 áreas, mismas que se difundieron, invitando a más personas a participar para conformar 193 áreas nominadas durante 1996-1997. Estas áreas fueron revisadas por la coordinación del programa AICAS y se constituyó una base de datos. La estructura y forma de la base de datos fueron adecuándose a las necesidades del programa. La información gráfica recabada en el taller que incluía los mapas dibujados por los expertos de todas las áreas que fueron nominadas, se digitalizó y sistematizó en CONABIO incorporándose en su sistema de información geográfica. En Mayo de 1997, durante una reunión del Comité Consultivo, la Coordinación y técnicos de la CONABIO, se revisaron, con el apoyo de mapas de vegetación, topografía e hidrografía, las 193 áreas propuestas, revisando los polígonos, coordenadas y limites. Durante 1998 el programa entró a una segunda fase en la cual se regionalizó, con el apoyo financiero del Fondo Mexicano para la Conservación de la Naturaleza A.C., (FMCN) formándose 4 coordinaciones regionales (Noreste, Noroeste, Sur y Centro). En cada región se organizaron dos talleres para revisar las AICAS, anexándose y eliminándose aquellas áreas que de acuerdo a la experiencia de los grupos de expertos así lo ameritaron, concluyendo con un gran total de 230 AICAS, así como con una lista de 5 áreas de prioridad mayor por Región en donde se tienen identificados los grupos locales que son capaces de implementar un plan de conservación en cada AICA. Los nuevos mapas se digitalizaron a escala 1:250,000.

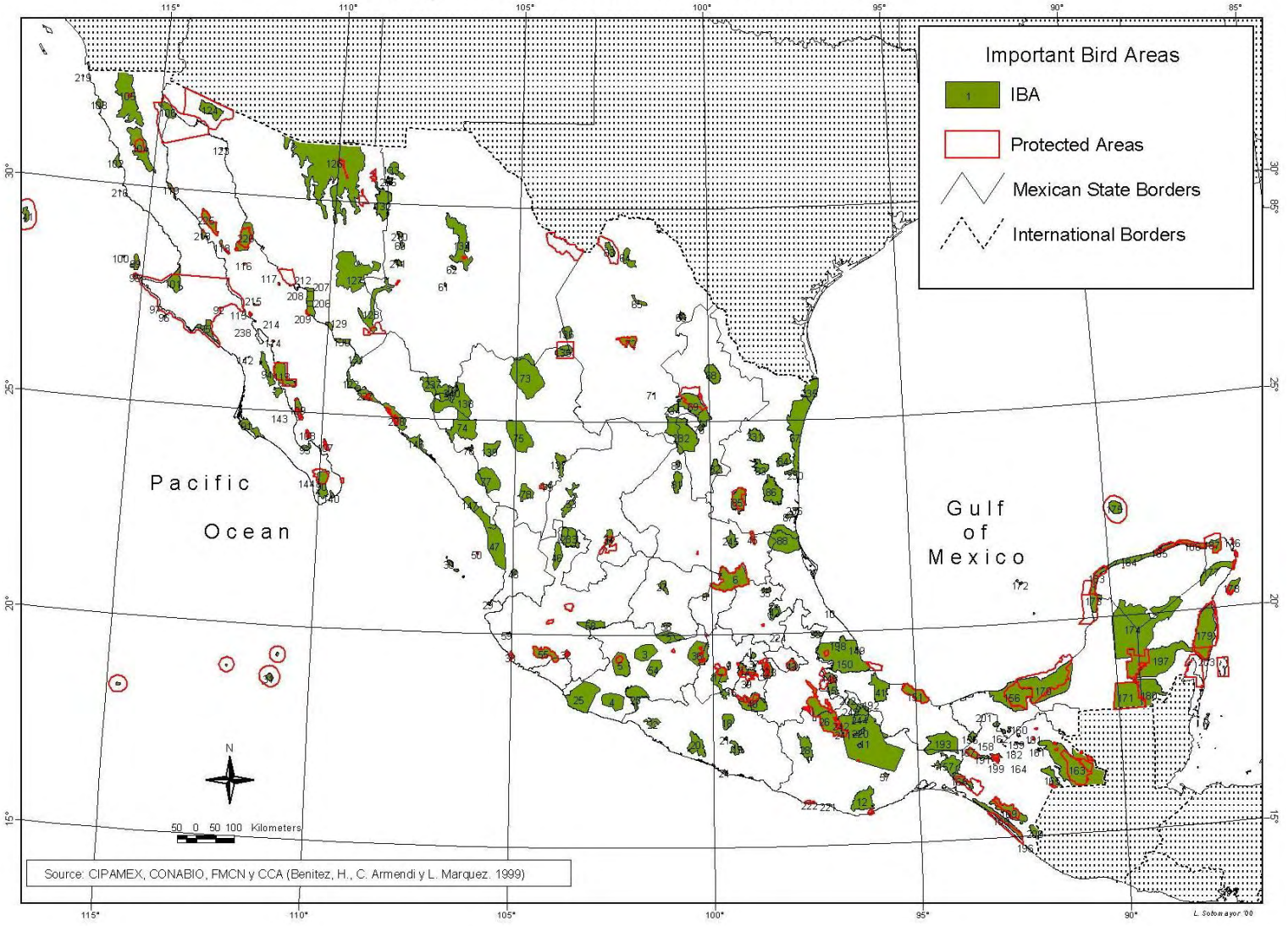
Cada área o AICA contiene una descripción técnica que incluye descripción biótica y abiótica, un listado avifaunístico que incluye las especies registradas en la zona, su abundancia (en forma de categorías) y su estacionalidad en el área. Finalmente Contiene un directorio con los especialistas que participaron en el llenado de las fichas correspondientes. El listado completo incluye un total 230 áreas, que incluyen más de 26,000 registros de 1,038 especies de aves (96.3% del total de especies para México según el American Ornithologist's Union). Adicionalmente, se incluye en al menos un área, al 90.2% de las especies listadas como amenazadas por la ley Mexicana (306 de 339 especies) y al 100 % de las especies incluidas en el libro de Collar *et al.* (1994, Birds to Watch 2). De las 95 especies endémicas de México (Arizmendi y Ornelas en prep.) todas están registradas en al menos un área.

1 Lago de Texcoco
2 Cuitzeo
3 Pátzcuaro
4 Tumbiscatio
5 Tancítaro
6 Reserva de la Biosfera Sierra Gorda
7 Sótano del Barro
8 El Zamorano
9 Ciénagas de Lerma
10 Tecolutla
11 Sierra Norte
12 Sierra de Miahuatlán
13 La Cima
14 Sur del Valle de México
15 Sierra de Zongolica
16 Grutas de Cacahuamilpa
17 Sierra de Taxco - Nevado de Toluca
18 Cañón del Zopilote
19 Acahuizotla - Agua del Obispo
20 Sierra de Atoyac
21 Omiltemi
22 Vallecitos de Zaragoza
23 Cuenca Baja del Balsas
24 Lagunas Costeras de Guerrero
25 Coalcomán - Pomaro

26 Valle de Tehuacán - Cuicatlán
27 Sierra de Santa Rosa
28 Tlaxiaco
29 Islas Marietas
30 Islas Marías
31 Islas Revillagigedo
32 Nevado de Colima
33 Chamela - Cuitzmala
34 Sierra Fría
35 Tlanchinol
36 Sierra Chincua
37 Ciénaga de Tlahuac
38 Cuetzalan
39 Canon de Lobos
40 Sierra de Huautla
41 Humedales de Alvarado
42 Huayacocotla
43 La Malinche
45 Sierra del Abra -Tanchipa
46 El Carricito
47 Marismas Nacionales
48 Reserva Ecológica Sierra de San Juan
50 Isla Isabel
53 Sierra de Valparaíso
54 Tacámbaro
55 Sierra de Manantlán
56 Laguna de Yuriria
57 Cerro Piedra Larga
58 Laguna de Chapala
59 Presa Cajón de Peñas
60 Babícora
61 Laguna de Mexicanos
62 Laguna de Bustillos
63 Sierra Maderas del Carmen
64 Sierra del Burro
65 Nacimiento Río Sabinas - Sureste Sierra de Santa Rosa
66 Presa Venustiano Carranza
67 Laguna Madre
68 Picachos
69 Sierra de Arteaga
70 El Potosí
71 Presa El Tulillo
72 Cuatro Ciénegas
73 Cuchillas de la Zarca
74 San Juan de Camarones
75 Santiaguillo
76 Las Bufas
77 Rio Presidio - Pueblo Nuevo
78 Guacamayita
79 La Michilia
80 El Manantial
81 Sierra Catorce
82 San Antonio Peña Nevada
83 Presa Vicente Guerrero
84 Parras de la Fuente
85 El Cielo
86 Sierra de Tamaulipas
87 Cerro del Metate
88 Humedales del Sur de Tamaulipas y Norte de Veracruz
90 Sierra de la Laguna
91 Bahía Magdalena - Almejas
92 Oasis San Ignacio
93 Ensenada de la Paz
94 Sierra La Giganta
95 Complejo Lagunar San Ignacio
96 Isla San Roque
97 Isla Asunción
98 Isla Natividad
99 Isla Cedros
100 Isla Benitos
101 Complejo Lagunar Ojo de Liebre
102 Área San Quintín
103 Bahía Todos Santos
104 Sierra San Pedro Mártir
105 Sierra Juárez
106 Delta del Río Colorado
107 Isla Cerralvo
108 Isla Espíritu Santo
109 Archipiélago San José
113 Archipiélago Loreto
114 Isla San Ildefonso
115 Isla San Marcos
116 Isla San Pedro Mártir
117 Isla San Pedro Nolasco
118 Archipiélago Salsipuedes
119 Sistema San Luis Gonzaga
122 Bahía Lechuguilla
123 Bahía e Islas de San Jorge
124 Reserva El Pinacate y Gran Desierto de Altar
126 Sistema de Sierras de la Sierra Madre Occidental
127 Cuenca del Río Yaqui
128 Álamos - Río Mayo
129 Sistema Tobari
130 Zonas húmedas Yávaros
131 Agiabampo
132 Baserac - Sierra Tabaco - Río Bavispe
133 Janos - Nuevo Casas Grandes
134 Sierra del Nido
135 Mapimí
136 Laguna de Jaco
137 Sierra de Órganos

138 Parte Alta del Río Humaya
139 Piélagos
140 Estero de San José
141 Isla Guadalupe
142 Oasis La Purísima y San Isidro
143 Oasis San Pedro de la Presa
144 Oasis Punta San Pedro - Todos Santos
146 Ensenada Pabellones
147 Sistema Lagunar Huizache - Caimanero
148 Río Metlac
149 Centro de Investigaciones Costeras La Mancha
150 Centro de Veracruz
151 Los Tuxtlas
155 Sierra de Tabasco
156 Pantanos de Centla
157 Chimalapas
158 Cerros de Tapalapa
159 Cerro Saybal - Cerro Cavahlna
160 Cordón Jolvit
161 Sierra Chixtontic - Sierra Canja
162 Cerro Blanco, La Yerbabuena y Jotolchen
163 Montes Azules
164 Cerros Alrededor de San Cristóbal de las Casas
165 Lagos de Montebello
166 La Sepultura
167 El Ocote
168 La Encrucijada
169 El Triunfo
170 Laguna de Términos
171 Calakmul
172 Islas de la Sonda de Campeche
173 Los Petenes
174 Sierra de Ticul - Punto Put
175 Arrecife Alacranes
176 Isla Contoy
177 Corredor Central Vallarta-Punta Laguna
178 Isla Cozumel
179 Sian Ka'an
180 Sur de Quintana Roo
181 Sierra Anover
182 Cerros de Chalchihuitan
183 Ria Celestún
184 Ichka' Ansijo
185 Reserva Estatal de Dzilam
186 Ría Lagartos
187 Yum-Balam
191 Corredor Laguna Bélgica - Sierra Limón - Cañón del Sumidero
192 Cerro de Oro
193 Uxpanapa
196 Laguna Pampa El Cabildo
197 Corredor Calakmul - Sian Ka'an
198 Laguna del Castillo
199 Zapotal - Mactumatza
200 El Tacaná
201 Sitio Grande
202 Presa Temascal
203 Uyumil C'eh
205 Mesa de Guacamayas
206 Sistema La Luna
207 Sistema Guásimas
208 Sistema Algodones
209 Estero Lobos
210 Cebadillas
211 Maderas Chihuahua
212 Estero del Soldado
214 Isla Santa Inés
215 Isla Tortuga
216 Isla San Jerónimo
218 Archipíelago Bahía de los Ángeles
219 Islas Coronado
220 Unión Zapoteco - Chinanteca
221 Laguna de Manialtepec
222 Laguna de Chacahua - Pastoría
223 Volcanes Iztaccíhuatl - Popocatépetl
224 Subcuenca Tecocomulco
225 Isla Ángel de la Guarda
226 Isla Tiburón - Canal El Infiernillo - Estero Santa Cruz
227 Bahía Navachiste
228 Bahía Santa Maria
230 Desembocadura del Rio Soto la Marina
231 Sierra de San Carlos
232 Pradera de Tokio
233 Monte Escobedo
234 Área Natural Sierra Zapalinamé
235 Delta del Rio Bravo
236 Rancho Los Colorados y Área de influencia
237 Pericos
238 Oasis Mulegé
240 Pericos - parte alta del Rio Humaya
241 Valle de Tehuacán - Sierra Norte
242 Valle de Tehuacán - Sierra Norte
243 Presa Temascal - Cerro de Oro
244 Cerro de Oro - Sierra Norte
245 San Nicolás de los Montes

Important Bird Areas in Mexico



CONSERVATION PRIORITY SETTING FOR BIRDS IN LATIN AMERICA

The Nature Conservancy's Wings of the Americas Program
and the University of Arkansas, Center for Advanced Spatial Technologies

This project was designed to develop and distribute high quality bird distribution data that could be used as a tool to help determine conservation priorities in Latin America. During the course of the project, a comprehensive list of bird species of conservation concern in Latin America was generated, using a consensus of opinion from a variety of sources. The list includes species considered of conservation concern by the Conservancy and the Network of Natural Heritage Programs and Conservation Data Centers; IUCN/BirdLife International; and Parker, Stotz, and Fitzpatrick in their publication "Neotropical Birds: Ecology and Conservation." Existing geographic range information for each species was collected and converted into a digital mapping format. The format used was a 15-minute grid cell base and all ranges were placed into the WORLDMAP biodiversity mapping software package. A total of 1289 species were included in the data base, out of which 164 species of conservation concern are present in Mexico, 74 of them endemic to the Country (shaded). Bird Species of Conservation Concern are defined for this exercise as any Latin American specie considered as:

a) Threatened, Near-threatened or Data-deficient in Collar, N.J., Crosby, M.J. & Stattersfield, A.J., 1994, Birds to Watch 2, The World List of Threatened Birds. BirdLife Conservation Series No. 4. BirdLife International, Cambridge, UK.; CR = Critical, EN = Endangered, VU = Vulnerable, NT = Near -Threatened, DD = Data Deficient.
b) Conservation priorities 1 to 3 in Parker, T.A., III, Stotz, D.F. & Fitzpatrick, J.W., 1996, Ecological and distributional databases. Pp. 113-436, In: Stotz, D.F., Fitzpatrick, J.W., Parker, T.A., III & Moskovits, D.K. (eds.) Neotropical Birds: Ecology and Conservation. University of Chicago Press, Chicago, USA.; or
c) G1, G3/4 Global Ranks proposed by The Nature Conservancy;
    - G1 = Critically Imperiled-Critically imperiled globally because of extreme rarity or because of some factor(s) making it especially vulnerable to extinction.
    - G2 = Imperiled-Imperiled globally because of rarity or because of some factor(s) making it very vulnerable to extinction or elimination.
    - G3 = Vulnerable-Vulnerable globally either because very rare and local throughout its range, found only in a restricted range (even if abundant at some locations), or because of other factors making it vulnerable to extinction or elimination.
    - G3/G4 = Uncertainty about the exact status of a taxon, which might be Apparently Secure-Uncommon but not rare.

Other taxa of recent description or that have been elevated from subspecie to specie, after the publication of the above mentioned documents. Bird Species of Conservation Concern distribution data for Mexico was taken from Howell, S.N.G. & Webb, S., 1995, A Guide to the Birds of Mexico and Northern Central America. Oxford University Press, Oxford, UK., and numerous other additional publications.

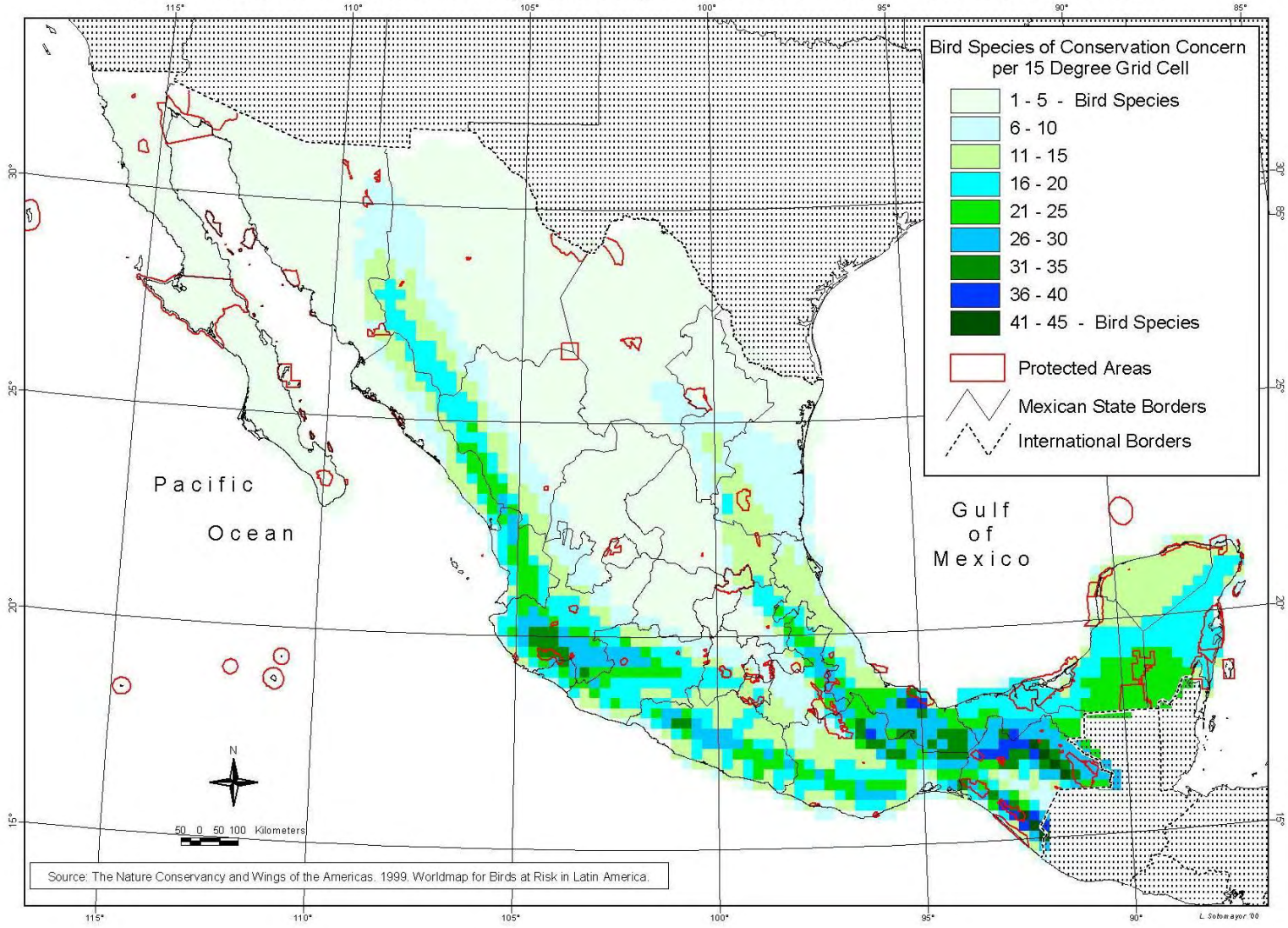
NO.	Scientific Name	Common Name	IUCN	TNC	Total cells	Cells in Mexico
1	*Crypturellus boucardi*	Slaty-Breasted Tinamou		G4	410	155
2	*Penelope purpurascens*	Crested Guan		G4	1957	629
3	*Ortalis poliocephala*	West Mexican Chachalaca		G4	274	274
4	*Ortalis wagleri*	Rufous-Bellied Chachalaca		G3/G4	161	161
5	*Penelopina nigra*	Highland Guan		G4	139	33
6	*Oreophasis derbianus*	Horned Guan	VU	G2	60	16
7	*Crax rubra*	Great Curassow		G4	1079	382
8	*Agriocharis ocellata*	Ocellated Turkey	NT	G4	244	197
9	*Dendrortyx barbatus*	Bearded Wood-Partridge	CR	G1	29	29
10	*Dendrortyx macroura*	Long-Tailed Wood-Partridge	NT	G3/G4	109	109
11	*Dendrortyx leucophrys*	Buffy-Crowned Wood-Partridge		G5	164	7

12	*Philortyx fasciatus*	Banded Quail		G3/G4	108	108
13	*Colinus nigrogularis*	Black-Throated Bobwhite		G3	173	136
14	*Cyrtonyx ocellatus*	Ocellated Quail	NT	G3	173	40
15	*Melanerpes hypopolius*	Gray-Breasted Woodpecker		G3	98	98
16	*Melanerpes pygmaeus*	Red-Vented Woodpecker		G3/G4	201	188
17	*Pharomachrus mocinno*	Resplendent Quetzal	NT	G3	223	33
18	*Euptilotis neoxenus*	Eared Trogon	EN	G3	416	416
19	*Trogon melanocephalus*	Black-Headed Trogon		G3	603	374
20	*Hylomanes momotula*	Tody Motmot		G3	584	263
21	*Aspatha gularis*	Blue-Throated Motmot		G3	145	43
22	*Electron carinatum*	Keel-Billed Motmot	NT	G2	369	86
23	*Ara militaris*	Military Macaw	VU	G3	1066	423
24	*Ara macao*	Scarlet Macaw		G3	9419	261
25	*Aratinga holochlora*	Green Parakeet		G3	257	257
26	*Aratinga strenua*	Pacific Parakeet		G3	122	14
27	*Rhynchopsitta pachyrhyncha*	Thick-Billed Parrot	EN	G2/G3	253	253
28	*Rhynchopsitta terrisi*	Maroon-Fronted Parrot	VU	G2	31	31
29	*Bolborhynchus lineola*	Barred Parakeet		G4	422	71
30	*Forpus cyanopygius*	Blue-Rumped Parrotlet		G3/G4	144	144
31	*Pionus senilis*	White-Crowned Parrot		G5	654	313
32	*Amazona xantholora*	Yellow-Lored Parrot		G3	207	195
33	*Amazona viridigenalis*	Red-Crowned Parrot	EN	G2	154	154
34	*Amazona finschi*	Lilac-Crowned Parrot	NT	G3	253	253
35	*Amazona autumnalis*	Red-Lored Parrot		G4	1174	295
36	*Amazona oratrix*	Yellow-Headed Parrot	EN	G?	373	356
37	*Amazona auropalliata*	Yellow-Naped Parrot		G3	154	24
38	*Cypseloides storeri*	White-Fronted Swift	DD	G3	83	83
39	*Panyptila sanctihieronymi*	Greater Swallow-Tailed Swift		G4	484	384
40	*Doricha eliza*	Mexican Sheartail		G2	23	23
41	*Campylopterus excellens*	Long-Tailed Sabrewing	NT	G2/G3	39	39
42	*Campylopterus rufus*	Rufous Sabrewing		G3	34	17
43	*Campylopterus hemileucurus*	Violet Sabrewing		G4	369	152
44	*Abeillia abeillei*	Emerald-Chinned Hummingbird		G3	222	64
45	*Lophornis brachylopha*	Short-Crested Coquette	EN	G1	9	9
46	*Cynanthus sordidus*	Dusky Hummingbird		G3	129	129
47	*Thalurania ridgwayi*	Mexican Woodnymph	VU	G2	33	33
48	*Hylocharis xantusii*	Xantus' Hummingbird		G2	69	69
49	*Hylocharis eliciae*	Blue-Throated Goldentail		G3	508	87
50	*Amazilia cyanocephala*	Azure-Crowned Hermit		G3	364	175
51	*Amazilia cyanura*	Blue-Tailed Hummingbird		G3/G4	114	8
52	*Eupherusa poliocerca*	White-Tailed Hummingbird	EN	G2	30	30
53	*Eupherusa cyanophrys*	Blue-Capped Hummingbird	EN	G2	6	6
54	*Lampornis viridipallens*	Green-Throated Mountain-Gem		G3	131	42
55	*Lamprolaima rhami*	Garnet-Throated Hummingbird		G3	179	81
56	*Otus seductus*	Balsas Screech-Owl		G2	107	107
57	*Otus barbarus*	Bearded Screech-Owl	NT	G2/G3	61	21
58	*Glaucidium griseiceps*	Central American Pygmy-Owl			610	180
59	*Glaucidium sanchezi*	Tamaulipas Pygmy-Owl			13	13
60	*Glaucidium palmarum*	Colima Pygmy-Owl			258	258
61	*Strix occidentalis*	Spotted Owl	NT	G3	446	446
62	*Strix fulvescens*	Fulvous Owl		G3	148	23

63	*Asio stygius*	Stygian Owl		G4	3914	403
64	*Aegolius ridgwayi*	Unspotted Saw-Whet Owl	NT	G3	92	24
65	*Nyctiphrynus mcleodii*	Eared Poorwill	NT	G3	233	233
66	*Nyctiphrynus yucatanicus*	Yucatan Poorwill		G4	220	179
67	*Caprimulgus salvini*	Tawny-Collared Nightjar		G3/G4	184	184
68	*Caprimulgus maculicaudus*	Spot-Tailed Nightjar		G4	5093	118
69	*Claravis mondetoura*	Maroon-Chested Ground-Dove		G3	435	91
70	*Geotrygon lawrencii*	Purplish-Backed Quail-Dove		G4	75	7
71	*Geotrygon albifacies*	White-Faced Quail-Dove		G4	296	131
72	*Geotrygon carrikeri*	Veracruz Quail-Dove	EN		8	8
73	*Buteogallus subtilis*	Mangrove Black-Hawk		G3	259	17
74	*Harpyhaliaetus solitarius*	Solitary Eagle	NT	G3	1138	444
75	*Harpia harpyja*	Harpy Eagle	NT	G3	9090	124
76	*Spizastur melanoleucus*	Black-And-White Hawk-Eagle	NT	G3/G4	10845	357
77	*Daptrius americanus*	Red-Throated Caracara		G4	13225	32
78	*Falco deiroleucus*	Orange-Breasted Falcon	NT	G3	6657	132
79	*Falco peregrinus*	Peregrine Falcon		G4	10019	771
80	*Laniocera rufescens*	Speckled Mourner		G4	632	79
81	*Deltarhynchus flammulatus*	Flammulated Flycatcher		G3	145	145
82	*Xenotriccus callizonus*	Belted Flycatcher	NT	G2	85	39
83	*Xenotriccus mexicanus*	Pileated Flycatcher	NT	G3	128	128
84	*Cotinga amabilis*	Lovely Cotinga		G3	450	126
85	*Manacus candei*	White-Collared Manakin		G3	441	145
86	*Synallaxis erythrothorax*	Rufous-Breasted Spinetail		G3	551	386
87	*Anabacerthia variegaticeps*	Spectacled Foliage-Gleaner		G3	394	89
88	*Sclerurus guatemalensis*	Scaly-Throated Leaftosser		G4	671	93
89	*Dendrocincla anabatina*	Tawny-Winged Woodcreeper		G3	514	270
90	*Lepidocolaptes leucogaster*	White-Striped Woodcreeper		G3/G4	368	368
91	*Grallaria guatimalensis*	Scaled Antpitta		G4	1386	318
92	*Vireo atricapillus*	Black-Capped Vireo	EN	G2/G3	417	417
93	*Vireo pallens*	Mangrove Vireo		G3/G4	441	300
94	*Vireo bairdi*	Cozumel Vireo		G2/G3	3	3
95	*Vireo nelsoni*	Dwarf Vireo	NT	G2/G3	239	239
96	*Vireo hypochryseus*	Golden Vireo		G3	458	458
97	*Vireo magister*	Yucatan Vireo		G3/G4	41	24
98	*Vireo brevipennis*	Slaty Vireo	NT	G2/G3	221	221
99	*Vireolaimus melitophrys*	Chestnut-Sided Shrike-Vireo	NT	G3	201	187
100	*Cyanolyca cucullata*	Azure-Hooded Jay		G3	189	78
101	*Cyanolyca pumilo*	Black-Throated Jay		G3/G4	155	33
102	*Cyanolyca nana*	Dwarf Jay	EN	G2	21	21
103	*Cyanolyca mirabilis*	White-Throated Jay	EN	G2	45	45
104	*Cyanocorax sanblasianus*	San Blas Jay		G3	89	89
105	*Cyanocorax beecheii*	Purplish-Backed Jay		G2	110	110
106	*Cyanocorax dickeyi*	Tufted Jay	NT	G3	38	38
107	*Calocitta colliei*	Black-Throated Magpie-Jay		G3/G4	229	229
108	*Corvus sinaloae*	Sinaloa Crow		G3	95	95
109	*Myadestes unicolor*	Slate-Colored Solitaire		G3/G4	164	72
110	*Turdus graysoni*	Grayson's Robin			13	13
111	*Melanoptila glabrirostris*	Black Catbird	NT	G3	254	216
112	*Toxostoma guttatum*	Cozumel Thrasher	NT	G2/G3	3	3
113	*Toxostoma cinereum*	Gray Thrasher		G3	200	200

114	*Toxostoma ocellatum*	Ocellated Thrasher		G3/G4	130	130
115	*Toxostoma lecontei*	Le Conte's Thrasher		G3	109	109
116	*Campylorhynchus jocosus*	Boucard's Wren		G3	88	88
117	*Campylorhynchus chiapensis*	Giant Wren		G3	15	15
118	*Campylorhynchus megalopterus*	Gray-Barred Wren		G3	115	115
119	*Hylorchilus sumichrasti*	Slender-Billed Wren	VU	G2	9	9
120	*Hylorchilus navai*	Nava's Wren	VU		7	7
121	*Cistothorus platensis*	Sedge Wren		G5	8580	790
122	*Troglodytes beani*	Cozumel Wren			4	4
123	*Uropsila leucogastra*	White-Bellied Wren		G3/G4	645	577
124	*Microcerculus philomela*	Nightingale Wren		G4	295	45
125	*Progne sinaloae*	Sinaloa Martin	DD	G3/G4	298	298
126	*Notiochelidon pileata*	Black-Capped Swallow		G3/G4	83	22
127	*Carduelis atriceps*	Black-Capped Siskin	NT	G3	64	27
128	*Coccothraustes abeillei*	Hooded Grosbeak		G3	257	207
129	*Xenospiza baileyi*	Sierra Madre Sparrow	EN	G1	97	97
130	*Spizella wortheni*	Worthen's Sparrow	EN	G3/G4Q	207	207
131	*Aimophila mysticalis*	Bridled Sparrow		G3	66	66
132	*Aimophila sumichrasti*	Cinnamon-Tailed Sparrow	NT	G3	11	11
133	*Aimophila notosticta*	Oaxaca Sparrow	NT	G2/G3	40	40
134	*Oriturus superciliosus*	Striped Sparrow		G3/G4	457	457
135	*Haplospiza rustica*	Slaty Finch		G3G4	795	62
136	*Amaurospiza concolor*	Blue Seedeater		G3	253	23
137	*Amaurospiza relicta*	Slate-Blue Seedeater	NT		135	135
138	*Pipilo ocai*	Collared Towhee		G3	153	153
139	*Melozone biarcuatum*	Prevost's Ground-Sparrow		G3/G4	136	25
140	*Melozone leucotis*	White-Eared Ground-Sparrow		G3/G4	48	12
141	*Atlapetes albinucha*	White-Naped Brush-Finch		G3/G4	72	72
142	*Atlapetes virenticeps*	Green-Striped Brush-Finch		G3	117	117
143	*Vermivora crissalis*	Colima Warbler	NT	G3/G4	296	296
144	*Dendroica chrysoparia*	Golden-Cheeked Warbler	VU	G2	137	26
145	*Geothlypis beldingi*	Belding's Yellowthroat	VU	G3	92	92
146	*Geothlypis flavovelata*	Altamira Yellowthroat	NT	G3	98	98
147	*Geothlypis speciosa*	Black-Polled Yellowthroat	VU	G3	38	38
148	*Geothlypis nelsoni*	Hooded Yellowthroat		G3/G4	165	165
149	*Ergaticus ruber*	Red Warbler		G3/G4	283	283
150	*Ergaticus versicolor*	Pink-Headed Warbler	NT	G3/G4	83	30
151	*Euthlypis lachrymosa*	Fan-Tailed Warbler		G3/G4	482	365
152	*Basileuterus belli*	Golden-Browed Warbler		G3	372	292
153	*Granatellus venustus*	Red-Breasted Chat		G3/G4	278	278
154	*Lanio aurantius*	Black-Throated Shrike-Tanager		G3/G4	386	260
155	*Piranga roseogularis*	Rose-Throated Tanager		G3	178	146
156	*Piranga erythrocephala*	Red-Headed Tanager		G3	256	256
157	*Chlorophonia occipitalis*	Blue-Crowned Chlorophonia		G3	207	71
158	*Tangara cabanisi*	Azure-Rumped Tanager	EN	G2	19	13
159	*Rhodothraupis celaeno*	Crimson-Collared Grosbeak		G3/G4	178	178
160	*Saltator atriceps*	Black-Headed Saltator		G4	1082	522
161	*Passerina rositae*	Rose-Bellied Bunting	NT	G3	6	6
162	*Passerina leclancherii*	Orange-Breasted Bunting		G3/G4	205	205
163	*Icterus auratus*	Orange Oriole		G3	178	178
164	*Icterus maculialatus*	Bar-Winged Oriole		G3	106	37

The Nature Conservancy Bird Species of Conservation Concern



OFFICIAL MEXICAN NORM FOR SPECIES AT RISK (BIRDS)

SECRETARIA DE MEDIO AMBIENTE RECURSOS NATURALES Y PESCA (SEDESOL 1994)

The Official Mexican Norm NOM-059-ECOL-1994 lists the following bird species and subspecies that are considered at risk. These are classified as (P) Endangered, (A) Threatened. (R) Rare and (Pr) Subject to Special Protection. Within these categories, endemic species are marked with an asterisk.

SCIENTIFIC NAME	COMMON NAME	CAT-		
Abeillia abeillei		*A*	*Buteo nitidus*	*Pr*
Accipiter bicolor		*R*	*Buteogallus anthracinus*	*A*
Accipiter cooperi		*A*	*Buteogallus subtilis*	*A*
Accipiter gentilis		*A*	*Buteogallus urubitinga*	*A*
Accipiter striatus		*A*	*Cairina moschata*	*P*
Aegolius ridgwayi		*R*	*Calothorax pulcher*	*A**
Agamia agami		*R*	*Campephilus guatemalensis*	*R*
Aimophila mystacalis		*A**	*Campephilus imperialis*	*P**
Aimophila notosticta		*A**	*Campylopterus curvipennis*	*R*
Aimophila sumichrasti		*A**	*Campylopterus excellens*	*A**
Amaurolimnas concolor		*R*	*Campylopterus rufus*	*A*
Amaurospiza concolor		*R*	*Campylorhynchus chiapensis*	*R**
Amazilia candida		*R*	*Campylorhynchus yucatanicus*	*R*
Amazilia tzacatl		*R*	*Carduelis atriceps*	*A*
Amazilia viridifrons		*R**	*Carduelis tristis*	*A*
Amazona auropalliata		*A*	*Cathartes burrovianus*	*A*
Amazona farinosa		*A*	*Catharus mexicanus*	*R*
Amazona finschi		*A**	*Celeus castaneus*	*A*
Amazona ochrocephala tresmariae		*Pr**	*Cercomacra tyrannina*	*R*
Amazona oratrix		*P*	*Charadrius collaris*	*R*
Amazona viridigenalis		*P**	*Charadrius melodus*	*A*
Amazona xantholora		*A*	*Charadrius montanus*	*A*
Anas acuta		*Pr*	*Chiroxiphia linearis*	*A*
Anas americana		*Pr*	*Chondrohiera uncinatus*	*R*
Anas discors		*Pr*	*Ciccaba nigrolineata*	*A*
Anas fulvigula		*Pr*	*Ciccaba virgata*	*A*
Anser albifrons elgasi		*P*	*Cinclus mexicanus*	*R*
Aquilachrysaetos		*P*	*Circus cyaneus*	*A*
Ara macao		*P*	*Claravis mondetoura*	*R*
Ara militaris		*P*	*Claravis pretiosa*	*R*
Aramides axillaris		*R*	*Colinus virginianus ridgwayi*	*P**
Aramides cajanea		*R*	*Columba leucocephala*	*A*
Aramus guarauna		*A*	*Columba nigrirostris*	*R*
Aratinga brevipes		*A**	*Columba speciosa*	*R*
Aratinga holochlora		*A**	*Cotinga amabilis*	*A*
Ardea herodias occidentalis		*R*	*Coturnicops noveboracensis*	*P*
Ardea herodias santilucae		*R*	*Crax rubra*	*A*
Arremon aurantiirostris		*R*	*Crax rubra griscomi*	*P**
Asio clamator		*A*	*Crotophaga major*	*R*
Asio flammeus		*A*	*Crypturellus cinnamomeus*	*R*
Asio stygius		*A*	*Cyanerpes lucidus*	*R*
Aspatha gularis		*A*	*Cyanocompsa cyanoides*	*R*
Athene cunicularia		*A*	*Cyanocorax beecheii*	*A**
Atthis ellioti		*A*	*Cyanocorax dickeyi*	*A**
Atthis heloisa		*A**	*Cyanolyca cucullata*	*A**
Attila spadiceus		*R*	*Cyanolyca mirabilis*	*A**
Aulacorhynchus prasinus		*Pr*	*Cyanolyca nana*	*P**
Automolus ochrolaemus		*R*	*Cyanolyca pumilo*	*A*
Aythya affinis		*Pr*	*Cygnus columbianus*	*P*
Basileuterus culicivorus		*R*	*Cyrtonyx ocellatus*	*R*
Botarus pinnatus		*R*	*Dactylortyx thoracicus*	*A*
Branta canadensis leucopareia		*Pr*	*Daptrius americanus*	*P*
Bubo virginianus		*A*	*Dendrocolaptes certhia*	*R*
Burhinus bistriatus		*R*	*Dendrocolaptes picumnus*	*R*
Busarellus nigricollis		*R*	*Dendrocyncla anabatina*	*A*
Buteo albicaudatus		*Pr*	*Dendrocyncla homochroa*	*R*
Buteo jamaicensis		*Pr*	*Dendroica chrysoparia*	*A*
Buteo magnirostris		*Pr*	*Dendroica kirtlandii*	*P*

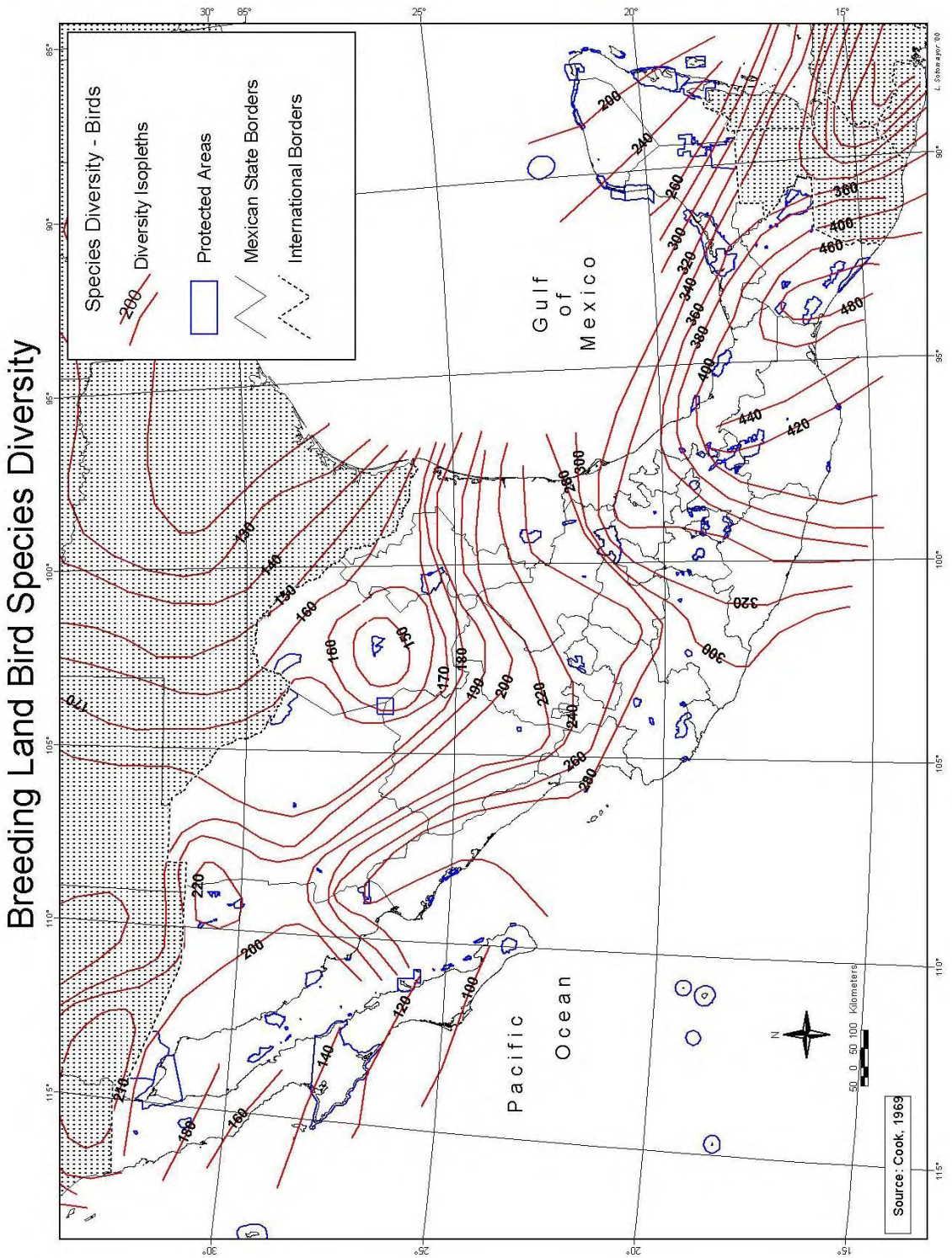
Dendroica magnolia	*R*	*Laterallus jamaicensis*	*R*
Dendroica virens	*R*	*Laterallus ruber*	*R*
Dendrortyx barbatus	*P**	*Leptodon cayanensis*	*R*
Dendrortyx leucophrys	*P*	*Leptopogon amaurocephalus*	*R*
Dendrortyx macroura	*Pr**	*Leptotila cassinii*	*R*
Diomedea immutabilis	*A*	*Leptotila rufaxilla plumbeiceps*	*R*
Doricha eliza	*R**	*Leucopternis albicollis*	*R*
Doricha enicura	*A*	*Limnothlypis swainsonii*	*P*
Dromococcyx phasianellus	*R*	*Lipaugus unirufus*	*R*
Dryocopus lineatus	*R*	*Lophornis brachylopha*	*A**
Dysithamnus mentalis	*R*	*Lophornis helenae*	*R*
Egretta rufescens	*A*	*Lophostrix cristata*	*A*
Elanoides forficatus	*R*	*Malacoptila panamensis*	*R*
Electron carinatum	*A*	*Manacus candei*	*R*
Eucometis penicillata	*R*	*Melanerpes pucherani*	*R*
Eupherusa cyanophrys	*A**	*Melanotis caerulescens*	*A**
Eupherusa poliocerca	*A**	*Micrastur ruficollis*	*R*
Euphonia gouldi	*R*	*Micrastur semitorquatus*	*R*
Euptilotis neoxenus	*A**	*Micrathene whitneyi graysoni*	*P*
Eurypyga helias	*R*	*Microrhopias quixensis*	*R*
Falco columbarius	*A*	*Mimodes graysoni*	*P**
Falco deiroleucus	*A*	*Mionectes oleagineus*	*R*
Falco femoralis	*A*	*Momotus momota*	*R*
Falco femoralis septentrionalis	*P**	*Myadestes occidentalis*	*Pr*
Falco peregrinus	*A*	*Myadestes townsendi*	*Pr*
Falco rufigularis	*A*	*Mycteria americana*	*A*
Falco mexicanus	*A*	*Myiobius sulphureipygius*	*R*
Florisuga mellivora	*R*	*Myioborus miniatus*	*R*
Formicarius analis	*R*	*Myioborus pictus*	*R*
Galbula ruficauda	*R*	*Myrmotherula schisticolor*	*R*
Geothlypis beldingi	*P**	*Numenius borealis*	*P*
Geothlypis flavovelata	*A**	*Nyctibius grandis*	*A*
Geothlypis speciosa	*P**	*Nyctiphrynus mcleodii*	*R**
Geotrygon albifacies	*R*	*Oceanodroma homochroa*	*A*
Geotrygon lawrencii	*A*	*Oceanodroma macrodactyla*	*P*
Geranospiza caerulescens	*A*	*Oceanodroma melania*	*A*
Glaucidium brasilianum	*A*	*Oceanodroma microsoma*	*A*
Glaucidium gnoma	*R*	*Odontophorus guttatus*	*R*
Glaucidium minutissimum	*R*	*Oncostoma cinereigulare*	*R*
Glyphorynchus spirurus	*R*	*Onychorhynchus coronatus*	*R*
Grus americana	*P*	*Onychorhynchus coronatus mexicanus*	*A*
Gymnogyps californianus	*P*	*Onychorhynchus occidentalis*	*P*
Haliaetus leucocephalus	*P*	*Oreophasis derbianus*	*P*
Haplospiza rusticus	*A*	*Ornithion semiflavum*	*R*
Harpagus bidentatus	*R*	*Otus asio*	*A*
Harpia harpyja	*P*	*Otus barbarus*	*R*
Harpyhaliaetus solitarius	*P**	*Otus guatemalae*	*R*
Heliomaster longirostris	*R*	*Otus seductus*	*A**
Heliothrix barroti	*R*	*Oxyura dominica*	*A*
Helmitheros vermivorus	*R*	*Pachyramphus cinnamomeus*	*R*
Henicorhina leucophrys	*R*	*Panyptila cayennensis*	*R*
Henicorhina leucosticta	*R*	*Panyptila sanctihieronymi*	*R*
Hylocharis xantusii	*A**	*Parabuteo unicinctus*	*A*
Hylomanes momotula	*R*	*Passerculus sandwichensis beldingi*	*A**
Hylophilus decurtatus	*R*	*Passerculus sandwichensis rostratus*	*R*
Hylophilus ochraceiceps	*R*	*Passerina rositae*	*P**
Hylorchilus sumichrasti	*A**	*Penelope purpurascens*	*Pr*
Icterus auratus	*A**	*Penelopina nigra*	*P*
Icterus cucullatus	*A*	*Phaethon aethereus*	*A*
Icterus graduacauda	*A*	*Phaetornis longuemareus*	*R*
Icterus wagleri	*A*	*Pharomachrus mocinno*	*P*
Ictinia mississipiensis	*A*	*Phoenicopterus ruber*	*A*
Ictinia plumbea	*R*	*Picumnus punticollis*	*A*
Ixobrychus exilis	*A*	*Pionopsitta haematotis*	*R*
Jabiru mycteria	*P*	*Pionus senilis*	*A*
Junco hyemalis insularis	*P**	*Pipilo erythrophthalmus socorrensis*	*P**
Lampornis viridipallens	*R*	*Platyrinchus cancrominus*	*R*
Lanio aurantius	*R*	*Platyrinchus mystaceus*	*R*
Laniocera rufescens	*R*	*Polioptila plumbea*	*R*
Larus heermanni	*A*	*Porzana flaviventer*	*R*

		Strix fulvescens	*R*
Progne sinaloae	*R**	*Strix occidentalis*	*A*
Psarocolius montezuma	*R*	*Strix varia*	*A*
Psarocolius wagleri	*A*	*Sula nebouxii*	*A*
Pterodroma cookii	*P*	*Sula sula*	*A*
Pteroglossus torquatus	*R*	*Synthliboramphus craveri*	*A*
Ptychoramphus aleuticus	*A*	*Synthliboramphus hypoleucus*	*A*
Ptychoramphus aleuticus australis	*R*	*Tangara cabanisi*	*A*
Puffinus auricularis	*A**	*Tangara larvata*	*R*
Puffinus creatopus	*P*	*Taraba major*	*R*
Puffinus opisthomelas	*A*	*Terenotriccus erythrurus*	*R*
Puffinus pacificus	*A*	*Thalurania ridgwayi*	*A**
Pulsatrix perspicillata	*P*	*Thamnistes anabatinus*	*R*
Quiscalus palustris	*P**	*Thryomanes sissonii*	*P**
Rallus elegans	*R*	*Tigrisoma lineatum*	*R*
Rallus elegans tenuirostris	*P*	*Todirostrum cinereum*	*R*
Rallus longirostris grossi	*R**	*Todirostrum sylvia*	*R*
Rallus longirostris levipes	*P**	*Tolmomyias sulphurescens*	*R*
Rallus longirostris pallidus	*R*	*Toxostoma guttatum*	*A**
Rallus longirostris yumanensis	*P*	*Troglodytes tanneri*	*P**
Ramphastos sulfuratus	*A*	*Trogon collaris*	*R*
Ramphocaenus rufiventris	*R*	*Trogon massena*	*R*
Regulus calendula obscurus	*A**	*Trogon violaceus*	*R*
Rhynchopsitta pachirhyncha	*P*	*Turdus infuscatus*	*R*
Rhynchopsitta terresi	*P**	*Turdus plebejus*	*R*
Rhytipterna holerythra	*R*	*Turdus rufitorques*	*R*
Ridgwayia pinicola	*R**	*Uropsila leucogastra*	*R*
Rosthramus sociabilis	*A*	*Veniliornis fumigatus*	*R*
Sarcoramphus papa	*P*	*Vermivora luciae*	*A*
Sclerurus guatemalensis	*R*	*Vireo atricapillus*	*A*
Sclerurus mexicanus	*R*	*Vireo bairdi*	*Pr**
Seiurus aurocapillus	*R*	*Vireo belli pusilus*	*P*
Seiurus motacilla	*R*	*Vireo brevipennis*	*A**
Seiurus noveboracensis	*R*	*Vireo nelsoni*	*A**
Sittasomus griseicapillus	*R*	*Vireolanius pulchellus*	*R*
Spizaetus ornatus	*P**	*Wilsonia citrina*	*A*
Spizaetus tyrannus	*A*	*Xenops minutus*	*A*
Spizastur melanoleucus	*P*	*Xenospiza baileyi*	*P**
Spizella wortheni	*A*	*Xenotriccus callizonus*	*A*
Sporophila schistacea	*R*	*Xenotriccus mexicanus*	*A*
Sterna antillarum	*P*	*Xiphorhynchus erythropygius*	*R*
Sterna elegans	*A*	*Zenaida graysoni*	*P**

OTHER PERTINENT INFORMATION ON BIRDS

The Commission for Environmental Cooperation's list of "Species of Common Conservation Concern in North America" (CEC in press), includes the following bird species: Ferruginous Hawk (*Buteo regalis*), Peregrine Falcon (*Falco peregrinus*), Loggerhead Shrike (*Lanius ludovicianus*), Piping Plover (*Charadrius melodus*), Mountain Plover (*Charadrius montanus*), Burrowing Owl (*Athene cunicularia*), Northern Spotted Owl (*Strix occidentalis caurina*), Mexican Spotted Owl (*Strix occidentalis lucida*), Golden-cheeked Warbler (*Dendroica chrysoparia*), Whooping Crane (*Grus americana*) and California Condor (*Gymnogyps californianus*).

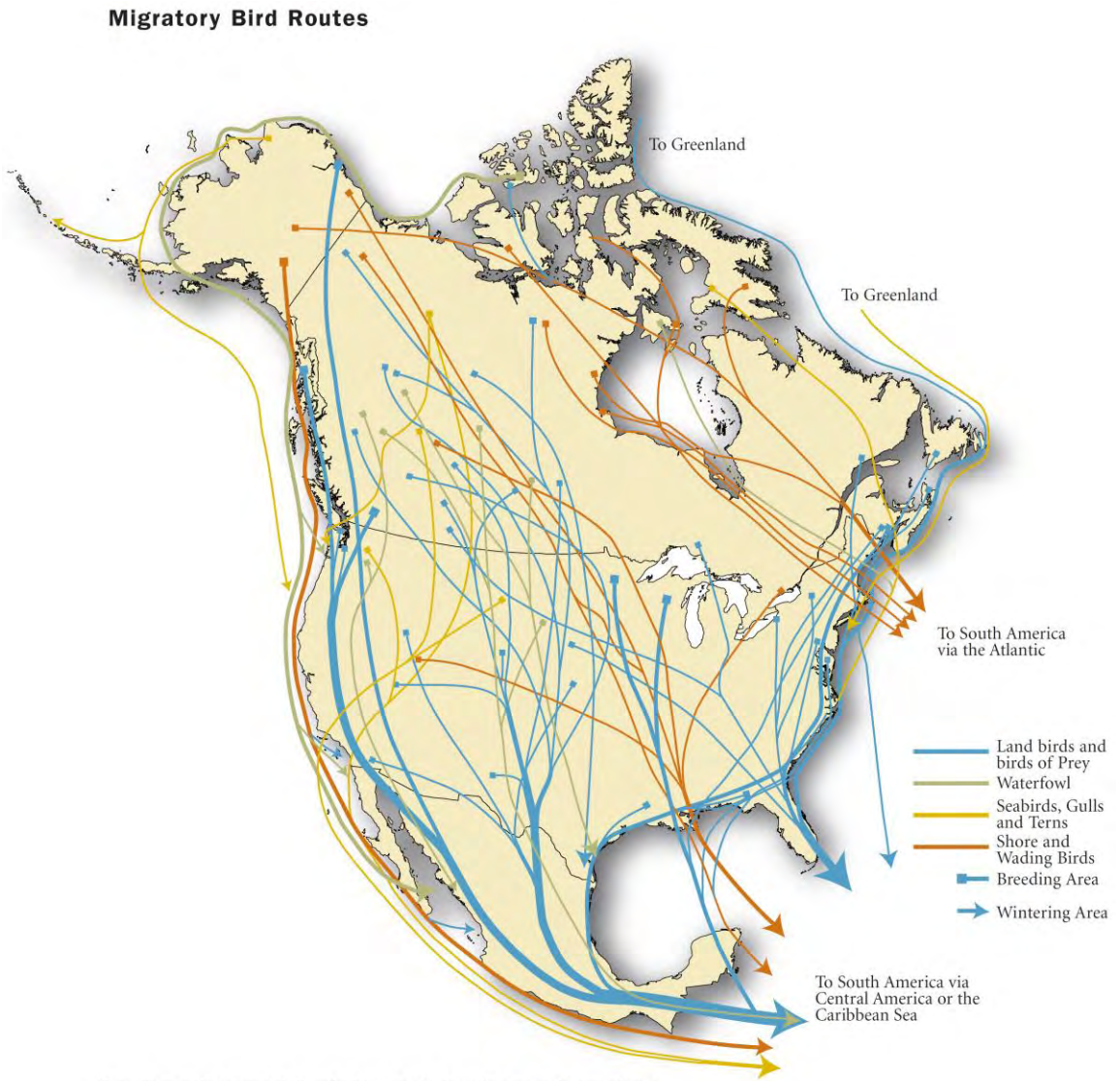
Geographic variation in species richness of North American breeding land birds was compiled by Cook (1969), dividing the continent into grid squares, tallying the numbers of species whose geographic range overlapped each square and then interpolating and smoothing the data to produce isopleths depicting diversity.


Breeding Land Bird Species Diversity
Species Diversity - Birds
Diversity Isopleths
Protected Areas
Mexican State Borders
International Borders
Gulf of Mexico
Pacific Ocean
Source: Cook, 1969
50 0 50 100 Kilometers
N

MIGRATORY BIRD ROUTES IN MEXICO

Mexico's geographical position, makes it a critical territory for North American migratory species. Three of the main waterfowl flyways, the Pacific, Central and Mississippi migration routes, are yearly utilized by many species, to overwinter in, or as passage through Mexico.

The movement of birds in Middle America is probably the poorest known aspect of biogeography in North American vertebrates. Neotropical migrants are composed of intratropical, nearctic-neotropical, altitudinal and neaustral-neotropic migrants. Individuals of the first three categories are common at stopover sites in southern Mexico. The Isthmus of Tehuantepec is the northernmost narrowing of North American continental landmass, causing a funneling and concentration of neartic-neotropic landbirds migrants. (Winker 1995)



Redrawn by the Commission on Environmental Cooperation, from National Geographic Society, Cartographic Division 1983.

3.2.2 MAMMALS

ASSESING CONSERVATION PRIORITIES IN MEGADIVERSE MEXICO: MAMMALIAN DIVERSITY, ENDEMICITY, AND ENDANGERMENT

Instituto de Ecología UNAM (Ceballos *et al.* 1998)

Information about mammalian species richness, composition and distribution was overlaid in a 2° x 2° grid, characterizing them by: geographic range size; body mass; and, conservation status, in order to select priority areas for conservation. Very low correspondence was found among areas of high diversity, high endemicity, or high number of endangered species. The distribution of many species with restricted geographic ranges, including endemic and non endemic species, did not coincide with areas of high species richness, endemicity or endangerment.

The study suggests that a basic conservation strategy should try to maximize the preservation of species considered endangered or having ecological characteristics correlated with extinction (208 species out of a total of 462 terrestrial species). (Numbers from Ceballos 1999)

- A higher priority should be assigned to endangered species (96 spp.), followed by non-endangered taxa with restricted distribution, i.e. less than 50,000 km² (112 spp.).

- Within endangered taxa geographically restricted species (61 spp.) should have priority over species of widespread distribution (35 spp.), and in this case (Ceballos com. pers.) endemic taxa (49 spp.) should be of higher priority than non-endemic ones (47 spp.).

- Non-endangered species with restricted distributions should also be given priority for conservation, because of the extinction threat associated with small geographic ranges.

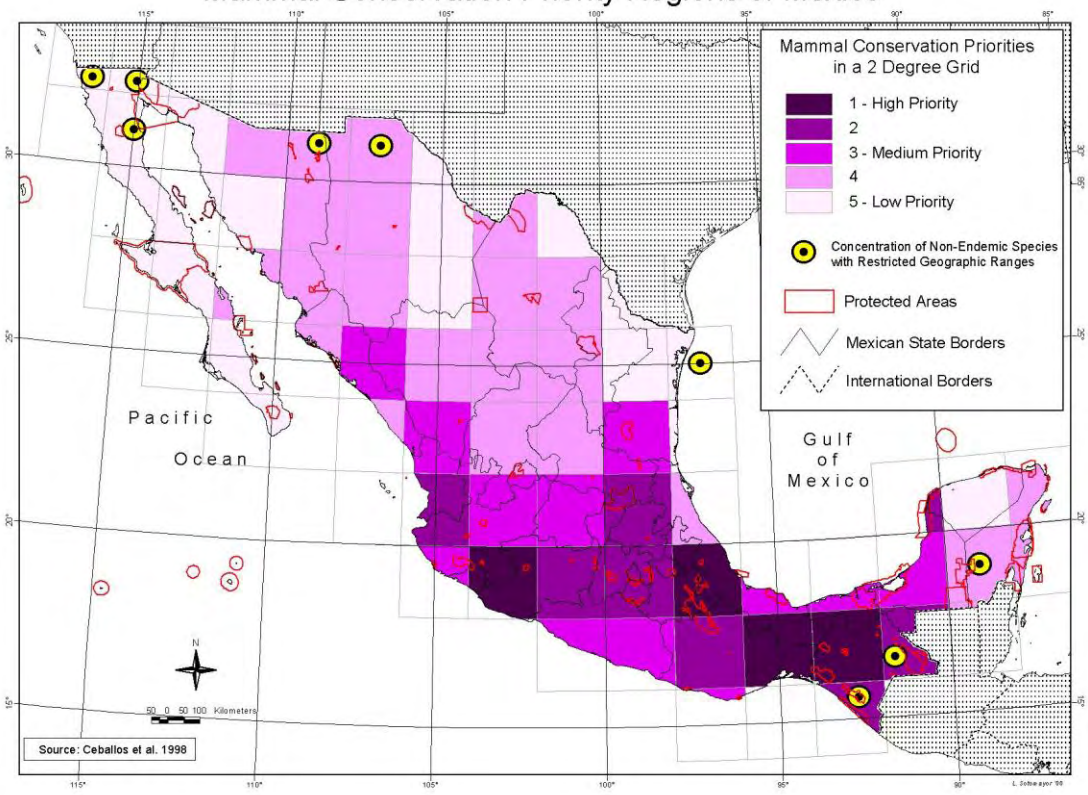
Conservation Priority for Terrestrial Mammals

Endangered + Endemic + Restricted Distribution -	44 spp.
Endangered + Endemic + Non-Restricted Distribution -	5 spp.
Endangered + Non-Endemic + Restricted Distribution -	17 spp.
Endangered + Non-Endemic + Non-Restricted Distribution -	30 spp.
Non-Endangered + Endemic + Restricted Distribution -	51 spp.
Non-Endangered + Non-Endemic + Restricted Distribution -	61 spp.
Non-Endangered + Non-Endemic + Non-Restricted Distribution -	254 spp.

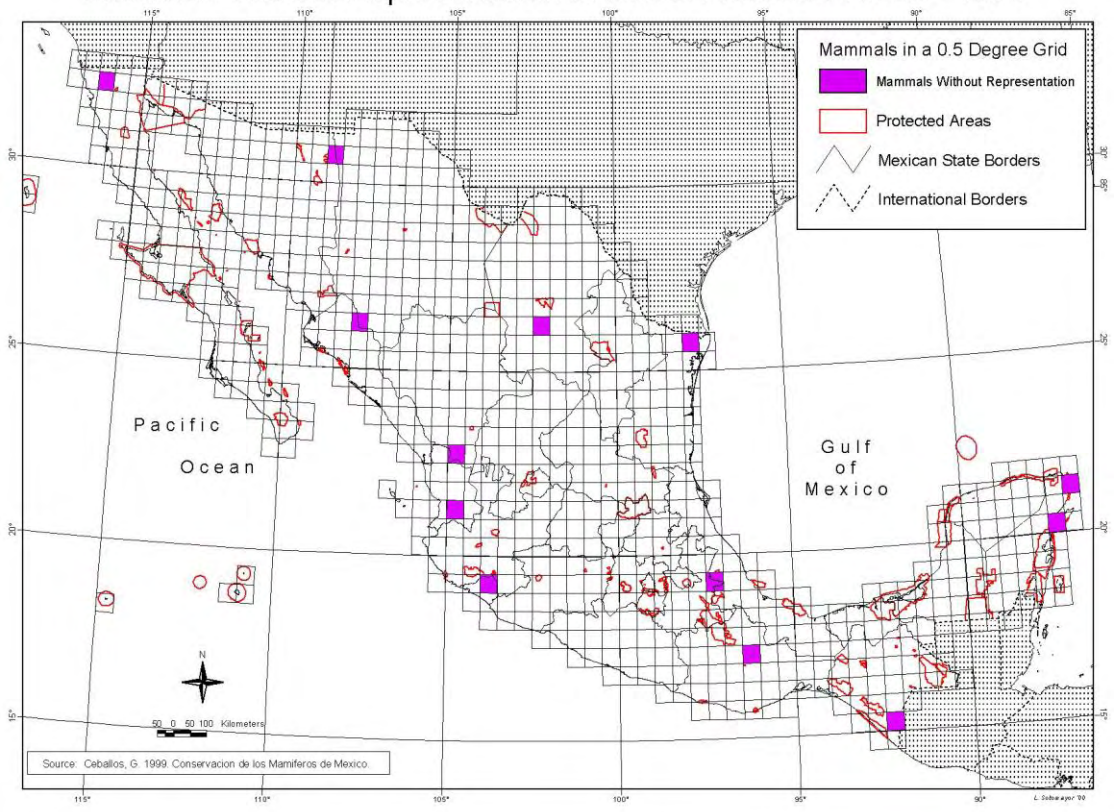
A comprehensive conservation strategy should be based on a network of reserves that include areas with high concentration of endangered species, high endemicity, high concentration of restricted species and high species (alpha) diversity. Additionally, the network should include areas of high beta diversity (complementarity of the areas as a guiding principle).

Protected are gaps identified by this study include: moist forests - Los Chimalapas, Oax.; dry forests - States of Sinaloa, Nayarit, Michoacán, Guerrero and Oaxaca; restricted neartic species - Janos - Casas Grandes, Chih. and the State of Tamaulipas.

Mammal Conservation Priority Regions of Mexico



Mammals Without Representation in Select Protected Areas - 1999



CONSERVATION OF MAMMALS IN MEXICO

Instituto de Ecología UNAM (Ceballos *et al.* 1999)

This article describes the results of a study, that identifies conservation areas for Mexico's 462 terrestrial mammals, using a complementarily approach that aims at achieving representation of the greater number of mammal species, in the least number of areas. The study identifies current species within 30 existing protected areas (27 Federal, 2 State and 1 no hunting area), ranks them according to the number of species they include and proposes an optimal group of areas that will include those species not represented.

The number of species contained in these 30 protected areas represents 75% of Mexico's species, which seems to represent a considerable coverage. Nevertheless, these only include 50% of the endemics, 52% of those with restricted distribution and 62% of endangered species, which means that those groups that are most prone to threats are not covered adequately, especially when most species are only represented by one or two populations. Out of these 30 areas, at least one population is protected within 24 of these. The selection criteria algorithm chooses first the most diverse area, second the one with the most species not represented in the first one and so on.

The 24 sites in the order by which they were chosen are: La Lacandona, Janos-Nuevo Casas Grandes, Manantlán, Islas del Golfo, Ajusco, El Triunfo, San Pedro Mártir, Maderas el Carmen, El Cielo, Calakmul, Chamela-Cuixmala, Pinacate, Omiltemi, La Sepultura, Vizcaino, La Michilía, Nevado de Toluca, Izta-Popo, La Laguna, Mapimí, Los Tuxtlas, Sian Ka'an, La Malinche, La Encrucijada. Sites not chosen by the algorithm were: El Ocote, Nevado de Colima, Lagunas de Zempoala, Zoquiapan y Anexas, Desierto de los Leones and El Chico (Ceballos com. pers).

Selection of additional protection sites was then based not only on complementarity, but also to cover those groups that are most prone to threats. This was achieved by utilizing species distribution over a 0.5° x 0.5° grid, emphasizing endemisms and restricted distribution. Results showed that 13 quadrants could cover 80% of species not previously covered.

The 13 quadrants identified are located in: Northern Baja California, Northern border between Chihuahua and Sonora, Central Coahuila, Northeastern Tamaulipas, Southwestern Chihuahua-Northeastern Sinaloa, Southern Durango-Northeastern Nayarit, Southern Nayarit, Northeastern Colima, Northwestern Puebla-Central Veracruz, Central Oaxaca, Southeastern Chiapas, Northern Quintana Roo and Northcentral Quintana Roo. In some of these areas, protected areas not considered by the study already exist and only need to be managed, to formalize their function.

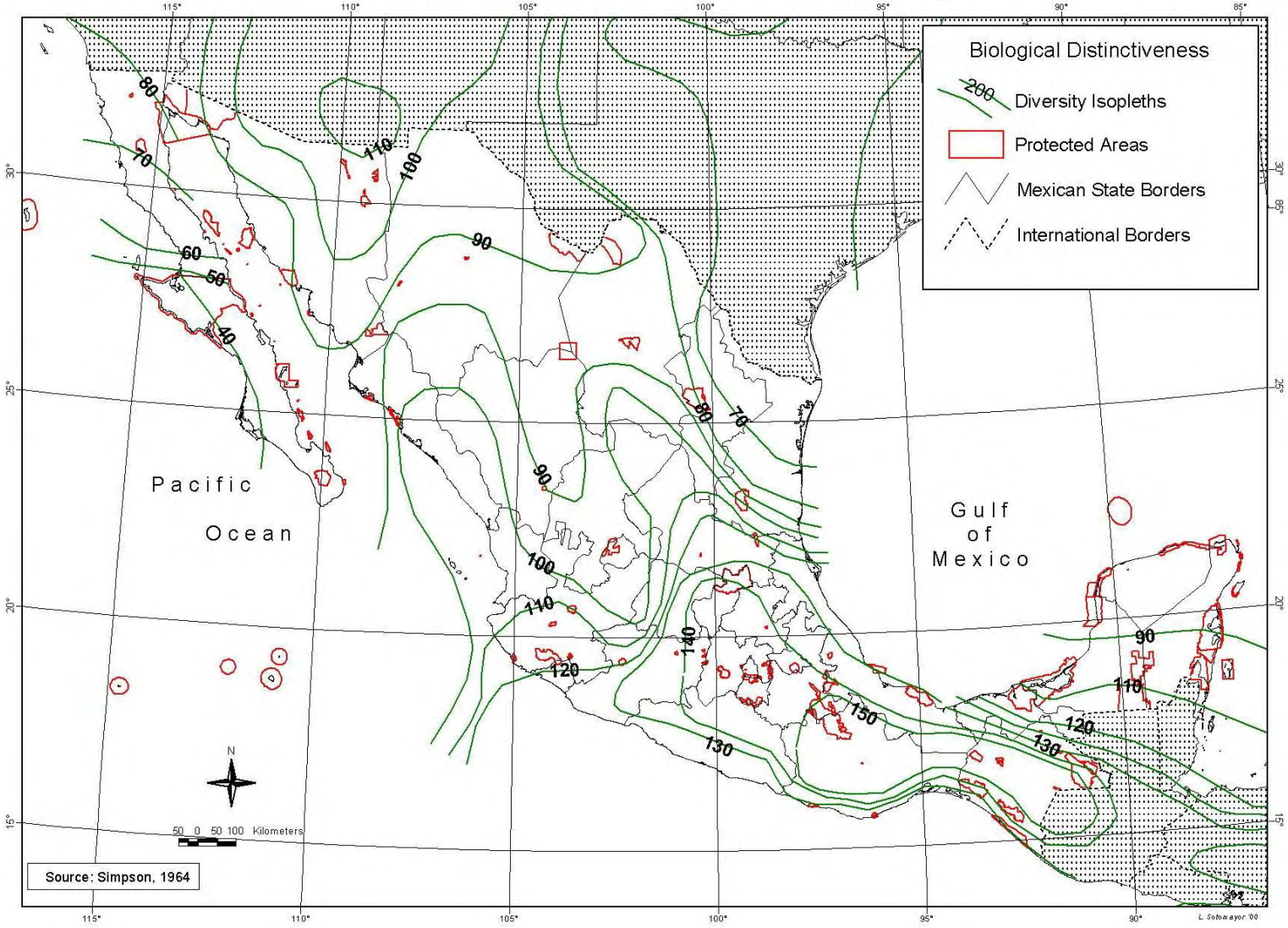
OTHER PERTINENT INFORMATION ON MAMMALS

Geographic variation in species richness of North American terrestrial mammals was compiled by Simpson (1964), dividing the continent into grid squares, tallying the numbers of species whose geographic range overlapped each square and then interpolating and smoothing the data to produce isopleths depicting diversity.

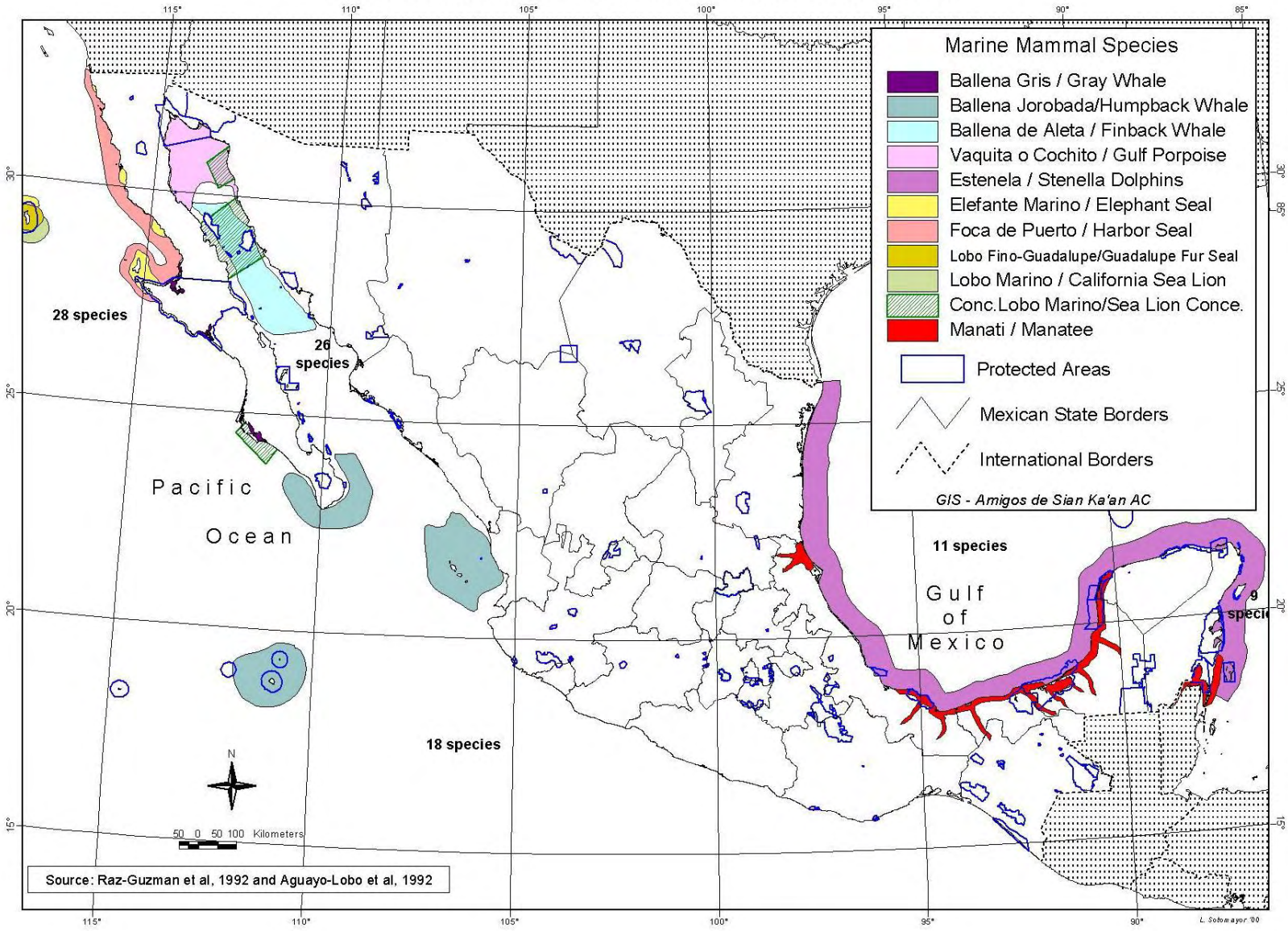
Distribution information on select marine mammals can be found on the Atlas Nacional de México, compiled by the Instituto de Geografía UNAM (Raz-Guzmán and Sánchez, 1992 and Aguayo-Lobo *et al*. 1992).

The Commission for Environmental Cooperation's list of "Species of Common Conservation Concern in North America" (CEC in press), includes the following mammal species: Black-tailed Prairie Dog (*Cynomys ludovicianus*), Sonoran Pronghorn (*Antilocapra Americana sonoriensis*), Lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*), [Greater] Mexican long-nosed bat (*Leptonycteris nivalis*), Black Bear (*Ursus americanus*) and Gray Wolf (*Canis lupus*).

Terrestrial Mammals Species Diversity



Select Marine Mammal Concentrations



OFFICIAL MEXICAN NORM FOR SPECIES AT RISK (MAMMALS)

SECRETARIA DE MEDIO AMBIENTE RECURSOS NATURALES Y PESCA (SEDESOL 1994)

The Official Mexican Norm NOM-059-ECOL-1994 lists the following mammal species and subspecies that are considered at risk. These are classified as (P) Endangered, (A) Threatened (R) Rare and (Pr) Subject to Special Protection. Within these categories, endemic species are marked with an asterisk.

SCIENTIFIC NAME	COMMON NAME	CAT.
Alouatta palliata		*P**
Alouatta pigra		*P*
Ammospermophilus insularis		*A*
Antilocapra americana		*P*
Arctocephalus townsendi	Foca de Guadalupe	*P**
Artibeus watsonii		*R*
Ateles geoffroyi		*P*
Balaenoptera borealis	Ballena boreal	*Pr*
Balaenoptera musculus	Ballena azul	*Pr*
Balaenoptera physalus	Rorcual común	*Pr*
Bassariscus astutus insulicola		*A**
Bassariscus astutus saxicola		*A**
Bassariscus sumichrasti		*R*
Bison bison bison		*Pr*
Cabassous centralis		*P*
Caluromys derbianus		*R*
Caluromys derbianus aztecus		*P*
Caluromys derbianus fervidus		*P*
Canis lupus		*P*
Castor canadensis		*P*
Centronycteris maximiliani		*R*
Chaetodipus anthonyi		*P*
Chaetodipus dalquesti		*R*
Chironectes minimus		*P*
Choeronycteris mexicana		*A*
Chrotopterus auritus		*R*
Coendou mexicanus		*A*
Conepatus semistriatus conepatl		*R**
Cryptotis goldmani alticola		*R**
Cryptotis magna		*R*
Cryptotis mexicana nelsoni		*R*
Cryptotis mexicana obscura		*R**
Cryptotis nigrescens mayensis		*R*
Cryptotis parva soricina		*R**
Cryptotis parva tropicalis		*R*
Cryptotis peregrina		*R**
Cyclopes didactylus		*P*
Cynomys ludovicianus		*A*
Cynomys mexicanus		*P**
Diaemus youngi cypselinus		*R*
Dipodomys gravipes		*P**
Dipodomys insularis		*A**
Dipodomys margaritae		*P**
Dipodomys merriami mitchelli		*A**
Dipodomys phillipsii oaxacae		*A**
Dipodomys phillipsii perotensis		*A**
Dipodomys phillipsii phillipsii		*A**
Dipodomys phillipsii		*R**
Eira barbara		*P*
Enchisthenes hartii		*R*
Enhydra lutris	Nutria marina	*P**
Erethizon dorsatum		*P*
Eschrichtius robustus	Ballena gris	*Pr*
Euderma maculatum		*R*
Eumops nanus		*R*
Felis onca		*P*
Felis pardalis		*P*
Felis wiedii		*P*
Felis yagouaroundi		*A*
Galictis vittata		*A*
Geomys personatus		*A*
Geomys tropicalis		*A**
Glaucomys volans		*A*
Heteromys nelsoni		*R*
Lasionycteris noctivagans		*R*
Leptonycteris nivalis		*A*
Leptonycteris sanborni		*A*
Lepus alleni tiburonensis		*R**
Lepus californicus magdalenae		*R**
Lepus californicus sheldoni		*R**
Lepus flavigularis		*P**
Lepus insularis		*R**
Liomys spectabilis		*R*
Lonchorhina aurita		*R*
Lutra longicaudis		*A*
Macrophyllum macrophyllum		*R*
Megaptera novaeangliae	Ballena jorobada	*Pr*
Megasorex gigas		*A**
Micronycteris brachyotis		*R*
Microtus californicus		*P*
Microtus guatemalensis		*A*
Microtus oaxacensis		*A**
Microtus pennsylvanicus		*P*
Microtus quasiater		*R**
Microtus umbrosus		*R**
Mimon crenulatum keenani		*R*
Mirounga angustirostris	Elefante marino	*A*
Molossops greenhalli mexicanus		*R*
Musonycteris harrisoni		*A**
Myotis albescens		*R*
Myotis evotis evotis		*R*
Myotis milleri		*A*
Myotis nigricans carteri		*R**
Myotis planiceps		*P*
Myotis vivesi		*R**
Nasua nelsoni		*A**
Nelsonia neotomodon		*R**
Nelsonia goldmani		*R**
Neotoma albigula seri		*A**
Neotoma anthonyi		*P**
Neotoma bryanti		*A**
Neotoma bunkeri		*P*
Neotoma lepida abbreviata		*A**
Neotoma lepida insularis		*A**
Neotoma lepida latirostra		*A**
Neotoma lepida marcosensis		*A**
Neotoma lepida nudicauda		*A**
Neotoma lepida perpallida		*A**
Neotoma lepida vicina		*A**
Neotoma martinensis		*A**
Neotoma phenax		*R**
Neotoma varia		*A**
Noctilio albiventris minor		*R*
Notiosorex crawfordi evotis		*A**

Notiosorex crawfordi crawfordi	*A*	*Peromyscus thomasi cryophilus*		*A**
Odocoileus hemionus cerrosensis	*A**	*Peromyscus thomasi nelsoni*		*A**
Odocoileus hemionus sheldoni	*A*	*Peromyscus thomasi thomasi*		*R**
Ondatra zibethicus	*A*	*Peromyscus winkelmanii*		*R*
Orcinus orca Orca	*Pr*	*Peromyscus zarhynchus*		*R**
Orthogeomys cuniculus	*A**	*Peropteryx kappleri kappleri*		*R*
Orthogeomys lanius	*A**	*Phoca vitulina*	Foca común	*Pr*
Oryzomys caudatus	*R**	*Phocoena sinus*	Vaquita	*P**
Oryzomys fulgens	*A**	*Phylloderma stenops*		*R*
Oryzomys nelsoni	*A**	*Physeter macrocephalus*	Cachalote	*Pr*
Oryzomys palustris cozumelae	*A**	*Potos flavus*		*R*
Oryzomys palustris crinitus	*A**	*Procyon insularis*		*P**
Oryzomys palustris peninsulae	*A**	*Procyon pygmaeus*		*P**
Otonyctomys hatii	*A*	*Pteronotus gymnonotus*		*R*
Ovis canadensis	*Pr*	*Reithrodontomys gracilis insularis*		*A**
Pappogeomys alcorni	*R*	*Reithrodontomys microdon*		*A**
Pappogeomys fumosus	*A**	*Reithrodontomys spectabilis*		*A**
Pappogeomys neglectus	*A*	*Rheomys mexicanus*		*R**
Perognathus amplus rotundus	*R*	*Rheomys thomasi*		*A*
Perognathus arenarius albulus	*A**	*Rheomys thomasi chiapensis*		*R*
Perognathus arenarius ammophilus	*A**	*Rhogeessa genowaysi*		*R*
Perognathus arenarius siccus	*A**	*Rhogeessa mira*		*R**
Perognathus baileyi insularis	*R**	*Rhynchonycteris naso*		*R*
Perognathus baileyi fornicatus	*R**	*Romerolagus diazi*		*P**
Perognathus intermedius minimus	*A**	*Saccopteryx leptura*		*R**
Perognathus penicillatus seri	*A**	*Scalopus aquaticus*		*P*
Perognathus spinatus bryanti	*A**	*Scapanusanthonyi*		*P*
Perognathus spinatus evermanni	*A**	*Scapanuslatimanus*		*A*
Perognathus spinatus guardiae	*A**	*Sciurus aberti barberi*		*R**
Perognathus spinatus lambi	*A**	*Sciurus aberti durangi*		*R**
Perognathus spinatus latijugularis	*A**	*Sciurus aberti phaeiurus*		*R**
Perognathus spinatus lorenzi	*A**	*Sciurus arizonensis*		*A*
Perognathus spinatus marcosensis	*A**	*Sciurus griseus*		*A*
Perognathus spinatus margaritae	*A**	*Sciurus oculatus*		*R*
Perognathus spinatus occultus	*A**	*Sciurus variegatoides*		*R*
Perognathus spinatus pullus	*A**	*Scotinomys teguina teguina*		*R*
Perognathus spinatus seorsus	*A**	*Sorex arizonensis*		*P*
Peromyscus boylii glasselli	*A**	*Sorex juncensis*		*R**
Peromyscus boylii madrensis	*A**	*Sorex macrodon*		*R**
Peromyscus bullatus	*R**	*Sorex milleri*		*R**
Peromyscus canipes	*R**	*Sorex ornatus ornatus*		*R**
Peromyscus collatus	*A**	*Sorex saussurei cristobalensis*		*R**
Peromyscus crinitus pallidisimus	*A**	*Sorex saussurei oaxacae*		*R**
Peromyscus dickeyi	*R*	*Sorex saussurei veraecrucis*		*R**
Peromyscus eremicus avius	*A**	*Sorex sclateri*		*R**
Peromyscus eremicus cedrosensis	*A**	*Sorex stizodon*		*R**
Peromyscus eremicus cinereus	*A**	*Sorex vagrans monticola*		*R*
Peromyscus eremicus insulicola	*A**	*Sorex veraepacis chiapensis*		*R*
Peromyscus eremicus polypolius	*A**	*Sorex veraepacis mutabilis*		*R**
Peromyscus eremicus tiburonensis	*A**	*Spermophilus madrensis*		*R*
Peromyscus eva carmeni	*A**	*Spermophilus perotensis*		*A**
Peromyscus guardia	*P*	*Spilogale pygmaea*		*A**
Peromyscus interparietalis	*R*	*Sylvilagus bachmani cerrosensis*		*R**
Peromyscus interparietalis interparietalis	*A**	*Sylvilagus graysoni*		*A**
Peromyscus interparietalis lorenzi	*A**	*Sylvilagus insonus*		*P*
Peromyscus leucopus cozumelae	*A**	*Sylvilagus mansuetus*		*R**
Peromyscus maniculatus cineritius	*A**	*Tamandua mexicana*		*A*
Peromyscus maniculatus dorsalis	*A**	*Tamandua mexicana hesperia*		*P*
Peromyscus maniculatus dubius	*A**	*Tamandua mexicana mexicana*		*P*
Peromyscus maniculatus exiguus	*A**	*Tamias merriami*		*R*
Peromyscus maniculatus geronimensis	*A**	*Tamiasciurus mearnsi*		*A*
Peromyscus maniculatus magdalenae	*A**	*Tapirus bairdii*		*P*
Peromyscus maniculatus margaritae	*A**	*Taxidea taxus*		*A*
Peromyscus mekisturus	*A*	*Thyroptera tricolor albiventer*		*R*
Peromyscus pembertoni	*P**	*Tonatia nicaraguae*		*R*
Peromyscus pseudocrinitus	*A**	*Trichechus manatus*	Manatí	*P*
Peromyscus sejugis	*A**	*Tylomys bullaris*		*A**
Peromyscus simulatus	*R**	*Tylomys tumbalensis*		*R**
Peromyscus slevini	*A**	*Ursus americanus*		*P*
Peromyscus stephani	*A**	*Ursus arctos horribilis*		*P*

Vampyrum spectrum	*R*	*Vulpes velox tenuirostris*		*A**
Vulpes macrotis	*A*	*Vulpes velox zinzeri*		*A**
Vulpes velox arsipus	*A*	*Xenomys nelsoni*		*A**
Vulpes velox devia	*A**	*Zalophus californianus*	Lobo marino	*Pr*
Vulpes velox macrotis	*A*	*Zygogeomys trichopus*		*P*
Vulpes velox neomexicana	*A*			

3.2.3 OTHER ANIMAL GROUPS

OFFICIAL MEXICAN NORM FOR SPECIES AT RISK (REPTILES, AMPHIBIANS, FISH AND INVERTEBRATES)

SECRETARIA DE MEDIO AMBIENTE RECURSOS NATURALES Y PESCA (SEDESOL 1994)

The Official Mexican Norm NOM-059-ECOL-1994 lists the following reptile, amphibian, fish and invertebrate species and subspecies that are considered at risk. These are classified as (P) Endangered, (A) Threatened, (R) Rare and (Pr) Subject to Special Protection. Within these categories, endemic species are marked with an asterisk.

REPTILES

SCIENTIFIC NAME	COMMON NAME	CAT.
Abronia bogerti		*R**
Abronia chiszari		*R**
Abronia deppei		*R**
Abronia fuscolabialis		*R**
Abronia graminea		*R**
Abronia kalaina		*R**
Abronia lythrochila		*R**
Abronia matudai		*R*
Abronia mitchelli		*R**
Abronia mixteca		*R**
Abronia oaxacae		*R**
Abronia ochoterenai		*R**
Abronia ornelasi		*R**
Abronia reidi		*R**
Abronia taeniata		*R**
Adelophis copei		*R**
Adelophis foxi		*R**
Adelphicos latifasciatus		*R**
Adelphicos nigrilatus		*R**
Adelphicos quadrivirgatus sargi		*R*
Agkistrodon bilineatus bilineatus		*Rr*
Agkistrodon bilineatus taylori		*A*
Anelytropsis papillosus		*R**
Anniella geronimensis		*R**
Anniella pulchra		*R*
Anolis adleri		*R**
Anolis anisolepis		*R**
Anolis baccatus		*R**
Anolis barkeri		*R**
Anolis biporcatus biporcatus		*R*
Anolis cumingi		*R**
Anolis cuprinus		*R**
Anolis cymbops		*R**
Anolis duellmani		*R**
Anolis dunni		*R**
Anolis forbesi		*R**
Anolis gadovi		*R**
Anolis isthmicus		*R**
Anolis liogaster		*R**
Anolis macrinii		*R**
Anolis matudai		*R**
Anolis megapholidotus		*R**
Anolis microlepidotus		*R**
Anolis milleri		*R**
Anolis naufragus		*R**
Anolis omiltemanus		*R**
Anolis parviciculatus		*R**
Anolis pentaprion		*R*
Anolis polyrhachis		*R**
Anolis pygmaeus		*R**
Anolis schiedei		*R**
Anolis simmonsi		*R**
Anolis suboculais		*R**
Anolis taylori		*R**
Anolis utowanae		*R**
Apalone ater	Tortuga	*Pr**
Apalone spinifera	Tortuga concha blanda	*Pr**
Aristelliger georgeensis		*R*
Atropoides numifer		*A**
Atropoides olmec		*A**
Barisia imbricata		*R**
Barisia levicollis		*R**
Barisia rudicollis		*R**
Bipes biporus		*R**
Bipes canaliculatus		*R**
Bipes tridactylus		*R**
Boa constrictor		*A*
Bothriechis aurifer		*A*
Bothriechis bicolor		*A*
Bothriechis rowleyi		*R**
Callisaurus draconoides		*A*
Caretta caretta caretta	Cahuama	*P*
Caretta caretta gigas	Cahuama	*P*
Caiman crocodylus	Caimán de concha	*Pr*
Celestus enneagrammus		*R**
Celestus rozellae		*R*
Cerrophidion barbouri		*R**
Cerrophidion tzotzilorum		*R**
Chelonia agassizi	Tortuga prieta	*P*
Chelonia mydas	Tortuga blanca	*P*
Chelydra serpentina	Tortuga lagarto	*Pr*
Chersodromus liebmanni		*R**
Chersodromus rubriventris		*R**
Chilomeniscus cinctus		*R*
Chilomeniscus punctatissimus		*R**
Chilomeniscus savagei		*R*
Chilomeniscus stramineus		*R**
Chrysemyspicta	Tortuga	*R*
Claudius angustatus	Tortuga	*P*
Cnemidophorus alpinus		*R**
Cnemidophorus bacatus		*R**
Cnemidophorus calidipes		*R**
Cnemidophorus canus		*A**
Cnemidophorus catalinensis		*R**
Cnemidophorus celeripes		*R**
Cnemidophorus ceralbensis		*R**
Cnemidophorus communis		*R**
Cnemidophorus estebanensis		*R**
Cnemidophorus hyperythrus beldingi		*A**
Cnemidophorus hyperythrus caeruleus		*A**

Cnemidophorus hyperythrus danheimae		*A**
Cnemidophorus hyperythrus espiritensis		*A**
Cnemidophorus hyperythrus pictus		*A**
Cnemidophorus hyperythrus schmidti		*R**
Cnemidophorus labialis		*R**
Cnemidophorus lineattissimus		*R**
Cnemidophorus martyris		*R**
Cnemidophorus maximus		*R**
Cnemidophorus mexicanus		*R**
Cnemidophorus neomexicanus		*R*
Cnemidophorus parvisocius		*R**
Cnemidophorus rodecki		*R**
Coleonyx brevis		*R*
Coleonyx elegans		*A*
Coleonyx reticulatus		*R*
Coleonyx variegatus		*R*
Coluber constrictor		*A*
Conopsis biserialis		*A**
Cophosaurus texanus		*A*
Corytophanes cristatus		*R*
Corytophanes hernandezi		*R*
Corytophanes percarinatus		*R*
Crocodylus acutus	Cocodrilo	*R*
Crocodylus moreleti	Cocodrilo	*R*
Crotalus aquilus		*Pr**
Crotalus atrox		*Pr*
Crotalus basiliscus		*Pr**
Crotalus catalinensis		*A**
Crotalus cerastes		*Pr*
Crotalus durissus		*Pr*
Crotalus enyo		*A**
Crotalus exsul		*A**
Crotalus intermedius		*A**
Crotalus lannomi		*A**
Crotalus lepidus		*Pr*
Crotalus mitchelli		*Pr*
Crotalus molossus		*Pr*
Crotalus polystictus		*Pr**
Crotalus pricei		*Pr*
Crotalus pusillus		*A**
Crotalus ruber		*Pr*
Crotalus scutulatus		*Pr*
Crotalus stejnegeri		*A**
Crotalus tigris		*Pr*
Crotalus tortugensis		*R**
Crotalus transversus		*P**
Crotalus viridis		*Pr*
Crotalus willardi		*Pr*
Crotaphytus collaris		*A*
Crotaphytus reticulatus		*A*
Cryophis hallbergi		*A**
Ctenosaura acanthura		*Pr**
Ctenosaura hemilopha		*Pr**
Ctenosaura pectinata		*A**
Ctenosaura similis		*A*
Dermatemys mawii	Tortuga blanca	*P*
Dermochelys coriacea coriacea	Tortuga laud	*P*
Dermochelys coriacea schelegelii	Tortuga laud	*P*
Dipsas brevifacies		*R*
Dipsas elegans		*R**
Dipsas gaigeae		*R**
Elaphe phaescens		*R**
Elgaria kingi		*R*
Elgaria multicarinata		*R*
Elgaria parva		*R**
Elgaria paucicarinata		*R**
Enulius oligostichus		*R**
Enyaliosaurus clarki		*A**
Enyaliosaurus defensor		*A**
Enyaliosaurus quinquecarinatus		*A*

Eretmochelys imbricata bissa	Tortuga carey	*P*
Eretmochelys imbricata imbricata	Tortuga carey	*P*
Eridiphas slevini		*A**
Eumeces altamirani		*R**
Eumeces colimensis		*R**
Eumeces copei		*R**
Eumeces dugesi		*R**
Eumeces gilberti		*R*
Eumeces lagunensis		*A**
Eumeces lynxe		*R**
Eumeces multilineatus		*R**
Eumeces multivirgatus		*R*
Eumeces ochoterenae		*R**
Eumeces parviauriculatus		*R**
Exiliboa placata		*R**
Ficimia ramirezi		*R**
Ficimia ruspator		*R**
Gambelia wislizenii		*R*
Geagras redimitus		*R**
Gehyra mutilata		*R*
Geophis anocularis		*R**
Geophis bicolor		*R**
Geophis blanchardi		*R**
Geophis cancellatus		*R*
Geophis chalybeus		*R**
Geophis dubius		*R*
Geophis duellmani		*R**
Geophis incumptus		*R**
Geophis isthmicus		*R**
Geophis laticinctus		*R**
Geophis laticollaris		*R*
Geophis latifrontalis		*R**
Geophis maculiferus		*R**
Geophis mutitorques		*R**
Geophis nasalis		*R*
Geophis nigrocinctus		*R**
Geophis omiltemanus		*R**
Geophis petersi		*R**
Geophis pyburni		*R**
Geophis russatus		*R**
Geophis sallaei		*R*
Geophis sieboldi		*R*
Geophis tarascae		*R**
Gerrhonotus liocephalus		*R*
Gerrhonotus lugoi		*A**
Gonatodes albogularis		*R*
Gopherus agassizi	Tortuga del desierto	*A*
Gopherus berlandieri	Tortuga del desierto	*A*
Gopherus flavomarginatus	Tortuga del desierto	*P**
Gyalopion quadrangularis		*R**
Gymnophthalmus speciosus		*R*
Heloderma horridum		*A**
Heloderma suspectum		*A*
Heterodon nasicus		*R*
Holbrookia lacerta		*R*
Hypsiglena torquata		*R*
Iguana iguana		*Pr*
Imantodes cenchoa		*R*
Imantodes gemmistratus		*R*
Imantodes tenuissimus		*R**
Kinosternon acutum	Pochitoque negro	*Pr*
Kinosternon alamosae	Tortuga casquito	*Pr**
Kinosternon cruentatum	Tortuga casquito	*Pr**
Kinosternon herrerai	Tortuga casquito	*Pr**
Kinosternon hirtipes	Tortuga casquito	*Pr*
Kinosternon integrum	Tortuga casquito	*Pr*
Kinosternon leucostomum	Tortuga casquito	*Pr*
Kinosternon oaxacae	Tortuga casquito	*R**
Kinosternon scorpioides	Tortuga casquito	*Pr*
Laemanctus longipes		*R*

Laemanctus serratus		*R*	*Phrynosoma mcalli*		*A**
Lampropeltis alterna		*A*	*Phrynosoma orbiculare*		*A**
Lampropeltis getula		*A*	*Phrynosoma taurus*		*A**
Lampropeltis mexicana		*A**	*Phyllodactylus angelensis*		*R**
Lampropeltis pyromelana		*A*	*Phyllodactylus apricus*		*R**
Lampropeltis ruthveni		*A**	*Phyllodactylus bordai*		*R**
Lampropeltis triangulum		*A*	*Phyllodactylus bugastrolepis*		*R**
Lampropeltis zonata herrerai		*A**	*Phyllodactylus davisi*		*A**
Lepidochelys kempi	Tortuga lora	*P*	*Phyllodactylus delcampoi*		*R**
Lepidochelys olivacea	Tortuga golfina	*P*	*Phyllodactylus duellmani*		*R**
Lepidophyma alvarezi		*A**	*Phyllodactylus homolepidurus*		*R**
Lepidophyma chicoasensis		*R**	*Phyllodactylus muralis*		*R**
Lepidophyma dontomasi		*R**	*Phyllodactylus nocticolus*		*R*
Lepidophyma flavimaculatum		*R*	*Phyllodactylus partidus*		*R**
Lepidophyma gaigeae		*R**	*Phyllodactylus paucituberculatus*		*R**
Lepidophyma lipetzi		*R**	*Phyllodactylus santacruzensis*		*R**
Lepidophyma micropholis		*R**	*Phyllodactylus tinklei*		*R**
Lepidophyma occulor		*R**	*Phyllodactylus unctus*		*R*
Lepidophyma pajapanensis		*R**	*Phyllodactylus xanti*		*R*
Lepidophyma radula		*R**	*Phyllorhynchus browni*		*R*
Lepidophyma sawini		*R*	*Pituophis deppei*		*A**
Lepidophyma smithi		*R*	*Pliocercus andrewsi*		*A**
Lepidophyma sylvaticum		*R**	*Pliocercus bicolor*		*A**
Lepidophyma tarascae		*R**	*Porthidium dunni*		*A*
Lepidophyma tuxtlae		*R**	*Porthidium hespere*		*R*
Leptodeira annulata		*R*	*Porthidium melanurum*		*R*
Leptodeira maculata		*R**	*Porthidium nasutum*		*Pr*
Leptophis ahaetulla		*A*	*Porthidium yucatanicum*		*R*
Leptophis diplotropis		*A**	*Procinura aemula*		*R**
Leptophis mexicanus		*A*	*Pseudemys gorzugi*	Tortuga	*R*
Leptophis modestus		*R*	*Pseudoleptodeira latifasciata*		*R**
Leptotyphlops bressoni		*R**	*Pseudoleptodeira uribei*		*R*
Lichanura trivirgata		*A*	*Rhadinaea bogertorum*		*R**
Loxocemus bicolor		*R*	*Rhadinaea cuneata*		*R**
Masticophis anthonyi		*A**	*Rhadinaea forbesi*		*R**
Masticophis aurigulus		*A**	*Rhadinaea hempsteadae*		*R*
Masticophis flagellum		*A*	*Rhadinaea hesperia baileyi*		*R**
Masticophis lateralis barbouri		*A**	*Rhadinaea marcellae*		*R**
Masticophis striolatus variolosus		*A**	*Rhadinaea mcdougalli*		*R**
Mesaspis antauges		*R**	*Rhadinaea montana*		*R**
Mesaspis gadovi		*R**	*Rhadinaea myersi*		*R*
Mesaspis juarezi		*R**	*Rhadinaea omiltemana*		*R**
Mesaspis moreleti		*R*	*Rhadinaea quinquelineata*		*R**
Mesaspis viridiflava		*R**	*Rhadinaea schistosa*		*R**
Micruroides euryxhanthus		*A*	*Rhadinophanes monticola*		*R**
Micrurus affinis affinis		*R**	*Rhinoclemmys areolata*	Tortuga	*A*
Micrurus bogerti		*R**	*Rhinoclemmys pulcherrima*	Tortuga sabanera	*A*
Micrurus browni		*R*	*Rhinoclemmys rubida*	Tortuga	*R**
Micrurus diastema		*R*	*Salvadora bairdi*		*R**
Micrurus distans		*R**	*Salvadora intermedia*		*R**
Micrurus elegans		*R*	*Salvadora lemniscata*		*R**
Micrurus ephippifer		*R**	*Salvadora mexicana*		*R**
Micrurus fulvius		*R*	*Sauromalus ater*		*A**
Micrurus laticollaris		*R**	*Sauromalus australis*		*A**
Micrurus limbatus		*R**	*Sauromalus hispidus*		*A**
Micrurus nebularis		*R**	*Sauromalus klauberi*		*P**
Micrurus nigrocinctus zunilensis		*R**	*Sauromalus obesus*		*A**
Micrurus proximans		*R**	*Sauromalus slevini*		*A**
Nerodia erythrogaster		*A*	*Sauromalus varius*		*A**
Nerodia melanogaster		*A**	*Sceloporus adleri*		*R**
Ophisaurus ceroni		*R**	*Sceloporus angustus*		*R**
Ophisaurus incomptus		*R**	*Sceloporus asper*		*R**
Ophryacus undulatus		*Pr**	*Sceloporus cozumelae*		*R**
Petrosaurus mearnsi		*R*	*Sceloporus cryptus*		*R**
Petrosaurus thalassinus		*R**	*Sceloporus exsul*		*R**
Phrynosoma asio		*R**	*Sceloporus graciosus*		*R*
Phrynosoma branconnieri		*R**	*Sceloporus grammicus*		*R*
Phrynosoma cerroense		*A**	*Sceloporus grandaevus*		*R**
Phrynosoma cornutum		*A**	*Sceloporus hunsakeri*		*R**
Phrynosoma ditmarsi		*A**	*Sceloporus insignis*		*R**

Sceloporus licki		*R**
Sceloporus lineatisimus		*R*
Sceloporus lineatulus		*R**
Sceloporus maculosus		*R**
Sceloporus magdougalli		*R**
Sceloporus megalepidurus		*R**
Sceloporus ornatus		*R**
Sceloporus rufidorsus		*R**
Sceloporus salvini		*R**
Sceloporus serrifer prezygus		*R**
Sceloporus stejnegeri		*R**
Sceloporus subpictus		*R**
Sceloporus tanneri		*R**
Sceloporus zosteromus		*R**
Scincella gemmingeri forbesorum		*R**
Scincella lateralis		*R*
Scincella silvicola		*R**
Sibon annulifera		*R*
Sibon philippi		*R*
Sibon zweifelli		*R*
Sistrurus catenatus		*Pr*
Sistrurus ravus		*Pr**
Sphaerodactylus argus		*R*
Sphaerodactylus glaucus		*R*
Staurotypus salvini	Tortuga tres lomos	*Pr*
Staurotypus triporcatus	Tortuga guau	*Pr*
Streptosaurus mearnsi slevini		*A**
Symphimus leucostomus		*R**
Symphimus mayae		*R**
Tantalophis discolor		*A**
Tantilla atriceps		*A*
Tantilla brevissima		*R*
Tantilla briggisi		*A**
Tantilla cascadae		*A**
Tantilla coronadoi		*R**
Tantilla cuniculator		*R**
Tantilla deppei		*A**
Tantilla flavilineata		*A**
Tantilla gracilis		*R**
Tantilla martindelcampoi		*R**
Tantilla miniata		*R*
Tantilla morgani		*R**
Tantilla oaxacae		*R**
Tantilla planiceps atriceps		*R**
Tantilla planiceps borgerti		*R**
Tantilla shawi		*R**
Tantilla slavensi		*R**
Tantilla striata		*R**
Tantilla tayrae		*R**
Tantillita brevissima		*R**
Tantillita lintoni		*R*
Terrapene carolina	Tortuga	*Pr*
Terrapene coahuila	Tortuga cuatrociénegas	*Pr**
Terrapene nelsoni	Tortuga	*Pr**
Terrapene ornata	Tortuga	*Pr*
Thamnophis chrysocephalus		*A**
Thamnophis couchi hammondi		*A*
Thamnophis cyrtopsis		*A*
Thamnophis digueti		*A*
Thamnophis elegans		*A*
Thamnophis eques		*A*
Thamnophis exsul		*A*
Thamnophis godmani		*A**
Thamnophis marcianus		*A*
Thamnophis mendax		*A**
Thamnophis nigronucaulis		*R*
Thamnophis proximus		*A*
Thamnophis scalaris		*A**
Thamnophis scaliger		*A**
Thamnophis sirtalis		*R*
Thamnophis sumichrasti		*A*
Thamnophis vicinus		*R*
Thecadactylus rapicaudus		*R*
Trachemys scripta	Tortuga jicotea	*Pr*
Trimorphodon biscutatus vilkinsonii		*R*
Tropidodipsas philippii		*R**
Tropidodipsas sartori macdougalli		*R**
Uma exsul		*R**
Uma notata		*A*
Uma paraphygas		*P*
Ungaliophis continentalis		*R*
Urosaurus irregularis		*A**
Urosaurus lahtelai		*A**
Urosaurus nigricaudus		*A**
Uta antiqua		*R**
Uta aquamata		*A*
Uta concinna		*A**
Uta mannophora		*A**
Uta nolascensis		*A**
Uta palmeri		*A**
Uta squamata		*R**
Uta stansburiana martinensis		*A**
Uta stansburiana stellata		*A**
Xantusia bolsonae		*A**
Xenosaurus grandis		*R*
Xenosaurus newmanorum		*R**
Xenosaurus platyceps		*R**

AMPHIBIANS

SCIENTIFIC NAME	COMMON NAME	CAT.
Ambystoma amblycephalum	*Ajolote*	*Pr**
Ambystoma andersoni	*Ajolote*	*Pr**
Ambystoma bombypellum	*Ajolote*	*Pr**
Ambystoma dumerili	*Ajolote de Pátzcuaro*	*Pr**
Ambystoma flavipiperatum	*Ajolote*	*Pr**
Ambystoma granulosum	*Ajolote*	*Pr**
Ambystoma lermaensis	*Ajolote*	*Pr**
Ambystoma mexicanum	*Ajolote*	*Pr**
Ambystoma ordinarium	*Ajolote*	*Pr**
Ambystoma rosaceum	*Ajolote*	*Pr**
Ambystoma taylori	*Ajolote*	*Pr**
Ambystoma tigrinum	*Ajolote*	*Pr*
Ambystoma velasci	*Ajolote*	*Pr**
Aneides lugubris		*R*
Bolitiglossa stuarti		*A*
Bolitiglossa veracrucis		*R**
Bolitoglossa engelhardti		*R*
Bolitoglossa flavimembris		*R*
Bolitoglossa hermosa		*R**
Bolitoglossa macrinii		*R**
Bolitoglossa mexicana		*R*
Bolitoglossa nigroflavescens		*R**
Bolitoglossa occidentalis		*R*
Bolitoglossaplatydactyla		*R**
Bolitoglossa riletti		*R*
Bolitoglossa rostrata		*R*
Bolitoglossa rufescens		*R*
Bolitoglossa yucatana		*R**
Bufo cavifrons		*R*

Bufo coccifer	*R*	*Hyla crassa*	*R**
Bufo cristatus	*R**	*Hyla cyanomma*	*A**
Bufo debilis	*R*	*Hyla dendroscarta*	*R**
Bufo gemmifer	*R**	*Hyla echinata*	*R**
Bufo retiformis	*R*	*Hyla erythromma*	*R**
Chiropterotriton arboreus	*R**	*Hyla godmani*	*A**
Chiropterotriton chiropterus	*R**	*Hyla hazelae*	*R**
Chiropterotriton chondrostega	*R**	*Hyla juanitae*	*A**
Chiropterotriton dimidiatus	*R**	*Hyla melanomma*	*R**
Chiropterotriton lavae	*R**	*Hyla mixe*	*R**
Chiropterotriton magnipes	*R**	*Hyla mixomaculata*	*A**
Chiropterotriton mosaueri	*R**	*Hyla mykter*	*A**
Chiropterotriton multidentaus	*R**	*Hyla nubicola*	*A**
Chiropterotriton priscus	*R**	*Hyla pachiderma*	*R**
Dendrotriton megarhinus	*R**	*Hyla pinorum*	*R**
Dendrotriton xolocalcae	*R**	*Hyla plicata*	*A**
Dermophis mexicanus	*R**	*Hyla robertsorum*	*A**
Dermophis oaxacae	*R**	*Hyla sabrina*	*A**
Duellmanohyla chamulae	*R**	*Hyla sartori*	*A**
Duellmanohyla ignicolor	*R**	*Hyla smaragdina*	*R**
Duellmanohyla schmidtorum	*R**	*Hyla taeniopus*	*A**
Eleutherodactylus angustidigitorum	*P**	*Hyla thorectes*	*R**
Eleutherodactylus batrachylus	*R**	*Hyla trux*	*A**
Eleutherodactylus berkenbuschi	*R**	*Hyla valancifer*	*R*
Eleutherodactylus decoratus	*R**	*Ixalotriton niger*	*P**
Eleutherodactylus dennisi	*R**	*Lineatriton lineola*	*R**
Eleutherodactylus dixoni	*R**	*Notophthalmus meridionalis*	*P*
Eleutherodactylus glaucus	*R**	*Nototriton adelos*	*R**
Eleutherodactylus grandis	*R**	*Nototriton alvarezdeltoroi*	*R**
Eleutherodactylus greggi	*R**	*Nyctanolis pernix*	*R*
Eleutherodactylus guerreroensis	*R**	*Oedipina elongata*	*R*
Eleutherodactylus interorbitalis	*R**	*Parvimolge towsendi*	*A*
Eleutherodactylus laticeps	*R*	*Plectrohyla acanthodes*	*R**
Eleutherodactylus lineatus	*R**	*Plectrohyla avia*	*R**
Eleutherodactylus matudai	*R*	*Plectrohyla hartwegi*	*R**
Eleutherodactylus maurus	*R**	*Plectrohyla lacertosa*	*R**
Eleutherodactylus megaloptymanum	*R**	*Plectrohyla pycnochila*	*A**
Eleutherodactylus modestus	*R*	*Pseudoeurycea altamontana*	*R**
Eleutherodactylus nivicolimae	*R*	*Pseudoeurycea anitae*	*A**
Eleutherodactylus omiltemanus	*R**	*Pseudoeurycea belli*	*A**
Eleutherodactylus palidus	*R**	*Pseudoeurycea brunnata*	*R*
Eleutherodactylus polymniae	*R**	*Pseudoeurycea cephalica*	*A*
Eleutherodactylus rufescens	*R**	*Pseudoeurycea cochranae*	*A**
Eleutherodactylus saltator	*R*	*Pseudoeurycea conanti*	*A**
Eleutherodactylus sartori	*R**	*Pseudoeurycea firscheini*	*R**
Eleutherodactylus silvicola	*R**	*Pseudoeurycea gadovi*	*R**
Eleutherodactylus spatulatus	*R**	*Pseudoeurycea galeanae*	*A**
Eleutherodactylus stuarti	*R*	*Pseudoeurycea goebeli*	*A*
Eleutherodactylus syristes	*R**	*Pseudoeurycea juarezi*	*A**
Eleutherodactylus tarahumaraensis	*R**	*Pseudoeurycea leprosa*	*A**
Eleutherodactylus taylori	*R**	*Pseudoeurycea longicauda*	*R**
Eleutherodactylus teretistes	*R**	*Pseudoeurycea melanomolga*	*R**
Eleutherodactylus uno	*R**	*Pseudoeurycea mystax*	*A**
Eleutherodactylus verrucipes	*R**	*Pseudoeurycea nigromaculata*	*R**
Eleutherodactylus verruculatus	*R**	*Pseudoeurycea parva*	*A**
Eleutherodactylus vinicolimae	*R*	*Pseudoeurycea praecellens*	*A**
Eleutherodactylus yucatanensis	*R**	*Pseudoeurycea rex*	*R*
Ensatina eschscholtzii	*R*	*Pseudoeurycea robertsi*	*A**
Gastrophryne elegans	*R*	*Pseudoeurycea saltator*	*A**
Gastrophryne olivacea	*R*	*Pseudoeurycea scandens*	*R**
Gastrophryne usta	*R*	*Pseudoeurycea smithi*	*A**
Hyla achinata	*R*	*Pseudoeurycea townsendi*	*A**
Hyla altipotens	*R**	*Pseudoeurycea unguidentis*	*A*
Hyla arborescandens	*R**	*Pseudoeurycea werleri*	*R*
Hyla bistincta	*R**	*Pternohyla dentata*	*A**
Hyla bogertae	*R**	*Ptychohyla euthysanota*	*A*
Hyla cembra	*A**	*Ptychohyla leonhardschulzei*	*R**
Hyla chaneque	*R**	*Rana berlandieri*	*Pr*
Hyla charadricola	*A**	*Rana boylii*	*R*
Hyla chryses	*R**	*Rana brownorum*	*R**

Rana chiricahuensis		*A*	*Rhyacosiredon leorae*		*A**
Rana dunni		*R**	*Rhyacosiredon rivularis*		*A**
Rana forreri		*R*	*Rhyacosiredon zempoalensis*		*A**
Rana johni		*P**	*Rhynophrynus dorsalis*		*R*
Rana megapoda		*Pr**	*Siren intermedia*		*R*
Rana montezumae		*Pr**	*Siren lacertina*		*R*
Rana neovolcanica		*A**	*Thorius dubitus*		*R**
Rana omiltemana		*P**	*Thorius macdougalli*		*R**
Rana pueblae		*P**	*Thorius minutissimus*		*R*
Rana pustulosa		*R**	*Thorius narisovalis*		*R**
Rana sierramadrensis		*R**	*Thorius pennatulus*		*R**
Rana tlaloci		*P**	*Thorius pulmonaris*		*R**
Rana trilobata		*R**	*Thorius schmidti*		*R**
Rana yavapaiensis		*R*	*Thorius troglodytes*		*R**
Rhyacosiredon altamirani		*A**	*Triprion petasatus*		*R*

FISH

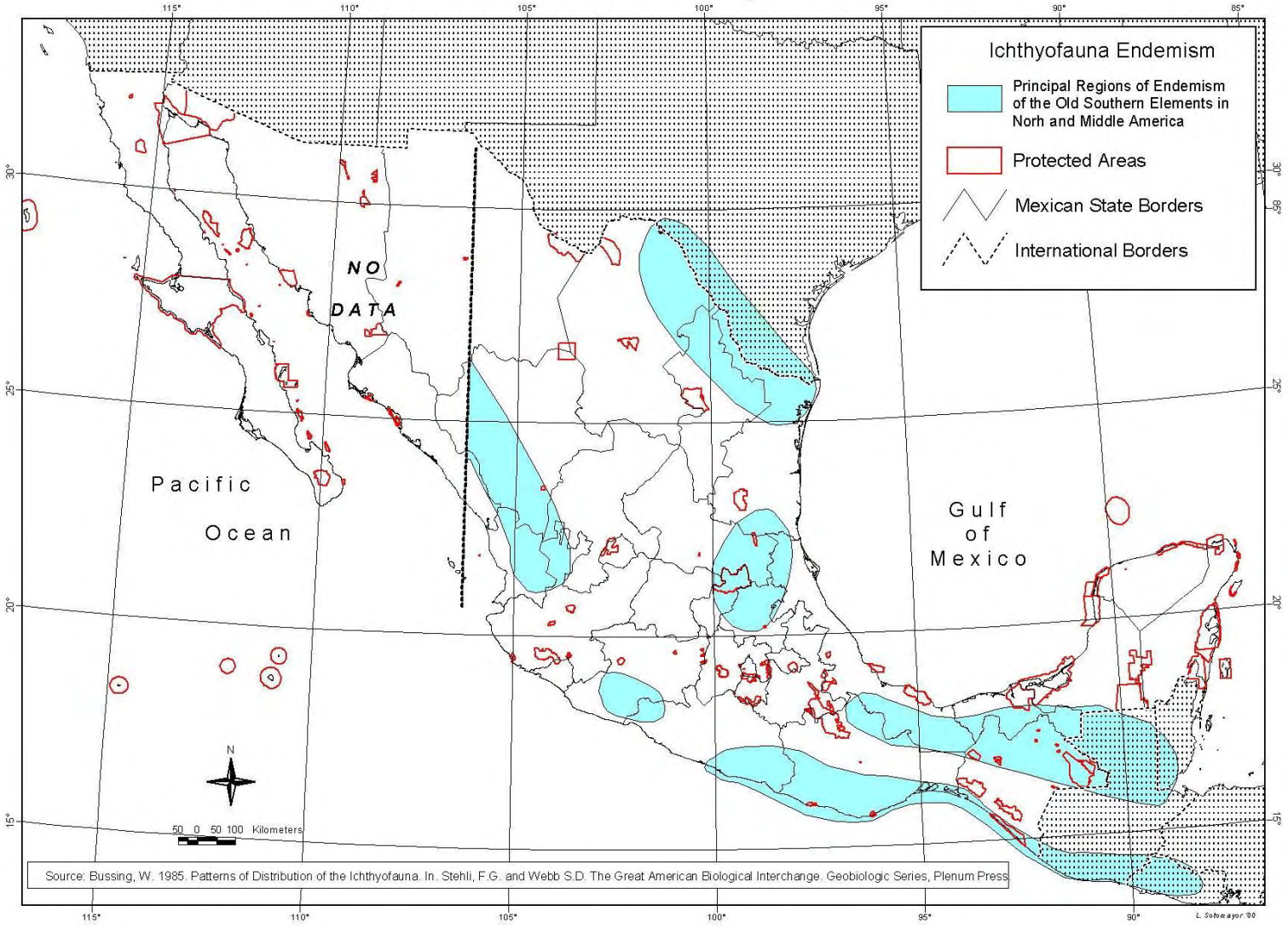
SCIENTIFIC NAME	COMMON NAME	CAT.			
Agosia chrysogaster	Pupo	*A**	*Cyprinodon pachycephalus*	C. cabezón	*P**
Algansea aphanea	Pupo de Ayutla	*A**	*Cyprinodon simus*	C. boxeador	*A**
Algansea barbata	Pupo del Lerma	*P**	*Cyprinodon verecundus*	C. dorsal larga	*A**
Algansea popoche	Popocha	*A**	*Dionda diaboli*	Carpa diabla	*P**
Allotoca dugesi	Tiro	*A**	*Dionda dichroma*	C. bicolor	*A**
Ameca splendens	Mexcalpique mariposa	*P**	*Dionda episcopa*	C. del Bravo	*P**
Astyanax armandoi	Sardinita labiosa	*A**	*Dionda mandibularis*	C. quijarona	*P**
Astyanax jordani	Sardina ciega	*A**	*Dionda melanops*	C. manchada	*A**
Campostoma ornatum	Rodapiedra mexicana	*P*	*Etheostoma australe*	Perca del Conchos	*P**
Catostomus bernardini	Matalote yaqui	*R*	*Etheostoma pottsi*	Perca mexicana	*A**
Catostomus cahita	Matalote cahita	*A**	*Fundulus lima*	Sardinilla de Península	*A**
Catostomus insignis	Matalote de Sonora	*P*	*Gambusia affinis*	Guayacón mosquito	*P*
Catostomus leopoldi	Matalote de Bavispe	*R**	*Gambusia alvarezi*	G. San Gregorio	*P**
Catostomus wigginsi	Matalote Opata	*A**	*Gambusia eurystoma*	G. del azufre	*R**
Characodon audax	Mexcalpique del Toboso	*A**	*Gambusia hurtadoi*	G. de Hda. Dolores	*R**
Characodon lateralis	Mexcalpique arcoiris	*P**	*Gambusia longispinis*	G. Cuatrociénegas	*A**
Chelacaerule ostigmata		*A*	*Gambusia puncticulata*		*A**
Chirostoma bartoni	Charal de la caldera	*A**	*Gambusia senilis*	G. manchado	*A*
Chirostoma charari	Charal tarasco	*P**	*Gasterosteus aculeatus*	Espinosho	*R*
Chirostoma compressum		*P**	*Gila ditaenia*	Carpita sonorense	*A*
Chirostoma promelas	Charal boca negra	*A**	*Gila elegans*	C. elegante	*P*
Cichlasoma bartoni	Mojarra Cacacolera	*P**	*Gila intermedia*	C. del Gila	*P*
Cichlasoma grammodes	M. Chiapa de Corzo	*R**	*Gila modesta*	C. de Saltillo	*R**
Cichlasoma hartwegi	M. Río Gde. de Chiapas	*R**	*Gila nigrescens*	C. de Chihuahua	*A**
Cichlasoma intermedium	M. del Petén	*P**	*Gila purpurea*	C. yaqui	*P*
Cichlasoma labridens	M. huasteca	*P**	*Gila robusta*		*R**
Cichlasoma minckleyi	M. Cuatrociénegas	*P**	*Girardinichthys viviparus*	Mexcalpique	*A**
Cichlasoma socolofi	M. de Misala	*R**	*Gobiesox fluviatilis*	Cucharita del río	*A**
Cichlasoma urophthalmus	M. del sureste	*P**	*Gobiesox mexicanus*	C. mexicana	*R**
Cualac tessellatus	Cachorrito de Medialuna	*P**	*Goodea toweri*	Mexcalpique cola azul	*P**
Cycleptus elongatus	Matalote azul	*R*	*Hubbsina turneri*	M. michoacana	*P**
Cyprinella bocagrande	Sardinita bocagrande	*A**	*Hybognathus amarus*	Carpa Chamizal	*P**
Cyprinella formosa	Carpa yaqui	*A*	*Hybopsis boucardi*	Carpa del Balsas	*A**
Cyprinella lutrensis	Sardinita roja	*A*	*Ictalurus australis*	Bagre del Pánuco	*A**
Cyprinella panarcys	S. del Conchos	*P**	*Ictalurus lupus*	B. bobo	*R*
Cyprinella proserpina	S. del Bravo	*A*	*Ictalurus mexicanus*	B. del río Verde	*R**
Cyprinella xanthicara	S. de Cuatrociénegas	*P**	*Ictalurus pricei*	B. yaqui	*R**
Cyprinodon alvarezi	Cachorrito del Potosí	*P**	*Lampetra geminis*	Lamprea de Jacona	*P**
Cyprinodon atrorus	C. del Bolsón	*A**	*Lampetra spadicea*	L. de Chapala	*P**
Cyprinodon beltrani	C. Lodero	*A**	*Lepomis megalotis*	Mojarra gigante	*A**
Cyprinodon bifasciatus	C. Cuatrociénegas	*A**	*Lucania interioris*	Sardinita Cuatrociénegas	*P**
Cyprinodon eximius	C. del Conchos	*A*	*Machrybopsis aestivalis*	Carpa de lunares	*A**
Cyprinodon fontinalis	C. de Carbonera	*A**	*Megupsilon aporus*	Cachorrito de Potosí	*P**
Cyprinodon labiosus	C. cangrejero	*A**	*Notropis aguirrepequenoi*	Carpa de pilón	*R**
Cyprinodon macrolepis	C. escamudo	*P**	*Notropis aulidion*	C. de Durango	*R**
Cyprinodon macularis	C. del desierto	*P**	*Notropis cumingi*	C. del Atoyac	*A**
Cyprinodon maya	C. gigante	*A**	*Notropis jemezanus*	C. del Bravo	*R**
Cyprinodon meeki	C. del Mezquital	*P**	*Notropis moralesi*	C. tepelneme	*A**
Cyprinodon nazas	C. de aguanaval	*A**	*Notropis orca*	C. del paso	*P**

Notropis saladonis	C. del Salado	*P**	*Ptychocheilus lucius*		*P*
Notropis simus	C. narizon	*P*	*Ptychocheilus osculus*		*P**
Ogilbia pearsei	Dama blanca ciega	*P**	*Rhamdia guatemalensis*		*A*
Oncorhynchus mykiss nelsoni	Trucha arcoiris	*R*	*Rhamdia guatemalensis sacrificii*	Juil de cenote	*P**
Ophisternon infernale	Anguila ciega yucateca	*P**	*Rhamdia reddelli*	Juil ciego	*A**
Poblana alchichica	Charal de Alchichica	*A**	*Rhinichthys osculus*	Carpa pinta	*P**
Poblana ferdebueni	Ch. de Almoloya	*A**	*Rivulus robustus*	Almirante	*P**
Poblana letholepis	Ch. de la Preciosa	*A**	*Scaphirhynchus platorynchus*	Esturión	*P*
Poblana squamata	Ch. de Quechulac	*A**	*Skiffia bilineata*	Tiro rayado	*A**
Poecilia butleri	Topote del Pacífico	*A*	*Skiffia francesae*	T. dorado	*P**
Poecilia latipunctata	T. del Tamesi	*A**	*Skiffia lermae*	Tiro	*A**
Poecilia sulphuraria	T. de Teapa	*A**	*Stypodon signifer*	Carpa de Parras	*P**
Poecilia velifera	T. aleta grande	*A**	*Tiaroga cobitis*	C. locha	*P*
Poeciliopsis latidens	Guatopote del Fuerte	*A**	*Totoaba macdonaldi*	Totoaba	*P**
Poeciliopsis occidentalis	G. de Sonora	*A*	*Xenoophorus captivus*	Mexcalpique viejo	*A**
Potamarius nelsoni	Bagre lacandon	*R**	*Xiphophorus clemenciae*	Espada de Clemencia	*P**
Priapella bonita	Guayacón bonito	*P**	*Xiphophorus couchianus*	E. de Monterrey	*P**
Priapella compressa	G. de Palenque	*A**	*Xiphophorus gordoni*	E. Cuatrociénegas	*P**
Priapella intermedia	G. de Chimalapa	*A**	*Xiphophorus meyeri*	E. de Muzquíz	*P**
Priapella olmecae	G. olmeca	*A**	*Xiphophorus milleri*	E. de Catemaco	*P**
Prietella phreatophila	Bagre ciego de Muzquíz	*P**	*Xyrauchen texanus*	Matalote jorobado	*P**

INVERTEBRATES

SCIENTIFIC NAME	COMMON NAME	CAT.			
Acropora cervicornis		*Pr*	*Megalonias nicklineana*		*P*
Acropora palmata		*Pr*	*Mexipyrgus churinceanus*		*P**
Alpheopsis stygicola		*P*	*Mexipyrgus escobedae*		*P**
Ancistromesus mexicanus		*Pr*	*Mexipyrgus lugoi*		*P**
Ankylocythere barbouri		*A*	*Mexipyrgus mojarralis*		*P**
Antipathes bichitoena	Corales	*Pr*	*Mexipyrgus multilineatus*		*P**
Antipathes grandis	Corales	*Pr*	*Mexithauma quadripaludium*		*P**
Antipathes ules	Coral	*Pr*	*Neopalaemon nahuatlus*	Langostino	*P*
Antromysis cenotensis		*A*	*Nymphophilus minckleyi*		*P**
Brachipelma emilia		*A*	*Paludisca caramba*		*P**
Brachipelma pallidum		*A*	*Papilio esperanza*		*A*
Brachipelma smithi		*A*	*Pinctada mazatlanica*	Madre perla	*Pr*
Brenania belkini		*P*	*Plexaura dichotoma*	Coral blando	*Pr*
Coahuilis hubbsi		*P**	*Plexaura homomalla*	Coral blanco	*Pr*
Cohiopina milleri		*P**	*Polymesoda caroliniana*	Almeja de fango	*Pr*
Creaseria morleyi		*A*	*Pternia sterna*	Concha nácar	*Pr*
Creaseriella anops		*A*	*Purpura patula pansa*	Caracol de tinta	*Pr**
Crocibullum escutellatum	Caracol gorrito	*Pr*	*Spondylus calcifer*	Almeja burra	*Pr*
Cyrtonaiass tampicoensis tecomatensis		*P*	*Tivella stultorum*	Almeja pismo	*Pr*
Danaus plexippus		*Pr*	*Troglocubanus perezfarfantae*	Langostino	*P*
Durangonella coahuilae		*P**	*Typhlatya campecheae*	Chacal	*P*
Isognomon alatus	Callo de árbol	*Pr*	*Typhlatya mitchelli*	Chaca*l*	*A*
Isostichopus fuscus	Pepino de mar	*P*	*Typhlatya pearceiChacal*		*A*
Limulus polyphemus	Cacerolita	*P*	*Typhloletidomysis quinterensis*		*A*
Macrobrachium acherontium	Langostino	*Pr*	*Typlopseuthelphusa mocinol*	Cangrejo	*P*
Macrobrachium villalobosi	Langostino	*Pr*			

Patterns of Distribution of Ichthyofauna in Mexico



Source: Bussing, W. 1985. Patterns of Distribution of the Ichthyofauna. In. Stehli, F.G. and Webb S.D. The Great American Biological Interchange. Geobiologic Series, Plenum Press.

3.2.4 VEGETATION

CENTRES OF PLANT DIVERSITY.

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The concept of sites or centres of high biodiversity has attracted the attention of conservationists, both as a tool for helping determine which areas should receive priority attention, and also as a challenge as to how to undertake the conservation action necessary, specially as the areas of high diversity are most found in developing countries which usually have limited human and financial resources available for this purpose.

The objectives of the Centres of Plant Diversity project are:

- To identify which areas around the world, if conserved, would safeguard the greatest number of plant species.
- To document the many benefits, economic and scientific, that conservation of those areas would bring to society and to outline the potential value of each for sustainable development.
- To outline a strategy for the conservation of the areas selected.

The criteria adopted for the selection of sites and vegetation types was based principally on a requirement that each must have one of the following two characteristics:

- The area is evidently species-rich, even though the number of species present may not be accurately known.
- The area is known to contain a large number of species endemic to it.

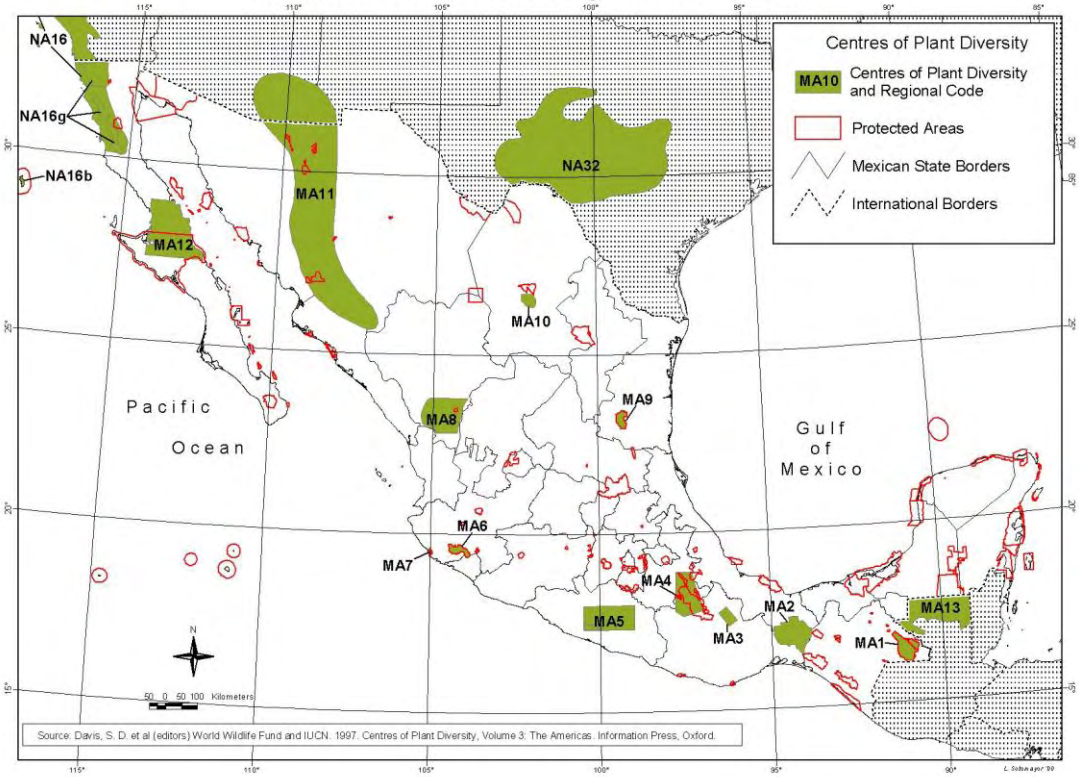
The following characteristics were also considered in the selection:

- The site contains an important genepool of plants of value to humans or that are potentially useful.
- The site contains a diverse range of habitat types.
- The site contains a significant proportion of species adapted to special edaphic conditions.
- The site is threatened or under imminent threat of large scale devastation.

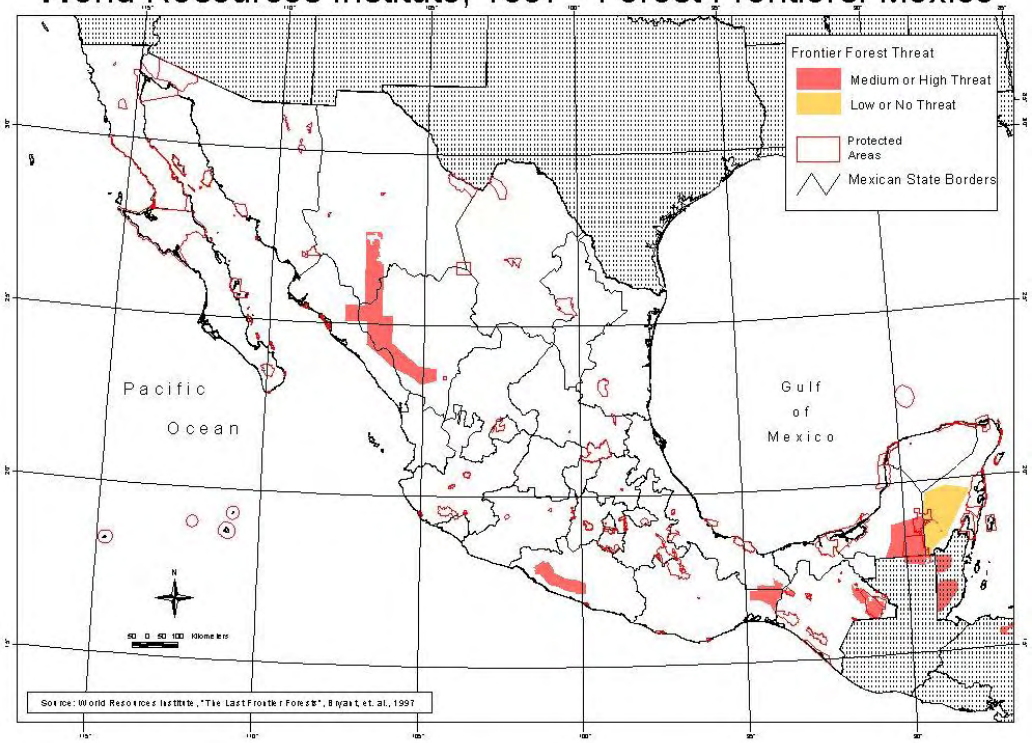
The project considers 234 sites which have been selected for detailed treatment, 14 of which are totally or partially included within Mexico and two more that are located directly adjacent to its international borders with the presence of similar ecosystems and species within them.

Code	Site	Area Km²	Altitude Range	Flora
	North America			
NA16 NA16b	California Floristic Province (Peninsular Ranges) Guadalupe Island (17 local endemics)	324,000	0 - 4,418 m	2,440
NA16g	Vernal Pools (California & Baja California)	20,000	0 -600 (to 2500 m)	> 200
	Central America			
MA1	Lacandon Rainforest region	6,000	80 - 1,750 m	4,000
MA2	Uxpanapa - Chimalapa region	7,700	80 - 2,250 m	3,500
MA3	Sierra de Juárez	1,700	500 - 3,250 m	2,000
MA4	Tehuacán - Cuicatlán region	9,000	600 - 2,200 m	2,700
MA5	Cañón del Zopilote region	4,383	600 - 3,550 m	> 2,000
MA6	Sierra de Manantlán region	1,396	400 - 2,860 m	2,800
MA7	Pacific lowlands Chamela-Cuixmala, Jal.	350	0 - 500 m	1,120
MA8	Upper Mezquital River region Sierra Madre Occ.	4,600	800 - 3,350 m	2,900
MA9	Goméz Farías region and El Cielo	2,400	200 - 2,200 m	> 1,000
MA10	Cuatro Ciénegas region	2,000	740 - 3,000 m	860
MA11	Apachian/Madrean region	180,000	500 - 3,500 m	4,000
MA12	Central region Baja California Peninsula	36,000	0 - 1,985 m	> 500
	Sites not located in Mexico but adjacent to Mexico's international borders			
MA13	Petén region and Maya BR	36,000	10 - 800 m	3,000
NA32	Edwards Plateau, Texas	100,000	100 - 1,000 m	2,300

Centres of Plant Diversity and Endemism



World Resources Institute, 1997 - Forest Frontiers: Mexico



FRONTIER FORESTS

World Resources Institute (Bryant, D. *et al.* 1997)

Frontier forests are the world's remaining large intact natural forest ecosystems. These forests are -- on the whole -- relatively undisturbed and big enough to maintain all of their biodiversity, including viable populations of the wide-ranging species associated with each forest type. As defined in this assessment, a frontier forest must meet seven criteria:

1) It is primarily forested.

2) It is big enough to support viable populations of all indigenous species associated with that forest type -- measured by the forest's ability to support wide-ranging animal species (such as elephants, harpy eagles, or brown bears).

3) It is large enough to keep these species' populations viable even in the face of the natural disasters -- such as hurricanes, fires, and pest or disease outbreaks -- that might occur there in a century.

4) Its structure and composition are determined mainly by natural events, though limited human disturbance by traditional activities of the sort that have shaped forests for thousands of years -- such as low-density shifting cultivation -- is acceptable. As such, it remains relatively unmanaged by humans, and natural disturbances (such as fire) are permitted to shape much of the forest.

5) In forests where patches of trees of different ages would naturally occur, the landscape exhibits this type of heterogeneity.

6) It is dominated by indigenous tree species.

7) It is home to most, if not all, of the other plant and animal species that typically live in this type of forest.

GAP ANALYSIS OF MEXICAN PROTECTED AREAS AND REMAINING PRIMARY TERRESTRIAL VEGETATION

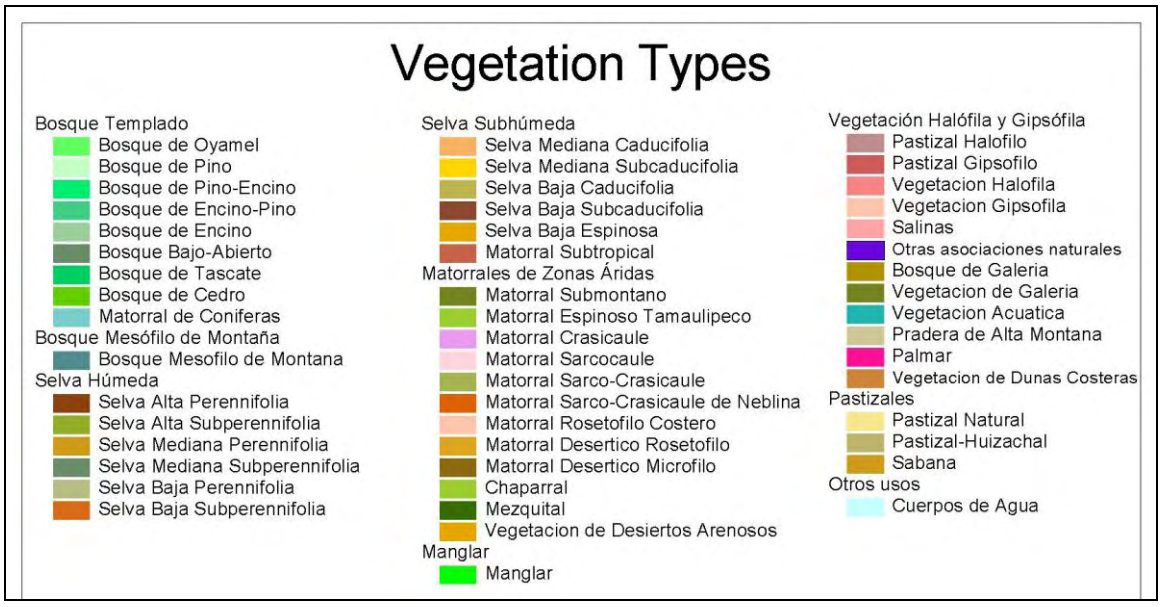
The Nature Conservancy (Bezaury-Creel *et al.* 2000)

Gap analysis is a method used to determine the protection status of biodiversity within a given region. Using this technique, conservation targets which are not well-protected by the current system of protection (called "gaps") can be pinpointed. A gap analysis can be performed at many scales, and is dependent on the quantity and quality of spatial data that is available for the region in question. Our goal for this analysis was to apply this technique at a nationwide level to perform a preliminary conservation assessment of Mexico's vegetation types, creating a data base that can be used to further refine the analysis to the ecoregional level. Arcview and Arcinfo software were used to carry out the GIS overlay analysis.

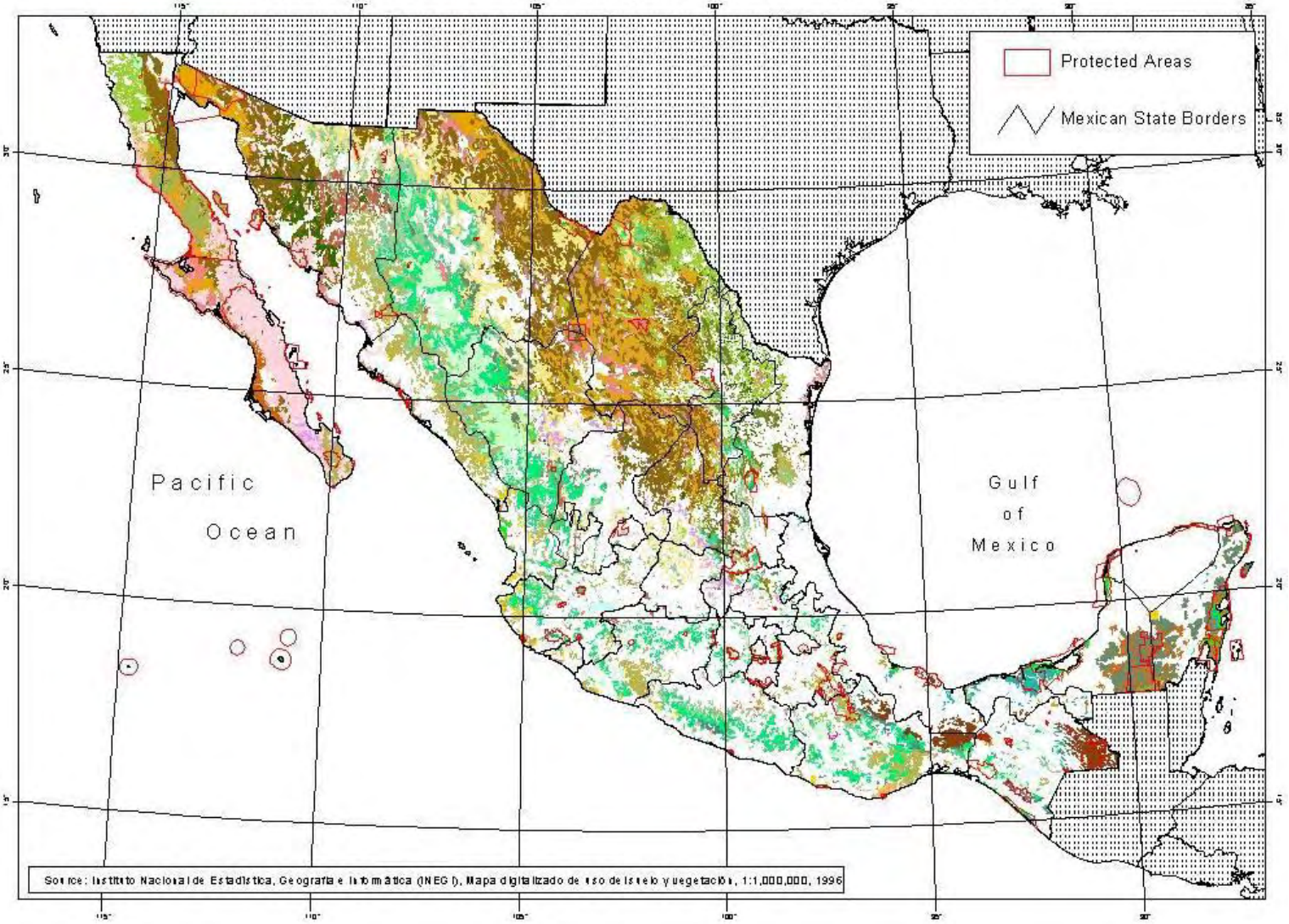
The current system of protected areas in Mexico was overlaid with the vegetation map to determine the amount of vegetation (remaining primary vegetation INEGI 1996, 1:1,000,000) contained within the current protected area system. The results of this process can then be analyzed in any number of ways. The graphs, maps and table included show examples of how these data can be used. For the analysis 10% was selected as a baseline goal for the desired amount of protection for each vegetation type. We then proposed that vegetation types of which little primary vegetation remained should have a higher percentage within protected areas in order to be considered 'well-protected'. The criteria we used for this analysis was:

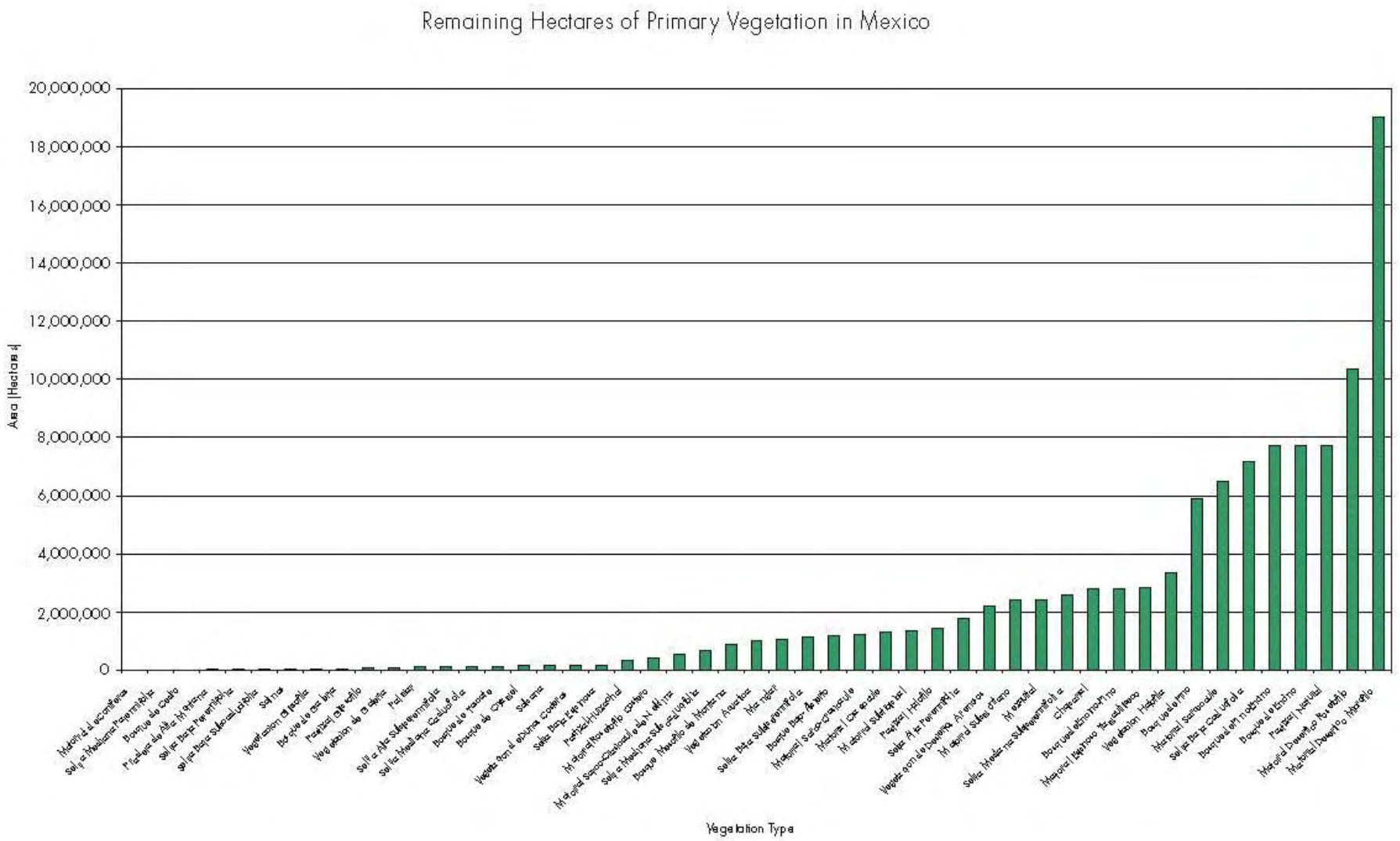
Less than .5 %	40%
From .5 to 1 %	30%
From 1 to 2 %	20%
More than 2%	10%

Since the vegetation classification at a country level is at a rather coarse scale, it is desirable to analyze these vegetation types at the ecoregional level. Many of these types span across several ecoregions, so the variation within these vegetation types that occur in more than one ecoregion is not well represented by a country-wide analysis.

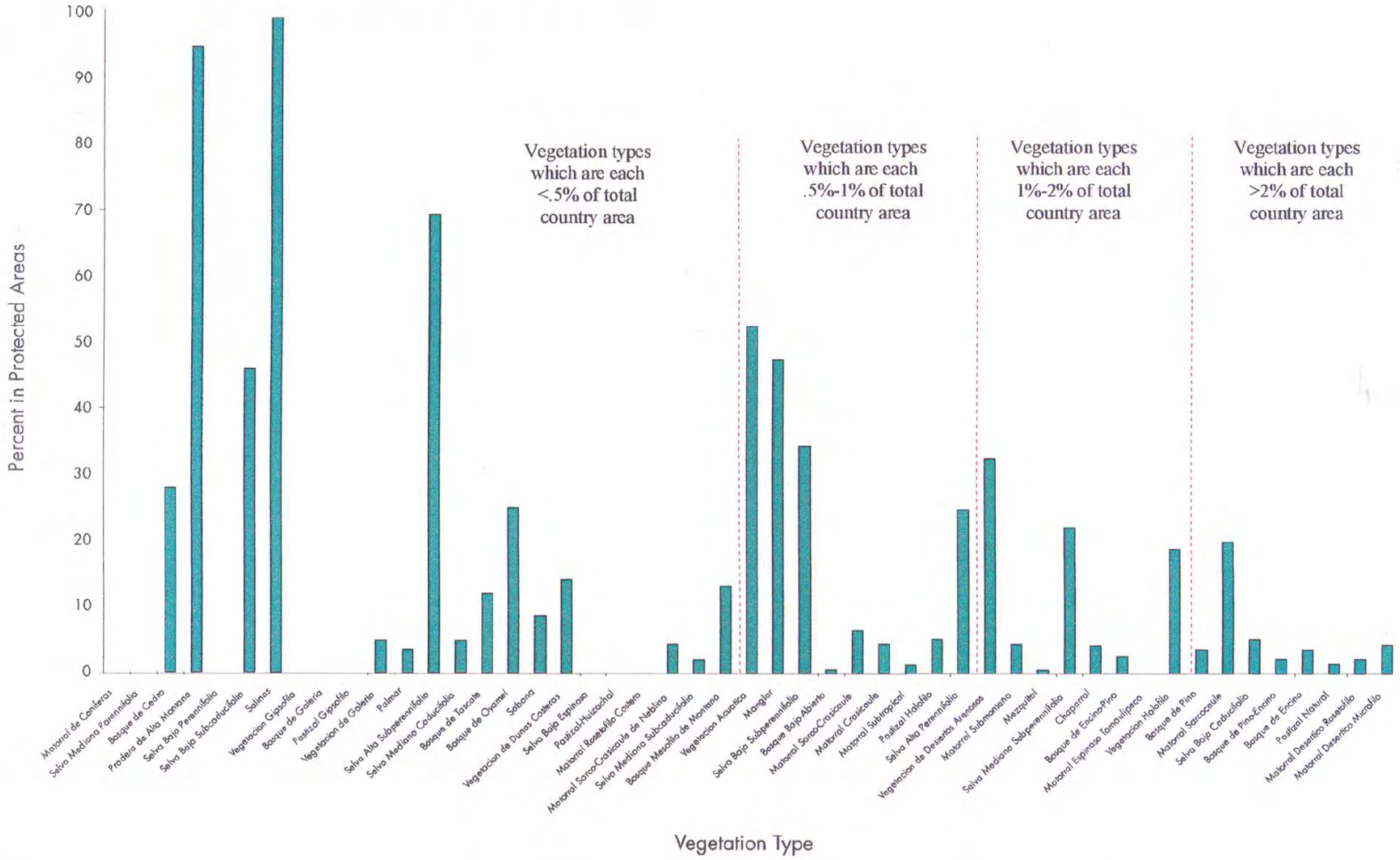


INEGI, 1996 - Primary Vegetation of Mexico

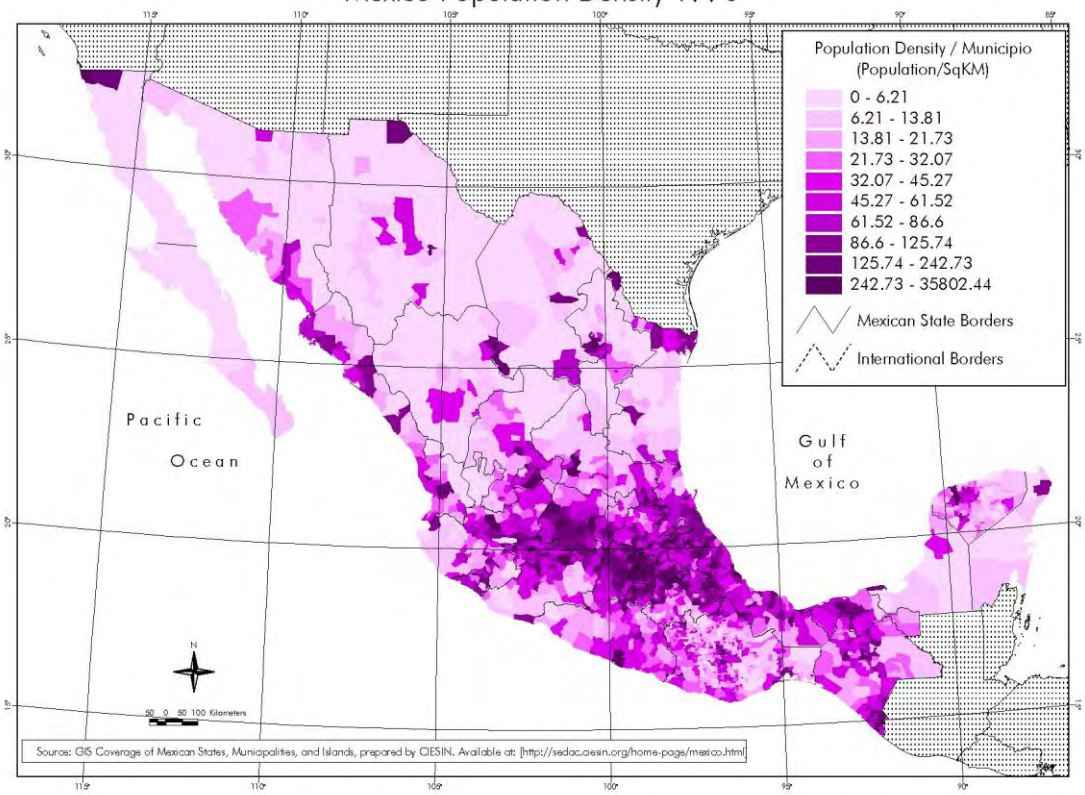



Remaining Hectares of Primary Vegetation in Mexico
20,000,000
18,000,000
16,000,000
14,000,000
12,000,000
10,000,000
8,000,000
6,000,000
4,000,000
2,000,000
0
Area (Hectares)
Vegetation Type

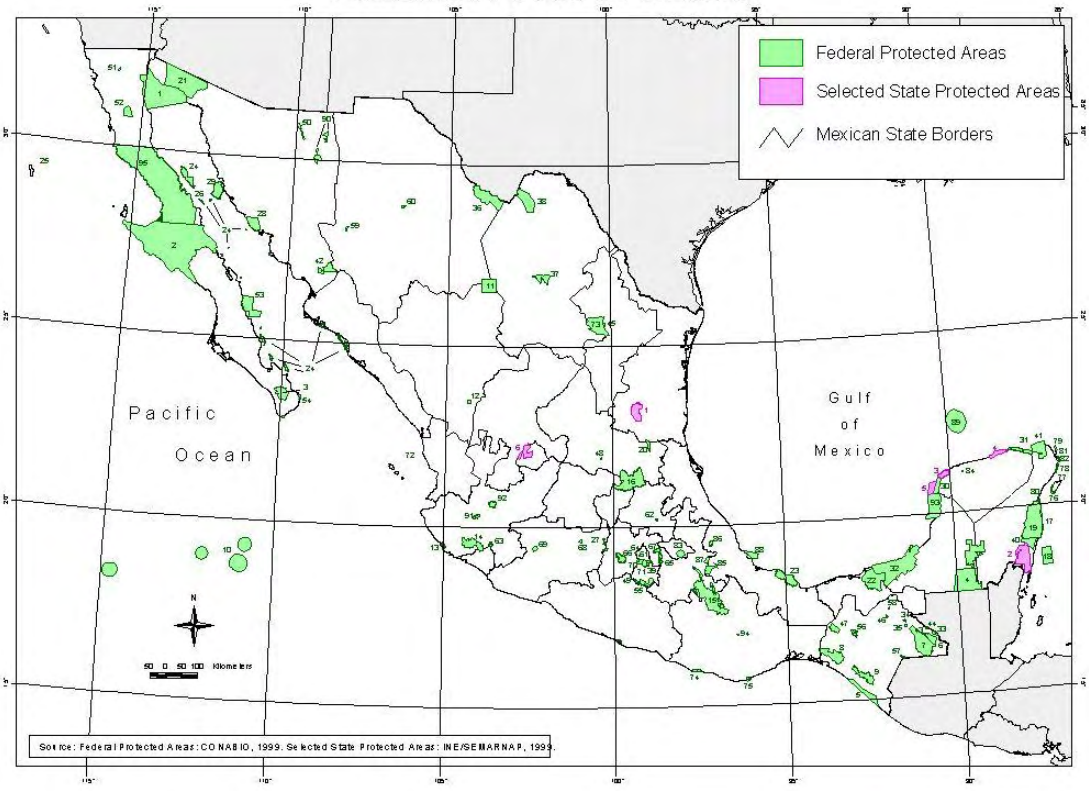
Percentage of Remaining Vegetation that is in Protected Areas



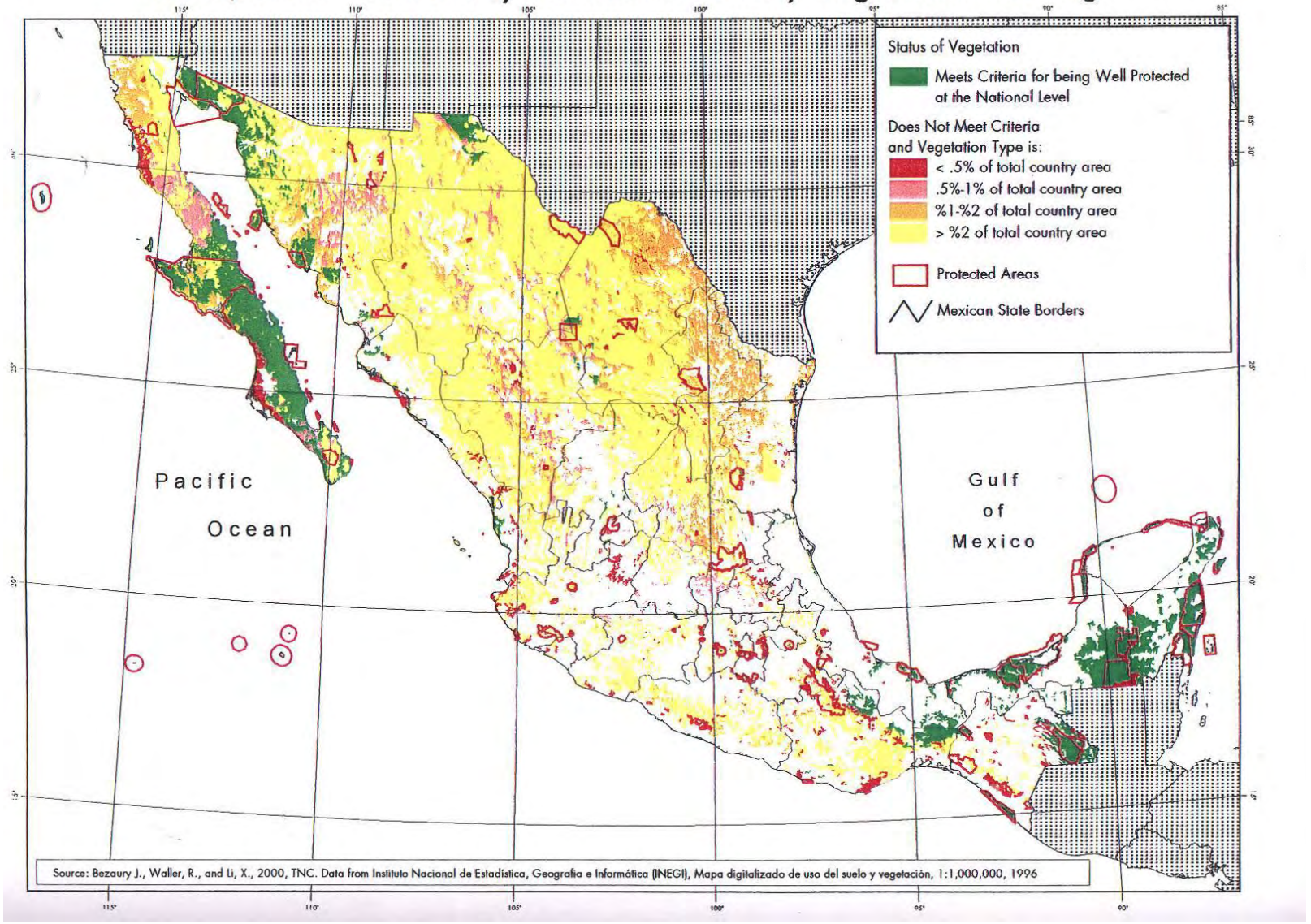
Mexico Population Density 1990



Protected Areas of Mexico



INEGI, 1996 - GAP Analysis Status of Primary Vegetation Coverage



Vegetation Type	Total Area Remaining in Mexico (ha.)	% of Mex.	Protection. Target	Total Area Remaining within Protected Areas (ha.)	% within Prot. Area	Additional Area Needed to Achieve Target (ha.)
Matorral de Coníferas	1,834	0.00	40%	0	0%	734
Selva Mediana Perennifolia	3,093	0.00	40%	0	0%	1,237
Bosque de Cedro	3,170	0.00	40%	886	27%	382
Pradera de Alta Montaña	16,550	0.01	40%	15,687	95%	0
Selva Baja Perennifolia	42,066	0.02	40%	0	0%	16,826
Selva Baja Subcaducifolia	43,684	0.02	40%	20,109	46%	0
Salinas	45,823	0.02	40%	45,474	99%	0
Vegetación Gipsófila	50,448	0.03	40%	0	0%	20,179
Bosque de Galería	50,634	0.03	40%	0	0%	20,254
Pastizal Gipsófilo	67,905	0.03	40%	0	0%	27,162
Vegetación de Galería	70,877	0.04	40%	3,446	4.86%	24,905
Palmar	101,068	0.05	40%	3,588	3.55%	36,839
Selva Alta Subperennifolia	103,362	0.05	40%	71,718	69%	0
Selva Mediana Caducifolia	134,820	0.07	40%	6,655	4.93%	47,273
Bosque de Táscate	138,795	0.07	40%	16,773	12%	38,745
Bosque de Oyamel	144,435	0.07	40%	36,169	25%	21,605
Sabana	147,015	0.07	40%	? 12,793	8.7%	46,013
Vegetación de Dunas Costeras	158,990	0.08	40%	22,496	14%	41,100
Selva Baja Espinosa	170,180	0.08	40%	0	0%	68,072
Pastizal - Huizachal	334,316	0.17	40%	0	0%	133,726
Matorral Rosetofilo Costero	429,574	0.21	40%	0	0%	171,830
Matorral Sarco-Crasicaule de Neblina	533,614	0.27	40%	23,050	4.31%	190,396
Selva Mediana Subcaducifolia	654,921	0.33	40%	13,564	2.07%	248,408
Bosque Mesófilo de Montaña	857,916	0.43	40%	113,314	13%	229,852
Vegetación Acuática	1,003,027	0.50	30%	527,162	53%	0
Manglar	1,056,635	0.53	30%	502,451	48%	0
Selva Baja Subperennifolia	1,134,264	0.57	30%	390,002	34%	0
Bosque Bajo - Abierto	1,181,022	0.59	30%	6,434	0.54%	347,873
Matorral Sarco-Crasicaule	1,215,444	0.61	30%	78,338	6.44%	286,295
Matorral Crasicaule	1,326,515	0.66	30%	59,171	4.46%	338,783
Matorral Subtropical	1,354,265	0.68	30%	16,896	1.24%	389,383
Pastizal Halófilo	1,417,626	0.71	30%	73,806	5.20%	351,482
Selva Alta Perennifolia	1,761,978	0.88	30%	440,356	25%	88,237
Vegetación de Desiertos Arenosos	2,224,704	1.11	20%	726,055	33%	0
Matorral Submontano	2,405,383	1.20	20%	106,922	4.44%	374,155
Mezquital	2,427,550	1.21	20%	13,847	0.57%	471,663
Selva Mediana Subperennifolia	2,601,275	1.30	20%	579,134	22%	0
Chaparral	2,792,167	1.39	20%	117,983	4.22%	440,450
Bosque de Encino - Pino	2,803,352	1.40	20%	72,173	2.57%	488,497
Matorral Espinoso Tamaulipeco	2,847,658	1.42	20%	0	0%	569,532
Vegetación Halófila	3,364,200	1.68	20%	635,402	19%	37,438

Bosque de Pino	5,883,246	2.94	10%	213,552	3.62%	374,773
Matorral Sarcocaule	6,459,531	3.23	10%	1,295,794	20%	0
Selva Baja Caducifolia	7,172,591	3.58	10%	375,176	5.23%	342,083
Bosque de Pino - Encino	7,683,349	3.84	10%	174,004	2.26%	594,331
Bosque de Encino	7,708,244	3.85	10%	281,479	3.65%	489,345
Pastizal Natural	7,728,628	3.86	10%	118,606	1.53%	654,257
Matorral Desertico Rosetofilo	10,336,026	5.16	10%	235,199	2.27%	798,404
Matorral Desertico Microfilo	19,001,591	9.49	10%	822,262	4.32%	1,077,897
Total Primary (hectares)	**109,195,365**	**54.53**		8,047,421		9,900,416
Total Other (agriculture, pasture, secondary)	86,515,246	45.47		2,050,397		

These figures include the following select State protected areas of national importance: El Cielo, Tamps, Sierra Fria, Ags., Los Petenes, Camp. (Marine portion in front of Celestún), El Palmar Yuc., Dzilam, Yuc. Bahia de Chetumal, Q. Roo

MEXICAN FLORA: RICHNESS AND ENDEMISMS

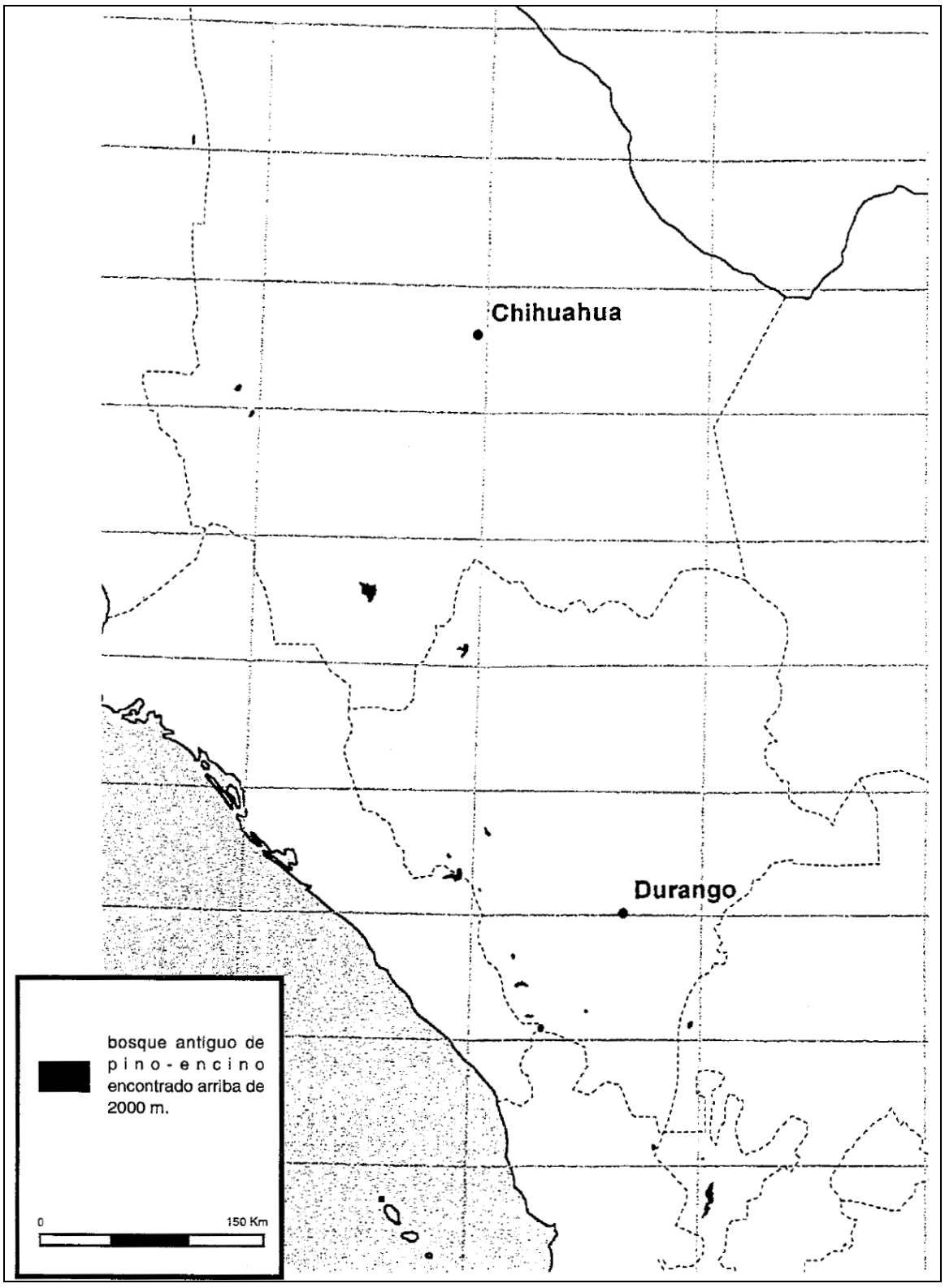
CONABIO-UNAM (Rzedowski, 1992 *in* Flores-Villela y Gerez 1994)

Vegetation Type	% Coverage	Plant Species Richness	Endemisms
Mesofilo de Montaña Cloud Forest	0.7%	3,000	30%
Tropical Perennifolio Tropical Wet Forest	4.4%	5,000	5%
Coníferas y Encinos Pine and Oak	12.9%	7,000	70%
Matorral Xerofilo y Pastizales Xerofile and Grasslands	34.8%	6,000	60%
A*cuática y Suabacuática* Aquatic and Subaquatic	1.43%	1,000	15%
Tropical Subcaducifolia, Caducifolia y Espinosa Tropical Dry Forests	7.9%	6,000	40%
Veg. Ruderal y Arvense Roaside and cultivated lands	ND	2,000	20%
MEXICO	100%	220 Families 2,410 Genera 18,000 Species 22,800 Prob. Sp.	(2 fam.) 10% (230 gen.) 52% (9,300 sp.)

Situación y conservación de los bosques antiguos de pino-encino de la Sierra Madre occidental y sus aves endémicas.

CIPAMEX (Lammertink *et al.* 1997)

SITIO	Bosque Antiguo - sup Km2				Prop. ANP	Sup. Km2 ANP Prop.
	Bosque de Encinos	Pino-encino de mesas	Pino-encino seco abierto	Bosque de cañones		
El Carricito, Jal	1.1	20.6	117.9		Carricito del Huichol.	149
Los Amoles, Jal.			4.9			
San Miguel Huaistita, Nay.				9.8		
SE R.B. la Michilia, Dgo.(Zac)			21.2			
Monte Oscuro, Dgo.						
Cerro Gordo, Dgo.		parche				
Calaveras, Dgo.				2.9		
El Gallo, Dgo.			(8.0)			
La Formación, Dgo.			(25.1)			
Mexiquillo, Dgo.				9.7		
Cerro Buenavista, Dgo.						
Cabezón, Dgo.		(O.6)				
Las Bufas, Dgo. Sin.	2.6	(5.7)		91.4	Las Bufas	206
Carboneras, Dgo.	1.2		10.2	3.7		
Pielagos, Dgo.				12.7		
Quebrada de Peñol, Dgo.				29.8		
Pino Gordo, Chih.		0.6	154			
Mesa Rechánachi, Chih.			9.8			
PN Basaseachic, Chih.			17.8	3.2		
Sierra Tabaco, Son				4.3	Sierra Tabaco - Río Babispe	515
Sitios de Anidación de Cotorras Serranas						
Mesa de Guacamayas, Chih.	Bosques alterados con pinos muertos en pie y otros árboles por encima los 2,300 m.s.n.m.					29
Cebadilla / Yahuirachic, Chih						351
Cócono / Ciénega de la Vaca, Dgo.						1,521



Remanentes de bosque antiguo de pino-encino en octubre de 1995.
Área total: 571 km², es decir, el 0.61% del área original. (Lammertink *et al.* 1997)

OFFICIAL MEXICAN NORM FOR SPECIES AT RISK (FLORA)

SECRETARIA DE MEDIO AMBIENTE RECURSOS NATURALES Y PESCA (SEDESOL 1994)

The Official Mexican Norm NOM-059-ECOL-1994 lists the following plant and fungi species and subspecies that are considered at risk. These are classified as (P) Endangered, (A) Threatened (R) Rare and (Pr) Subject to Special Protection. Within these categories, endemic species are marked with an asterisk.

FAMILY SCIENTIFIC NAME	CAT.
ACANTHACEAE	
Bravaisia integerrima	*A*
Holographis argyrea	*R*
Louteridium donell-smithii	*P*
Louteridium mexicanum	*R*
Louteridium parayi	*P*
ACERACEAE	
Acer negundo mexicanum	*R**
Acer skotchii	*P*
ACTINIDACEAE	
Saurauia serrata	*R*
AGARICACEAE	
Agaricus augustus	*A*
Psathyrella spadicea	*A*
Psilocybe angustipleurocystidiata	*R*
Psilocybe armandii	*R*
Psilocybe aztecorum aztecorum	*R*
Psilocybe aztecorum bonetii	*R*
Psilocybe baderillensis	*P*
Psilocybe barrerae	*R*
Psilocybe caerulescens caerulescens	*R*
Psilocybe caerulescens ombrophila	*R*
Psilocybe caerulipes	*R*
Psilocybe cordispora	*R*
Psilocybe cubensis	*R*
Psilocybe fagicola fagicola	*R*
Psilocybe fagicola mesocystidiata	*R*
Psilocybe galindoii	*R*
Psilocybe heimii	*P*
Psilocybe herrerae	*R*
Psilocybe hoogshagenii convexa	*R*
Psilocybe hoogshagenii hoogshagenii	*R*
Psilocybe jacobsii	*R*
Psilocybe mammillata	*R*
Psilocybe mexicana	*R*
Psilocybe muliercula	*R*
Psilocybe pleurocystidiosa	*P*
Psilocybe rzedowskii	*P*
Psilocybe sanctorum	*R*
Psilocybe schultesii	*R*
Psilocybe singeri	*P*
Psilocybe subcubensis	*R*
Psilocybe subyungensis	*R*
Psilocybe uxpanapensis	*P*
Psilocybe veraecrucis	*P*
Psilocybe wassoniorum	*R*
Psilocybe weldenii	*P*
Psilocybe xalapensis	*R*
Psilocybe yungensis	*R*
Psilocybe zapotecorum	*R*
Tricholosporum subporphyrophyllum	*P*
Tricholosporum tropicalis	*P*
AGAVACEAE	
Agave bracteosa	*A*
Agave congesta	*R*
Agave chiapensis	*R**
Agave dasylirioides	*A**
Agave guiengola	*A**
Agave gypsophila	*R*
Agave impressa	*A**
Agave kewensis	*R**
Agave lurida	*P**
Agave nizandensis	*P**
Agave ornithobroma	*R*
Agave parrasana	*R**
Agave parviflora	*A*
Agave peacockii	*R**
Agave polianthiflora	*A*
Agave titanota	*R**
Agave victoria-reginae	*P**
Agave vizcainoensis	*R**
Beaucarnea gracilis	*A**
Beaucarnea goldmanii	*A**
Beaucarnea hiriartiae	*A**
Beaucarnea pliabilis	*A**
Beaucarnea purpusii	*A**
Beaucarnea recurvata	*A*
Beaucarnea stricta	*A**
Beschorneria albiflora	*R*
Beschorneria calcicola	*R**
Beschorneria tubiflora	*R*
Beschorneria wrightii	*R**
Dasylirion palaciosii	*R**
Dasylirion longissimum	*A*
Furcraea bendinghausii	*A**
Furcraea macdougallii	*P**
Manfreda brunnea	*A*
Manfreda guerrerensis	*R**
Manfreda longiflora	*A*
Manfreda nanchititlensis	*A**
Manfreda planifolia	*R**
Manfreda potosina	*R**
Polianthes densiflora	*R**
Polianthes howardii	*R**
Polianthes longiflora	*R**
Polianthes palustris	*R**
Polianthes platyphylla	*R**
Yucca endlichiana	*R*
Yucca grandiflora	*R**
Yucca lacandonica	*A*
Yucca queretaroensis	*R*
AMANITACEAE	
Amanita caesarea	*Pr*
Amanita hemibapha	*A*
Amanita muscaria	*A*
AMARYLLIDACEAE	
Hymenocallis concinna	*P**
Hymenocallis durangoensis	*P**
Hymenocallis guerrerensis	*A**
Hymenocallis leavenworthii	*A**

Petronymphe decora	*P**
Zephyranthes conzatti	*A**
ANACARDIACEAE	
Astronium graveolens	*A*
Spondias radlkoferi	*A*
ANNONACEAE	
Guatteria anomala	*A*
APOCYNACEAE	
Vallesia spectabiilis	*R**
ARACEAE	
Anthurium podophyllum	*A*
Dieffembachia seguine	*A*
Monstera adansonii	*A*
Monstera punctulata	*A*
Monstera tuberculata	A
Spathiphyllum friedrichsthalii	A
ASCLEPIADACEAE	
Asclepias mcvaughii	*R*
BETULACEAE	
Carpinus caroliniana	*A*
Ostrya virginiana	*R*
BIGNONIACEAE	
Tabebuia chysantha	*A*
Tabebuia palmeri	*A*
BOLETACEAE	
Boletus edulis	*Pr*
Boletus pinophilus	*A*
Suillus brevipes	*A*
Suillus granulatus	*A*
BROMELIACEAE	
Catopsis berteroniana	*R*
Tillandsia carloshankii	*A**
Tillandsia chiapensis	*A**
Tillandsia concolor	*A*
Tillandsia ehlersiana	*A**
Tillandsia elongata	*A*
Tillandsia festucoides	*R*
Tillandsia flexuosa	*R*
Tillandsia imperialis	*A*
Tillandsia lampropoda	*A*
Tillandsia ortgiesiana	*A**
Tillandsia polita	*A*
Tillandsia ponderosa	*A*
Tillandsia pueblensis	*A**
Tillandsia roland gosselinii	*A**
Tillandsia seleriana	*A*
Tillandsia socialis	*A**
Tillandsia tricolor	*A*
Vriesea breedloveana	*A**
Vriesea malzinei disticha	*A**
Vriesea ovandensis	*A**
BURSERACEAE	
Bursera arborea	*A**
Bursera bonetii	*R*
Bursera coyucensis	*R*
CACTACEAE	
Aporocactus leptophis	*P**
Aporocactus flagelliformis	*R**
Ariocarpus agavoides	*P**
Ariocarpus bravoanus	*R**
Ariocarpus fissuratus	*A**
Ariocarpus kotschoubeyanus	*A**
Ariocarpus scapharostrus	*P**
Ariocarpus trigonus	*A**
Astrophytum asterias	*P**
Astrophytum capricorne	*A**
Astrophytum ornatum	*A**
Astrophytum myriostigma	*A**
Aztekium hintonii	*R**
Aztekium ritteri	*A**
Backebergia militaris	*R**
Cephalocereus nizandensis	*R**
Cephalocereus senilis	*A**
Coryphantha delicata	*R**
Coryphantha durangensis	*R**
Coryphantha elephantidens	*A*
Coryphantha glanduligera	*A**
Coryphantha gracilis	*P**
Coryphantha grata	*R**
Coryphantha greenwoodii	*R**
Coryphantha odorata	*R**
Coryphantha poselgeriana	*A**
Coryphantha pseudoechinus	*R**
Coryphantha pulleiniana	*A**
Coryphantha ramillosa	*A*
Coryphantha retusa melleospina	*R**
Coryphantha schwarziana	*R**
Coryphantha sulcata nickelsiae	*A*
Coryphantha werdermannii	*P**
Cryptocereus anthonyanus	*A*
Echinocactus grusonii	*P**
Echinocactus parryi	*A**
Echinocactus platyacanthus	*Pr**
Echinocereus adustus	*A**
Echinocereus bristolii	*R*
Echinocereus delaetii	*A**
Echinocereus freudenbergerii	*A**
Echinocereus knippelianus	*A**
Echinocereus laui	*A**
Echinocereus leucanthus	*R**
Echinocereus lindsayi	*P**
Echinocereus longisetus	*R**
Echinocereus nivosus	*R**
Echinocereus palmeri	*P*
Echinocereus poselgeri	*P*
Echinocereus pulchellus	*A**
Echinocereus reichenbachii fitchii	*A**
Echinocereus schmollii	*P**
Echinocereus sciurus	*R**
Echinocereus stoloniferus	*R**
Echinocereus subinermis	*R**
Echinocereus weinbergii	*R**
Echinomastus erectocentra acunensis	*P*
Echinomastus intertextus	*A**
Echinomastus mariposensis	*A**
Echinomastus unguispinus durangensis	*A*
Echinomastus unguispinus laui	*A**
Echinomastus unguispinus unguispinus	*R**
Echinomastus warnockii	*R*
Epiphyllum chrysocardium	*A**
Epithelantha bokei	*A*
Epithelantha micromeris	*R*
Escobaria aguirreana	*R**
Escobaria asperispina	*A**
Escobaria chaffeyi	*A**
Escobaria laredoi	*R**
Escobaria roseana	*R**
Ferocactus chrysacanthus	*A**
Ferocactus cylindraceus	*R*
Ferocactus haematacanthus	*R**
Ferocactus johnstonianus	*R**
Ferocactus pilosus	*A**
Ferocactus rectispinus	*A**
Ferocactus reppenhagenni	*R**
Ferocactus townsendianus townsendianus	*A*
Ferocactus viridescens	*A**
Geohintonia mexicana	*R**
Hamatocactus crassihamatus	*A**
Hamatocactus uncinatus	*A**
Leuchtenbergia principis	*A**

Lophocereus schottii	*mieckleyanus*		R*
Lophocereus schottii	*monstrosus*		R*
Lophophora diffusa			A*
Lophophora williamsii			Pr
Mammillaria albicans			R*
Mammillaria albicoma			A*
Mammillaria angelensis			R*
Mammillaria anniana			R*
Mammillaria aureiceps			A*
Mammillaria aureilanata			A*
Mammillaria aurihamata			R*
Mammillaria backebergiana			R*
Mammillaria baumii			R*
Mammillaria beiselii			R*
Mammillaria blossfeldiana			R*
Mammillaria bocasana			A*
Mammillaria bombycina			R*
Mammillaria boolii			R*
Mammillaria candida			A*
Mammillaria capensis			R*
Mammillaria carmenae			P*
Mammillaria carretii			R*
Mammillaria cerralboa			R*
Mammillaria coahuilensis			A*
Mammillaria crucigera			R*
Mammillaria deherdtiana	*deherdtiana*		R*
Mammillaria deherdtiana	*dodsonii*		A*
Mammillaria dixanthocentron			R*
Mammillaria duoformis			R*
Mammillaria erectacantha			A*
Mammillaria evermanniana			R*
Mammillaria fittkaui			R*
Mammillaria gaumeri			R*
Mammillaria glareosa			R*
Mammillaria goodridgii			R*
Mammillaria grusonii			R*
Mammillaria guelzowiana			A*
Mammillaria guerreronis			R*
Mammillaria hahniana			A*
Mammillaria halei			R*
Mammillaria heidiae			R*
Mammillaria hernandezii			R*
Mammillaria herrerae			P*
Mammillaria hertrichiana			R*
Mammillaria huitzilopochtli			R*
Mammillaria humboldtii			A*
Mammillaria insularis			R*
Mammillaria johnstonii			R*
Mammillaria klissingiana			A*
Mammillaria knippeliana			R*
Mammillaria kraehenbuehlii			R*
Mammillaria laui laui			P*
Mammillaria laui dasyacantha			P*
Mammillaria laui discata			P*
Mammillaria lenta			A*
Mammillaria lindsayi			R*
Mammillaria longiflora			A*
Mammillaria longimamma			A*
Mammillaria magnifica			R*
Mammillaria maritima			R*
Mammillaria marksiana			R*
Mammillaria mathildae			A*
Mammillaria matudae			R*
Mammillaria melaleuca			A*
Mammillaria mercadensis			R*
Mammillaria meyranii			R*
Mammillaria microhelia			R*
Mammillaria miegiana			R*
Mammillaria moelleriana			R*
Mammillaria multidigitata			R*
Mammillaria nana			R*
Mammillaria napina			A*
Mammillaria neopalmeri			R*
Mammillaria oteroi			A*
Mammillaria painteri			R*
Mammillaria parkinsonii			R*
Mammillaria pectinifera			A*
Mammillaria peninsularis			R*
Mammillaria pennispinosa			R*
Mammillaria perezdelarosae			R*
Mammillaria pilcayensis			R*
Mammillaria pilispina			R*
Mammillaria plumosa			A*
Mammillaria pondii			R*
Mammillaria pringlei			R*
Mammillaria pubispina			R*
Mammillaria reppenhagenii			R*
Mammillaria rettigiana			R*
Mammillaria roseoalba			R*
Mammillaria rubrograndis			R*
Mammillaria saboae			A*
Mammillaria san-angelensis			P*
Mammillaria sanchezmejoradae			P*
Mammillaria schiedeana			A*
Mammillaria schwarzii			R*
Mammillaria senilis			A*
Mammillaria setispina			R*
Mammillaria slevinii			R*
Mammillaria solisioides			A*
Mammillaria stella-de-tacubaya			R*
Mammillaria surculosa			R*
Mammillaria tayloriorum			R*
Mammillaria tepexicensis			R*
Mammillaria theresae			A*
Mammillaria tonalensis			A*
Mammillaria varieaculeata			R*
Mammillaria weingartiana			A*
Mammillaria wiesingeri			R*
Mammillaria xaltianguensis			R*
Mammillaria yaquensis			R*
Mammillaria yucatanensis			R*
Mammillaria zeilmanniana			R*
Mammillaria zephyranthoides			A*
Melocactus dawsonii			A*
Melocactus delessertianus			P*
Melocactus ruestii			A
Mitrocereus fulviceps			R*
Morangaya pensilis			R*
Nopalxochia macdougallii			R
Nopalxochia phyllanthoides			A*
Obregonia denegrii			A*
Opuntia anteojoensis			R*
Opuntia arenaria			R
Opuntia bravoana			R*
Opuntia excelsa			R*
Opuntia rosarica			R*
Opuntia santamaria			R*
Ortegocactus macdougallii			A*
Pachycereus gaumeri			P*
Pelecyphora aselliformis			A*
Pelecyphora strobiliformis			P*
Peniocereus cuixmalensis			R*
Peniocereus fosterianus			R*
Peniocereus greggii			R
Peniocereus lazaro-cardenasii			R*
Peniocereus maculatus			R*
Peniocereus marianus			R*
Peniocereus tepalcatepecanus			R*
Peniocereus zopilotensis			R*
Pilosocereus cometes			R*

Pterocereus gaumeri	*R**
Selenicereus anthonyanus	*A**
Selenicereus atropilosus	*R**
Stenocactus coptonogonus	*R**
Stenocactus sulphureus	*R**
Stenocereus chacalapensis	*R**
Stenocereus eruca	*A**
Stenocereus martinezii	*R**
Strombocactusdisciformis	*A**
Thelocactus bicolor bolansis	*A**
Thelocactus hastifer	*R**
Thelocactus heterochromus	*A**
Thelocactus leucacanthus ehrenbergii	*R**
Thelocactus macdowellii	*A**
Thelocactus rinconensis nidulans	*A**
Thelocactus schwarzii	*R**
Thelocactus tulensis	*A**
Turbinicarpus gautii	*A**
Turbinicarpus gielsdorfianus	*A**
Turbinicarpus hoferi	*A**
Turbinicarpus laui	*A**
Turbinicarpus lophophoroides	*A**
Turbinicarpus mandragora	*A**
Turbinicarpus pseudomacrochele	*P**
Turbinicarpus pseudopectinatus	*R**
Turbinicarpus saueri	*A**
Turbinicarpus schmiedickeanus	*A**
Turbinicarpus schmiedickeanus gracilis	*P**
Turbinicarpus subterraneus	*A**
Turbinicarpus swobodae	*A**
Turbinicarpus valdezianus	*A**
Turbinicarpus viereckii	*A**
Turbinicarpus ysabelae	*A**
CANTHARELLACEAE	
Cantharellus cibarius	*Pr*
CELASTRACEAE	
Zinowiewia concinnia	*P*
CERATOPHYLLACEAE	
Ceratophyllum echinatum	*R*
CHRYSOBALANACEAE	
Licania arborea	*A*
COCHLOSPERMACEAE	
Amoreuxia palmafitida	*R*
Amoreuxia wrightii	*P*
COMBRETACEAE	
Conocarpus erecta	*Pr*
Laguncularia racemosa	*Pr*
COMPOSITAE	
Arnicastrum guerrerense	*R*
COMPOSITAE	
Dahlia scapigera	*R**
Dahlia tenuicaulis	*R*
Oxylobus macrocephalus	*R*
Perymenium wilburorium	*P*
Psacalium nanum	*R*
Senecio orcutti	*P*
Stevia cruzii	*R*
Stevia gypsophila	*R*
Zinnia citrea	*R*
Zinnia violacea	*A*
CORNACEAE	
Cornus florida urbiniana	*R*
CRASSULACEAE	
Echeveria amphoralis	*R**
Echeveria elegans	*P**
Echeveria laui	*P**
Echeveria longissima aztatlensis	*A**
Echeveria longissima longissima	*A**
Echeveria moranii	*R**
Echeveria purpusorum	*P**
Echeveria setosa ciliata	*P**
Echeveria setosa deminuta	*P**
Echeveria setosa minor	*P**
Echeveria setosa oteroi	*P**
Echeveria setosa setosa	*P**
Graptopetalum grande	*R*
Graptopetalum macdougallii	*P**
Sedum frutescens	*P**
Sedum platyphyllum	*R**
Sedum suaveolens	*P**
Sedum torulosum	*R**
CUPRESSACEAE	
Cupressus benthamii	*Pr*
Cupressus forbesii	*R*
Cupressus guadalupensis	*P**
Cupressus lusitanica	*Pr*
Cupressus montana	*R*
Juniperus californica	*R*
Juniperus monticola	*Pr*
CYATHEACEAE	
Alsophila firma	*Pr*
Alsophilasalvinii	*R*
Cnemidaria apiculata	*R*
Cnemidaria decurrens	*R*
Cyathea bicrenata	*Pr*
Cyathea costaricensis	*P*
Cyathea divergens tuerckheimii	*Pr*
Cyathea fulva	*Pr*
Cyathea mexicana	*P*
Cyathea scabriuscula	*Pr*
Cyathea schiedeana	*R*
Sphaeropteris horrida	*R*
Trichipteris mexicana	*R*
DICKSONIACEAE	
Cibotium regale	*P*
Cibotium schiedei	*P*
Culcita coniifolia	*R*
Dicksonia gigantea	*R*
DITRICHACEAE	
Astomiopsis exserta	*A*
EBENACEAE	
Diospyros riojae	*P*
Diospyros xolocotzii	*R*
PELEOCARPACEAE	
Sloanea terniflora	*R*
ENTOLOMATACEAE	
Entoloma giganteum	*A*
ERICACEAE	
Arbutus occidentalis	*R*
Comarostaphylis discolor	*R*
EUPHORBIACEAE	
Bernardia mollis	*A*
Cnidoscolus autlanensis	*R*
Croton wilburi	*R*
Phyllanthus fluitans	*R*
Sapium macrocarpum	*A*
Tetrorchidium rotundatum	*A*
FOUQUIERIACEAE	
Fouquieria fasciculata	*A**
Fouquieria leonilae	*R**
Fouquieria ochoterenae	*P**
Fouquieria purpussii	*P**
Fouquieria shrevei	*R**
FRANKENIACEAE	
Frankenia johnstonii	*P*
Frankenia margaritae	*A*
GENTIANACEAE	
Gentiana calyculata	*R*
Gentiana spathacea	*R*

GOMPHIDEACEAE	
Gomphidius rutilus	*A*
GRAMINAE	
Agrostis novogaliciana	*R*
Arthrostylidium spinosum	*P*
Digitaria paniculata	*R*
Guadua spinosa	*P*
Muhlenbergia jaliscana	*R*
Olmeca recta	*P**
Olmeca reflexa	*P**
Triniochloa laxa	*P*
Triniochloa micrantha	*P*
Tripsacum maizar	*A*
Tripsacum zopilotense	*R**
Zea diploperennis	*A**
Zea perennis	*P**
GRIMMIACEAE	
Jaffueliobryum arsenei	*R*
GUTYFERAE	
Calophyllus brasiliense rekoi	*A*
HAMMAMELIDACEAE	
Matudea trinerva	*A*
HOOKERIACEAE	
Schizomitrium mexicanum	R
HYGROPHORACEAE	
Hygrophorus russula	*A*
IRIDACEAE	
Ainea conzatti	*A**
Fosteria oaxacana	*A*
Sessilanthera heliantha	*R**
Tigridia bicolor	*R**
Tigridia flammea	*R*
Tigridia hintonii	*R**
Tigridia huajuapanensis	*R**
Tigridia inusitata	*R*
Tigridia orthantha	*R*
ISOETACEAE	
Isoetes bolanderi	*R*
JUGLANDACEAE	
Alfaroa mexicana	*R**
Juglans major	*A*
Juglans pyriformis	*A*
LABIATAE	
Salvia manantlanensis	*R**
LACANDONIACEAE	
Lacandonia schismatica	*R**
LAURACEAE	
Litsea glaucescens	*P*
LEGUMINOSAE	
Acosmium panamense	*A*
Albizia plurijuga	*A*
Bauhinia fryxellii	*R*
Calliandra arborea	*A*
Dalbergia congestiflora	*P*
Dalbergia granadillo	*P*
Enterolobium schomburgkii	*A*
Erithrina coralloides	*A*
Olneya tesota	*Pr*
Ormosia isthmensis	*P*
Ormosia macrocalyx	*P*
Peltogyne mexicana	*A*
Platymiscium lasiocarpum	*P*
Vatairea lundellii	*P*
LILIACEAE	
Calochortus foliosus	*R**
Calochortus nigrescens	*R*
Schoenocaulon jaliscense	*R*
Schoenocaulon pringlei	*R*
Zygadenus virescens	*R*

LYCOPODIACEAE	
Lycopodium dichotomum	*A*
MAGNOLIACEAE	
Magnolia dealbata	*P*
Magnolia grandiflora	*A*
Magnolia iltisiana	*A*
Magnolia schiedeana	*A*
Talauma mexicana	*A*
MALVACEAE	
Dendrosida batesii	*A*
Dendrosida breedlovei	*A*
Hampea montebellensis	*A*
Hibiscus spiralis	*A*
Periptera ctenotricha	*R*
Periptera macrostelis	*R*
Phymosia rosea	*R*
Phymosia rzedowskii	*R*
MARATTIACEAE	
Marattia laxa	*R*
Marattia weinmanniifolia	*R*
MELIACEAE	
Cedrela dugesii	*Pr*
MICROCYSTACEAE	
Coelomorum microcystoides	*Pr*
MORCHELACEAE	
Morchella conica	*Pr*
Morchella costata	*A*
Morchella elata	*Pr*
Morchella esculenta	*Pr*
Morchella umbrina	*A*
NOSTOCACEAE	
Cylindrospermopsis philippinensis	*Pr*
OLEACEAE	
Fraxinus udhei	*Pr*
Hesperalaea palmeri	*P*
ORCHIDACEAE	
Acineta barkeri	*A*
Amparoa beloglossa	*A**
Aspidogyne stictophylla	*R*
Barbosella prorepens	*A*
Barkeria dorotheae	*A**
Barkeria melanocaulon	*A**
Barkeria scandens	*Pr**
Barkeria shoemakeri	*R**
Barkeria skinneri	*R**
Barkeria strophinx	*A**
Barkeria warthoniana	*R**
Bletia urbana	*A**
Cattleya skinneri	*A*
Caularthron bilamellatum	*R*
Chysis bractescens	*A*
Chysis limminghei	*A**
Clowesia glaucoglossa	*R**
Clowesia rosea	*A**
Cochleanthes flabelliformis	*R*
Coelia densiflora	*R*
Corallorhiza macrantha	*R*
Cryptarrhena lunata	*R*
Cuitlauzina pendula	*A**
Cycnoches ventricossum	*A*
Cypripedium dickinsonianum	*R*
Cypripedium irapeanum	*A*
Dignathe pygmaeus	*R**
Dracula pusilla	*R*
Dryadella guatemalensis	*R*
Elleanthus himenophorus	*A*
Encyclia abbreviata	*R*
Encyclia adenocaula	*A**
Encyclia atrorubens	*R**
Encyclia citrina	*Pr**

Encyclia distantiflora	*R*	*Oerstedella pansamalae*	*A*
Encyclia kienastii	*P**	*Oncidium crista-galli*	*R*
Encyclia lorata	*R**	*Oncidium endocharis*	*A*
Encyclia mariae	*A**	*Oncidium ensatum*	*R*
Encyclia neurosa	*R*	*Oncidium exauriculatum*	*R*
Encyclia pollardiana	*R**	*Oncidium flavovirens*	*R**
Encyclia tuerckheimii	*R*	*Oncidium incurvum*	*A**
Encyclia vagans	*R*	*Oncidium leucochilum*	*A*
Encyclia vitellina	*Pr*	*Oncidium ochmatochilum*	*A*
Epidendrum alabastrialatum	*R*	*Oncidium pollardii*	*A**
Epidendrum alticola	*A*	*Oncidium pumilio*	*R*
Epidendrum cerinum	*R*	*Oncidium stelligerum*	*R**
Epidendrum chloe	*R*	*Oncidium stramineum*	*A**
Epidendrum cnemidophorum	*A*	*Oncidium suttonii*	*R*
Epidendrum coronatum	*R*	*Oncidium tigrinum*	*A**
Epidendrum cystosum	*R*	*Oncidium unguiculatum*	*A*
Epidendrum dorsocarinatum	*R**	*Oncidium wentworthianum*	*R*
Epidendrum dressleri	*R**	*Osmoglossum convallarioides*	*A*
Epidendrum incomptoides	*R**	*Pachyphyllum mexicanum*	*R**
Epidendrum isthmii	*R*	*Palumbina candida*	*A*
Epidendrum skutchii	*R*	*Papperitzia leiboldii*	*R**
Epidendrum smaragdinum	*R*	*Pelexia congesta*	*R*
Epidendrum sobralioides	*A*	*Phragmipedium exstaminodium*	*P*
Euristyles borealis	*R*	*Phragmipedium xerophyticum*	*P**
Galeandra batemanii	*A*	*Physogyne gonzalezii*	*R**
Galeottia grandiflora	*P*	*Platystele caudatisepala*	*A*
Galeottiella sarcoglossa	*R*	*Platystele jungermannioides*	*A*
Gongora tridentata	*R*	*Platystele repens*	*R*
Govenia tequilana	*R**	*Platythelys venustula*	*R*
Habenaria umbratilis	*R**	*Pleurothallis abbreviata*	*R*
Hagsatera brachycolumna	*R**	*Pleurothallis deregularis*	*R*
Ionopsis satyrioides	*R*	*Pleurothallis digitale*	*A*
Jacquiniella gigantea	*R*	*Pleurothallis endotrachys*	*R*
Kefersteinia lactea	*R*	*Pleurothallis eximia*	*A**
Lacaena bicolor	*A*	*Pleurothallis hintonii*	*R**
Laelia anceps dawsonii	*P**	*Pleurothallis lanceola*	*R*
Laelia gouldiana	*P**	*Pleurothallis liebmanniana*	*R**
Laelia speciosa	*Pr**	*Pleurothallis nelsonii*	*R**
Laelia superbiens	*A*	*Pleurothallis nigriflora*	*R**
Lemboglossum cervantesii	*A**	*Pleurothallis oblanceolata*	*A**
Lemboglossum cordatum	*A*	*Pleurothallis saccatilabia*	*R**
Lemboglossum ehrenbergii	*A**	*Pleurothallis setosa*	*R*
Lemboglossum galeottianum	*R**	*Pleurothallis unguicallosa*	*R**
Lemboglossum madrense	*A**	*Pleurothallis violacea*	*R*
Lemboglossum majale	*P*	*Pleurothallis vittariaefolia*	*R*
Lemboglossum rossii	*A*	*Ponera dressleriana*	*R**
Lemboglossum uroskinneri	*P*	*Ponera pellita*	*R*
Lepanthes ancylopetala	*R**	*Ponthieva parviflora*	*R**
Lepanthes guatemalensis	*R*	*Pseudocranichis thysanochila*	*R**
Lepanthes parvula	*R*	*Pseudogoodyera wrightii*	*R*
Lepanthopsis floripecten	*R*	*Restrepia lankesteri*	*A*
Leucochyle subulata	*R*	*Restrepiopsis ujarensis*	*R*
Ligeophila clavigera	*R*	*Rhynchostele pygmaea*	*R*
Lycaste lassioglossa	*P*	*Rodriguezia dressleriana*	*R**
Lycaste skinneri	*P*	*Rossioglossum grande*	*P*
Lyroglossa pubicaulis	*R*	*Rossioglossum insleayi*	*A**
Macradenia brassavolae	*R*	*Rossioglossum splendens*	*A**
Malaxis greenwoodiana	*R**	*Rossioglossum williamsianum*	*P*
Malaxis hagsateri	*R**	*Sarcoglottis cerina*	*R*
Malaxis pandurata	*R*	*Scelochilus tuerckheimii*	*A*
Maxillaria alba	*R*	*Schiedeella nagelii*	*R**
Maxillaria nasuta	*R*	*Sigmatostalix guatemalensis*	*A*
Maxillaria oestlundiana	*A**	*Sigmatostalix mexicana*	*R**
Maxillaria tonsoniae	*R*	*Sobralia lindleyana*	*R*
Mesoglossum londesboroughianum	*A**	*Sobralia mucronata*	*R*
Mormodes maculata unicolor	*A**	*Spiranthes torta*	*R*
Mormodes porphyrophlebia	*A**	*Stanhopea ecornuta*	*A*
Mormodes sanguineoclaustra	*P**	*Stanhopea oculata*	*A*
Mormodes sotoana	*P*	*Stanhopea tigrina*	*A**
Mormodes uncia	*P**	*Stelis chihobensis*	*R*

Stellilabium standleyi	*A*
Teuscheria pickiana	*R*
Trichocentrum hoegei	*R**
Trichopilia galeottiana	*P*
Trichosalpinx cedralensis	*R*
Warrea costaricensis	*A*
PALMAE	
Bactris balanoidea	*R*
Brahea berlandieri	*R**
Brahea edulis	*Pr**
Brahea nitida	*Pr*
Brahea moorei	*R**
Calyptrogyne ghiesbreghtiana	*A*
Chamaedorea alternans	*A**
Chamaedorea arenbergiana	*A*
Chamaedorea atrovirens	*A*
Chamaedorea carchensis	*A*
Chamaedorea cataractarum	*A**
Chamaedorea elatior	*A*
Chamaedorea ernesti-augusti	*A*
Chamaedorea ferruginea	*A*
Chamaedorea foveata	*A*
Chamaedorea fractiflexa	*A*
Chamaedorea geonomiformis	*A*
Chamaedorea glaucifolia	*P**
Chamaedorea graminifolia	*A*
Chamaedorea hooperiana	*A*
Chamaedorea klotzschiana	*R**
Chamaedorea liebmannii	*A*
Chamaedorea metallica	*P**
Chamaedorea microspadix	*A**
Chamaedorea nubium	*A*
Chamaedorea oreophila	*A**
Chamaedorea paradoxa	*A*
Chamaedorea parvisecta	*A*
Chamaedorea pinnatifrons	*A*
Chamaedorea pochutlensis	*A**
Chamaedorea queroana	*A**
Chamaedorea quezalteca	*A*
Chamaedorea rhizomatosa	*A*
Chamaedorea rigida	*A*
Chamaedorea rojasiana	*A*
Chamaedorea sartorii	*A*
Chamaedorea schiedeana	*A**
Chamaedorea simplex	*A*
Chamaedorea stolonifera	*A**
Chamaedorea stricta	*A*
Chamaedorea tenella	*P**
Chamaedorea tuerckheimii	*P*
Chamaedorea vulgata	*A*
Chamaedorea whitelockiana	*A*
Chamaedorea woodsoniana	*A*
Coccothrinax readii	*A**
Cryosophila argentea	*A*
Cryosophilanana	*A*
Erythea aculeata	*A**
Gaussia gomez-pompae	*A**
Gaussia maya	*A*
Geonoma membranacea	*A*
Geonoma oxycarpa	*A*
Orbignya guacuyule	*Pr*
Pseudophoenix sargentii	*A*
Reinhardtia elegans	*A**
Reinhardtia gracilis	*R*
Roystonea dunlapiana	*R*
Roystonea regia	*R*
Sabal gretheriae	*R**
Sabal pumos	*R*
Sabal uresana	*R**
Synechanthus fibrosus	*P*
Thrinax radiata	*A*
PINACEAE	
Abies concolor	R
Abies flinckii	*Pr*
Abies guatemalensis	*P*
Abies hickeli	*P**
Abies mexicana	*A**
Abies vejari	*A**
Calocedrus decurrens	*A*
Picea chihuahuana	*P*
Picea mexicana	*P*
Picea martinezii	*P*
Pinus atennuata	*Pr*
Pinus caribaea hondurensis	*A*
Pinus catarinae	*Pr**
Pinus chiapensis	*Pr**
Pinus contorta murrayana	*Pr*
Pinus coulteri	*Pr*
Pinus culminicola	*Pr**
Pinus edulis	*Pr*
Pinus flexilis	*Pr*
Pinus jaliscana	*R*
Pinus jeffreyi	*Pr*
Pinus johannis	*Pr**
Pinus lagunae	*R**
Pinus martinezii	*Pr**
Pinus maximartinezii	*P**
Pinus monophylla	*Pr*
Pinus muricata	*P*
Pinus nelsonii	*R**
Pinus pinceana	*Pr**
Pinus quadrifolia	*Pr*
Pinus reflexa	*R*
Pinus rzedowskii	*R**
Pseudotsuga flahaulti	*R**
Pseudotsuga guinieri	*R**
Pseudotsuga macrolepis	*R**
Pseudotsuga rehderi	*R**
PODOCARPACEAE	
Podocarpus matudai	*R*
Podocarpus reichei	*R*
PODOSTEMACEAE	
Blandowia myriophilla	*R*
Marathrum rubrum	*R**
Vanroyenella plumosa	R*
POLYPODIACEAE	
Asplenium auritum	*A*
Asplenium dentatum	*A*
Asplenium serratum	*A*
Campyloneurum phyllitides	*A*
Nephrolepis cordifolia	*P*
Polypodium triseriale	*A*
POTTIACEAE	
Bryoceuthospora mexicana	*R*
PSILOTACEAE	
Psilotum complanatum	*A*
PYROLACEAE	
Nypopithys multiflora	*R*
RHACHITHECIACEAE	
Hypnodontopsis mexicana	*R*
RHYZOPHORACEAE	
Rhyzophora mangle	*Pr*
RUBIACEAE	
Balmea stormae	*R*
Bouvardia capitata	*R*
Bouvardia dictyoneura	*R*
Bouvardia erecta	*A*
Bouvardia langlassei	*R*
Bouvardia loeseneriana	*R*
Bouvardia rosei	*R*

Bouvardia xylosteoides	*R*
Crusea coronata	*R*
Crusea hispida grandiflora	*R*
Crusea lucida	*R*
Galium carmenicola	*R*
Galium carterae	*R*
Galium moranii	*R*
Hamelia rovirosae	*R*
Hoffmania chiapensis	*R*
Omiltemia filisepala	*R**
Omiltemia longipes	*R**
Pinarophyllon flavum	*R*
SALICACEAE	
Populus guzmanantlensis	*R**
Populus simaroa	*R*
SAPOTACEAE	
Bumelia cartilaginea	*P*
Mastichodendron capiri	*A*
SAXIFRAGACEAE	
Hydrangea nebulicola	*P**
SCHIZAECEAE	
Schizaea elegans	*A*
SCROPHULARIACEAE	
Castilleja mcvaughii	*R*
Pedicularis glabra	*R*
SELAGINELLACEAE	
Selaginella porphyrospora	*P*
SEMATOPHYLLACEAE	
Acritodon nephophilus	*A*
STERCULIACEAE	
Chiranthodendron pentadctylon	*A*
STROBILOMYCETACEAE	
Leccinum aurantiacum	*A*
SYMPLOCACEAE	
Symplocos austromexicana	*R*
SYMPLOCACEAE	
Symplocos coccinea	*R*
Symplocos excelsa	*R*
Symplocos sousae	*R*
TAXACEAE	
Taxus globosa	*R*
TILIACEAE	
Mortoniodendron guatemalense	*P*
Tilia mexicana	*P*
UMBELLIFERAE	
Donnellsmithia silvicola	*R*
Tauschia allioides	*P*
Tauschia bicolor	*R*
Tauschia tarahumara	*R*
VALERIANACEAE	
Valeriana pratensis	*R*
VERBENACEAE	
Avicennia germinans	*Pr*
ZAMIACEAE	
Ceratozamia euryphillidia	*P**
Ceratozamia hildae	*A**
Ceratozamia kuesteriana	*R**
Ceratozamia latifolia	*R**
Ceratozamia matudae	*A**
Ceratozamia mexicana	*A**
Ceratozamia microstrobila	*A**
Ceratozamia miqueliana	*P**
Ceratozamia morettii	*A**
Ceratozamia norstogii	*P**
Ceratozamia robusta	*A**
Ceratozamia sabatoi	*A**
Ceratozamia zaragozae	*P**
Dioon califanoi	*P**
Dioon caputoi	*P**
Dioon edule	*A**
Dioon holmgrenii	*A*
Dioon merolae	*P**
Dioon purpusii	*A**
Dioon rzedowskii	*A**
Dioon spinulosum	*P**
Dioon tomasellii sonorense	*P**
Dioon tomasellii tomasellii	*A**
Zamia cremnophila	*P*
Zamia fischeri	*A*
Zamia furfuracea	*A**
Zamia herrerae	*R*
Zamia inermis	*P*
Zamia lawsoniana	*A*
Zamia loddigesii	*A*
Zamia paucijuga	*R*
Zamia picta	*R*
Zamia polymorpha	*A*
Zamia purpurea	*P*
Zamia soconuscensis	*P*
Zamia spartea	*A*
Zamia splendens	*A*
Zamia sylvatica	*A*
Zamia vazquezi	*A*
ZYGOPHYLLACEAE	
Guaiacum sanctum	*Pr*
ZYGOPHYLLACEAE	
Guaiacum coulteri	*Pr*

3.2.5 NATIONAL LEVEL SELECT BIOGROUPS CONSERVATION TARGETS ANALYSIS

4.1 SITE PRIORITIES

The third dimension to be analized in this document, are those exercises that deal with specific sites or discrete regions, which are important to preserve biodiversity in Mexico. The main difference between these exercises and the previous ones that were included in the Select Biogroups Conservation Targets chapter, is that in general terms, the importance of the former deals with overall biodiversity relevance of the sites according to experts opinion, and the latter is based on actual field data on the relevance of the site for a few specific species. Sites identified in both set of exercises integrate Mexico´s National Conservation Sites Portfolio.

The National Site Conservation Site Portfolio becomes a basic tool used for determining which specific areas at the national level need special attention in order to preserve Mexico´s biodiversity and by providing a comprehensive view at this level, it helps determine which conservation strategies are better adapted to implement on different sites within the portfolio.

The conservation strategy toolbox available to implement conservation in Mexico is ample. On the legal side different laws provide different tools: protected areas and environmental program ordinances (ordenamiento ecológico del territorio or OET) from the Ecology Law; wildlife management units (unidades de manejo para la conservación de vida silvestre or UMAS), critical habitat (hábitats críticos para la conservación de la vida silvestre), no-take zones (áreas de refugio para proteger especies acuáticas) from the Wildlife Law; fisheries regulations from the Fisheries Laws; forestry management plans from the Forestry Law; limited water extraction zones (zonas vedadas o reglamentadas), national water reserves (reservas de aguas nacionales) from the Water Law, etc. On the non governmental side, and small but dynamic land trust movement is emerging in Mexico that includes not only private landholders but indigenous communities and ejido lands. This is augmented by an also incipient but increasing realization that alternative rural productive practices can be modified not only to generate more profit, but also to protect biodiversity.

A first set of exercises are the ones developed by CONABIO (National Commission on Knowledge and Use of Biodiversity). These expert workshop driven exercises identify regions of importance for terrestrial, freshwater and marine biodiversity. All three exercises are here superimposed in one map in order to visualize overlap of their individual results.
A second set of exercises deal with specific sites, on different habitats, including:

The Conservation Foundation - Mainly terrestrial
Secretaría de Desarrollo Social - Mainly terrestrial
World Wildlife Fund - Freshwater
Great Barrier Reef Marine Park Authority, The World Bank, IUCN – Coastal-Marine
World Wildlife Fund – Coastal-Marine
Wetlands International/WWF – Coastal-Marine
RAMSAR Convention on Wetlands - Wetlands
Conservation International - Wetlands

4.1.1 CONABIO PRIORITY REGIONS

REGIONES PRIORITARIAS TERRESTRES

CONABIO 1999

El Programa Regiones Prioritarias para la Conservación de la Biodiversidad de la CONABIO se orienta a la detección de áreas, cuyas características físicas y bióticas favorezcan condiciones particularmente importantes desde el punto de vista de la biodiversidad. El Proyecto Regiones Prioritarias Terrestres (RPT), en particular, tiene como objetivo general la determinación de unidades estables desde el punto de vista ambiental en la parte continental del territorio nacional, que destaquen la presencia de una riqueza ecosistémica y específica comparativamente mayor que en el resto del país, así como una integridad ecológica funcional significativa y donde, además, se tenga una oportunidad real de conservación. Esto último implicó necesariamente considerar las tendencias de apropiación del espacio por parte de las actividades productivas de la sociedad a través del análisis del uso del suelo. El método de obtención de las Regiones Prioritarias Terrestres constó de las siguientes fases: primera reunión de especialistas; trabajo de gabinete; aporte adicional de información por la comunidad científica; y segunda reunión de especialistas.

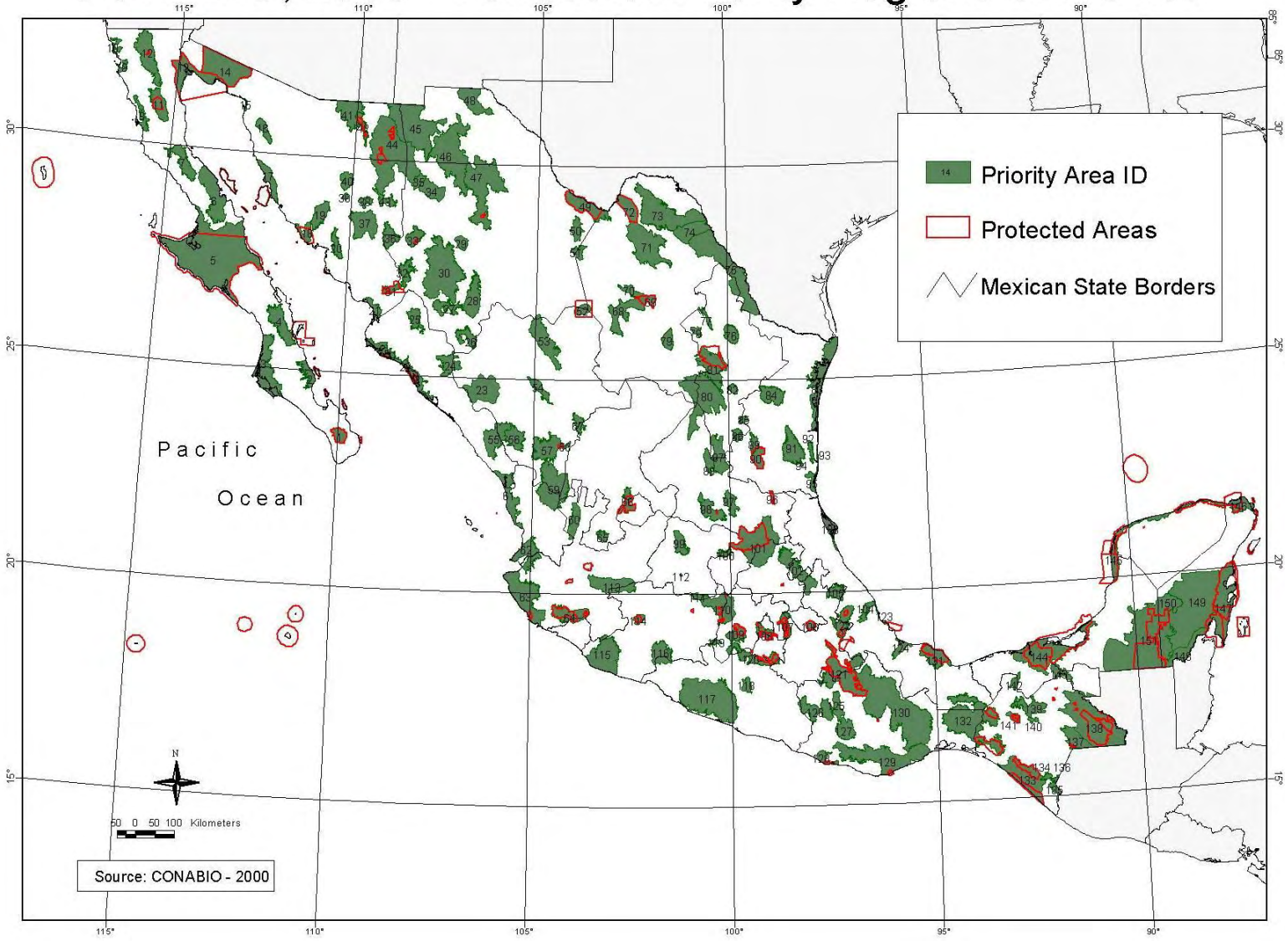
Aunque esta regionalización tendrá una naturaleza dinámica, como producto de este proyecto se dispone de un mapa cuya escala de trabajo fue de 1:250 000 (topografía) y 1:1000 000 (vegetación) con 151 regiones prioritarias terrestres para la conservación de la biodiversidad en México, que cubren una superficie de 504 634 km2, correspondiente a más de la cuarta parte del territorio.

Debe considerarse que las regiones identificadas por los expertos tienen por sí mismas la calidad de prioritarias, ya que representan la propuesta de la comunidad académica nacional sobre regiones del país que por sus atributos biológicos deben ser consideradas bajo algún esquema de conservación y de uso sustentable, por lo mismo, se pretende sugerir acciones en el corto y mediano plazo, las cuales no necesariamente estarán encaminadas a decretarlas bajo alguna categoría de área natural protegida.

Clave	Nombre de la región
1.	Sierra La Laguna
2.	Sierra El Mechudo
3.	Planicies de Magdalena
4.	Sierra La Giganta
5.	El Vizcaíno - El Barril
6.	Sierras La Libertad - La Asamblea
7.	Valle de los Cirios
8.	San Telmo - San Quintín
9.	Punta Banda - Eréndira
10.	Santa María - El Descanso
11.	Sierra San Pedro Mártir
12.	Sierra de Juárez
13.	Delta del río Colorado
14.	Gran Desierto de Altar - El Pinacate
15.	Bahía de San Jorge
16.	Sierras El Álamo - El Viejo
17.	Sierra Seri
18.	Cajón del Diablo
19.	Sierra Libre
20.	Sierra El Bacatete
21.	Las Bocas
22.	Marismas Topolobampo-Caimanero
23.	San Juan de Camarones
24.	Río Humaya
25.	San José
26.	Guadalupe y Calvo - Mohinora
27.	Barranca Sinforosa
28.	Rocahuachi - Nanaruchi
29.	Lago Los Mexicanos
30.	Alta Tarahumara - Barrancas
31.	Sierra Álamos - El Cuchujaqui
32.	Cañón de Chínipas
33.	Basaseachic
34.	Babícora
35.	Cuenca del río Chico - Sirupa
36.	Yécora - El Reparo
37.	San Javier - Tepoca
38.	Sierras El Maviro - Santo Niño
39.	Sierra Mazatán
40.	Cañada Mazocahui
41.	Cananea - San Pedro
42.	Sierras Los Ajos - Buenos Aires - La Púrica
43.	Sahuaripa
44.	Bavispe - El Tigre
45.	Sierra de San Luis - Janos
46.	Pastizales del norte del río Santa María
47.	Sierra del Nido - Pastizal de Flores Magón
48.	Médanos de Samalayuca
49.	Cañón de Santa Elena

50. El Berrendo
51. Laguna Jaco
52. Mapimí
53. Cuchillas de la Zarca
54. Santiaguillo
55. Río Presidio
56. Pueblo Nuevo
57. Guacamayita
58. La Michilía
59. Cuenca del río Jesús María
60. Sierra los Huicholes
61. Marismas Nacionales
62. Sierra Vallejo - Río Ameca
63. Chamela - Cabo Corrientes
64. Manantlán - Volcán de Colima
65. Sierra de Morones
66. Sierra Fría
67. Sierra de Órganos
68. Sierra La Fragua
69. Cuatrociénegas
70. Sierra de la Madera
71. Sierras La Encantada - Santa Rosa
72. Sierra Maderas del Carmen
73. Sierra El Burro - río San Rodrigo
74. Cinco Manantiales
75. Matorral tamaulipeco del bajo Río Bravo
76. Sierra Picachos
77. Sierra Bustamante
78. La Popa
79. Sierra La Paila
80. Tokio
81. El Potosí - Cumbres de Monterrey
82. Cañón de Iturbide
83. Laguna Madre
84. Sierra de San Carlos
85. Puerto Purificación
86. San Antonio - Peña Nevada
87. El Huizache
88. Pastizales gipsófilos de Matehuala
89. Valle de Jaumave
90. El Cielo
91. Sierra de Tamaulipas
92. Encinares tropicales de Loma Las Pitas y Sierra de Maratines
93. Rancho Nuevo
94. Cenotes de Aldama
95. Laguna de San Andrés
96. Sierra Abra - Tanchipa
97. Llanura del río Verde
98. Sierra de Álvarez
99. Sierras Santa Bárbara - Santa Rosa
100. Cerro Zamorano
101. Sierra Gorda - río Moctezuma
102. Bosques mesófilos de la Sierra Madre Oriental
103. Laguna de Tamiahua
104. Encinares tropicales de la planicie costera veracruzana
105. Cuetzalan
106. La Malinche
107. Sierra Nevada
108. Ajusco - Chichinautzin
109. Nevado de Toluca
110. Sierra de Chincua
111. Cerro Ancho - Lago de Cuitzeo
112. Hoya Rincón de Parangueo
113. Cerro Viejo - Sierras de Chapala
114. Tancítaro
115. Sierra de Coalcomán
116. Infiernillo
117. Sierra Madre del Sur de Guerrero
118. Cañón del Zopilote
119. Sierra Nanchititla
120. Sierras de Taxco - Huautla
121. Valle de Tehuacán - Cuicatlán
122. Pico de Orizaba - Cofre de Perote
123. Dunas costeras del centro de Veracruz
124. Humedales del Papaloapan
125. Cerros Negro - Yucaño
126. Sierras Triqui - Mixteca
127. El Tlacuache
128. Bajo río Verde
129. Sierra Sur y costa de Oaxaca
130. Sierras del Norte de Oaxaca - Mixe
131. Sierra de los Tuxtlas - Laguna del Ostión
132. Selva Zoque - La Sepultura
133. El Triunfo - La Encrucijada - Palo Blanco
134. El Mozotal
135. Tacaná - Boquerón
136. Selva espinosa Alto Grijalva - Motozintla
137. El Momón - Montebello
138. Lacandona
139. Bosques mesófilos de los Altos de Chiapas
140. Huitepec - Tzontehuitz
141. La Chacona - Cañón del Sumidero
142. El Manzanillal
143. Lagunas de Catazajá - Emiliano Zapata
144. Pantanos de Centla
145. Petenes - Ría Celestún
146. Dzilam - Ría Lagartos - Yum Balam
147. Sian Ka'an - Uaymil - Xcalak
148. Río Hondo
149. Zonas forestales de Quintana Roo
150. Sur del Punto Put
151. Silvituc - Calakmul

CONABIO, 2000 - Terrestrial Priority Regions of Mexico



REGIONES PRIORITARIAS MARINAS DE MÉXICO

CONABIO / USAID / WWF / FMCN / PACKARD

CONABIO, (Arriaga *et al.* 1998 a)

La vastedad de los ecosistemas marinos es una de las principales razones por las que su conocimiento e información son, frecuentemente, escasos y fragmentados. Sin embargo, la intrincada dependencia del hombre de los recursos y la conciencia de que estos recursos están siendo fuertemente impactados por las mismas actividades humanas, ha planteado la necesidad de incrementar el conocimiento sobre el medio marino, a todos los niveles, para emprender acciones que conlleven a su mantenimiento, conservación, recuperación o restauración.

Bajo esta perspectiva, la Comisión Nacional para el Conocimiento y Uso de la Biodiversidad (CONABIO) instrumentó el Programa de Regiones Prioritarias Marinas de México, por medio de talleres multidisciplinarios, reunió a un grupo de 74 expertos del sector académico, gubernamental, privado, social y organizaciones no gubernamentales de conservación. En estos talleres, con base en la información y conocimiento compartido de los participantes, se identificaron, delimitaron y caracterizaron 70 áreas costeras y oceánicas consideradas prioritarias por su alta biodiversidad, por la diversidad en el uso de sus recursos y por su falta de conocimiento sobre biodiversidad. De la misma forma, se identificaron las amenazas al medio marino de mayor incidencia o con impactos significativos en nuestras costas y mares, de acuerdo con las cuales se hicieron recomendaciones para su prevención, mitigación, control o cancelación.

Se llevó al cabo una clasificación de las 70 áreas prioritarias, considerando criterios ambientales (e.g., integridad ecológica, endemismo, riqueza, procesos oceánicos, etc.), económicos (e.g., especies de importancia comercial, zonas pesqueras y turísticas importantes, recursos estratégicos, etc.) y de amenazas (contaminación, modificación del entorno, efectos a distancia, especies introducidas, etc.). La clasificación resultó en diferentes grupos definidos por el patrón de uso de los recursos, el conocimiento sobre biodiversidad y las amenazas que enfrentan, considerando la información generada durante el taller. Es indispensable señalar que esta clasificación se hizo tomando como base la evaluación que realizaron los participantes al taller, utilizando los criterios de evaluación para cada una de las áreas.

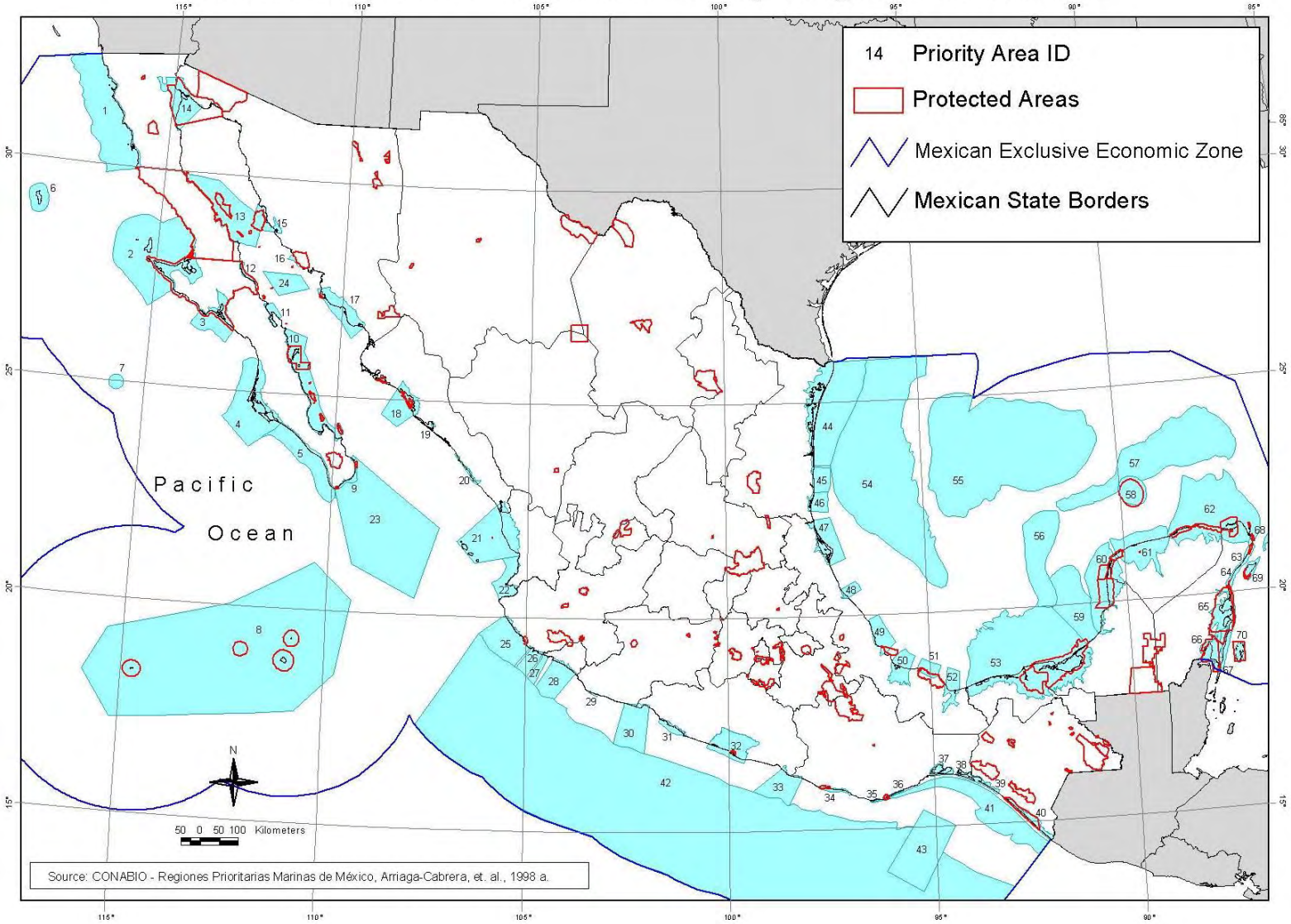
Posteriormente, los valores así asignados fueron analizados por medio de un análisis de conglomerados, lo que dio como resultado 58 áreas de alta biodiversidad, de las cuales 41 presentaron algún tipo de amenaza para la biodiversidad y 38 correspondieron a áreas de uso por sectores. Finalmente, también se identificaron 8 áreas que son importantes biológicamente pero no se cuenta con información sobre biodiversidad. Cuatro áreas no tienen ninguna clasificación debido a que, por la escasa información contenida en la ficha correspondiente, el análisis no resultó en clasificación alguna.

AB = Áreas de alta biodiversidad
AU = Áreas de uso por sectores
AA = Áreas que presentan alguna amenaza para la biodiversidad
AFI = Áreas de falta de información de biodiversidad

Clave	Nombre de la Región				
1.	Ensenadense	AB	AA	AU	
2.	Vizcaíno	AB	AA	AU	
3.	San Ignacio	AB	AA	AU	
4.	Bahía Magdalena	AB	AA	AU	
5.	Barra de Malva-Cabo Falso	AB	AA		AFI
6.	Isla Guadalupe	AB			
7.	Cayos Alijos				AFI
8.	R.B. Archipiélago Revillagigedo	AB	AA	AU	
9.	Los Cabos	AB			
10.	Complejo Insular de BC Sur	AB			

11. Bahía Concepción	AB	AA	AU	
12. Costa Oriental Vizcaíno				AFI
13. Complejo Insular de B Calif.	AB		AU	
14. Alto Golfo	AB	AA	AU	
15. Canal del Infiernillo	AB			
16. Cajón del Diablo	AB			
17. Sist. Lag. Sur de Sonora	AB	AA	AU	
18. Lag. Sta. Ma. La Reforma	AB		AU	
19. Laguna de Chiricahueto	AB			
20. Piaxtla-Urias	AB	AA	AU	
21. Marismas Nacionales	AB	AA		
22. Bahía de Banderas	AB	AA	AU	
23. Boca del Golfo				
24. Guaymas				
25. Mismaloya-Pta. Soledad	AB			
26. Chamela-El Palmito	AB	AA	AU	
27. Pta. Graham-El Carrizal	AB	AA	AU	
28. Cuyutlán-Chupadero	AB	AA	AU	
29. Maruata-Colola	AB	AA	AU	
30. Mexiquillo-Delta del Balsas	AB	AA	AU	
31. Tlacoyunque	AB			
32. Coyuca-Tres Palos	AB	AA	AU	
33. Copala-Punta Maldonado	AB			
34. Chacahua-Escobilla	AB			
35. Puerto Ángel-Mazunte	AA		AU	
36. Huatulco	AB	AA	AU	
37. Laguna Superior e Inferior	AB	AA	AU	
38. Laguna Mar Muerto	AB	AA	AU	
39. Punta Arista	AB	AA	AU	
40. Corredor Puerto Madero	AB			
41. Plat. Cont. Golfo Tehuantepec	AB	AA	AU	
42. Trinchera Mesoamericana-ZEE				AFI
43. Tehuantepec.				AFI
44. Laguna Madre	AB	AA	AU	
45. La Pesca-Rancho Nuevo	AB	AA	AU	
46. Laguna San Andrés	AB			
47. Pueblo Viejo-Tamiahua	AB	AA	AU	
48. Tecolutla	AB			
49. Laguna Verde-Antón Lizardo	AB	AA	AU	
50. Sist. Lagunar de Alvarado	AB	AA		
51. Los Tuxtlas				
52. Delta del Río Coatzacoalcos		AA	AU	
53. Pant. Centla-Lag de Términos	AB	AA	AU	
54. Giro Tamaulipeco			AU	AFI
55. Fosa Sigsbee	AB		AU	AFI
56. Cayos Campeche	AB	AA		
57. Escarpe Campeche				
58. Arrecife Alacranes	AB	AA	AU	
59. Sonda de Campeche	AB	AA	AU	
60. Champotón-El Palmar	AB	AA	AU	
61. Sisal-Dzilam	AB			
62. Dzilam-Contoy	AB			
63. Pta. Maroma-Nizuc	AB	AA	AU	
64. Tulum-Xpuha	AB	AA	AU	
65. Sian Ka'an	AB	AA		
66. Bahía Chetumal	AB	AA		
67. Xcalac-Majahual	AB	AA		
68. Arrow Smith				AFI
69. Cozumel	AB	AA	AU	
70. Banco Chinchorro	AB	AA		

CONABIO, 1998 - Marine Priority Regions of Mexico



REGIONES HIDROLÓGICAS PRIORITARIAS

CONABIO, (Arriaga *et al.*1998 b)

Las aguas epicontinentales incluyen una rica variedad de ecosistemas, muchos de los cuales están física y biológicamente conectados o articulados por el flujo del agua y el movimiento de las especies. Estas conexiones son fundamentales para el mantenimiento de la biodiversidad y el bienestar de las comunidades humanas, no sólo a niveles local y regional, sino además nacional y global.

Los hábitats acuáticos epicontinentales son más variados en rasgos físicos y químicos que los del ambiente marino. Aparte de los pantanos, que tradicionalmente se agrupan como humedales continentales, los sistemas epicontinentales incluyen lagos, ríos, estanques, corrientes, aguas subterráneas, manantiales, cavernas sumergidas, planicies de inundación, charcos e incluso el agua acumulada en las cavidades de los árboles. Las diferencias en las características químicas del agua, transparencia, velocidad o turbulencia de la corriente, así como de profundidad y morfometría del cuerpo acuático, contribuyen a la diversidad de los recursos biológicos que se presentan en las aguas epicontinentales. Asimismo, no es extraño el hecho de que un organismo dado pueda requerir de más de un hábitat acuático durante su ciclo de vida.

La preocupación creciente sobre el mantenimiento de la biodiversidad de las aguas epicontinentales y los esfuerzos por reducir los riesgos que enfrentan muchas especies están basados en evidencias sobre la pérdida de hábitats (degradación, cambios en la calidad y fragmentación) y de especies, así como en la sobreexplotación e introducción de especies exóticas. Las tasas de extinción para estos ecosistemas provienen principalmente de lagos y ríos. Aunque la evidencia prevalece, en general es muy dispersa y, desde la perspectiva geográfica, sin continuidad. El hecho de que haya muchas especies en franca declinación o enfrentando la extinción en los pocos países en donde se cuenta con conocimiento de campo razonable, justifica la preocupación real por el estado de la biodiversidad de las aguas epicontinentales. Un hecho alarmante es que, aunque los humanos siempre han hecho uso de los sistemas dulceacuícolas y sus especies, en los últimos 200 años, a través de la Revolución Industrial, el desarrollo económico acelerado y el crecimiento poblacional han transformado estos ecosistemas a una escala sin precedente.

Enmarcado en este contexto, en octubre de 1997, la Comisión Nacional para el Conocimiento y Uso de la Biodiversidad (CONABIO) inició el Programa de Regiones Prioritarias Marinas y Limnológicas de México. El objetivo fue desarrollar un marco de referencia para contribuir a la conservación y manejo sostenido de los ambientes oceánico, costero y de aguas epicontinentales, tomando en consideración los sitios de mayor biodiversidad y de uso actual y potencial en el país. Este programa forma parte de una serie de estrategias instrumentadas por la CONABIO para la promoción a nivel nacional del conocimiento y conservación de la biodiversidad de México.

Como parte de dicho programa, se realizaron dos talleres sobre regiones hidrológicas prioritarias, con la finalidad de llevar al cabo la regionalización de los cuerpos de agua epicontinentales considerados como prioritarios en función de su biodiversidad. Los talleres reunieron a 45 especialistas del sector académico, gubernamental y de organizaciones no gubernamentales para realizar un diagnóstico de los ambientes de agua dulce y seleccionar áreas en función de su alta riqueza biológica, grado de conocimiento general o carencia de información, actividades de uso actuales y potenciales, impactos negativos actuales y potenciales en la biodiversidad y servicios ambientales.

Con la información anterior, se elaboraron mapas del territorio nacional (escala 1:4 000 000) de las áreas prioritarias consensadas por su biodiversidad, uso de recursos, carencia de información y potencial para conservación, así como una ficha técnica de cada área con información de tipo biológico y físico, problemática y sugerencias identificadas para su estudio, conservación y manejo.

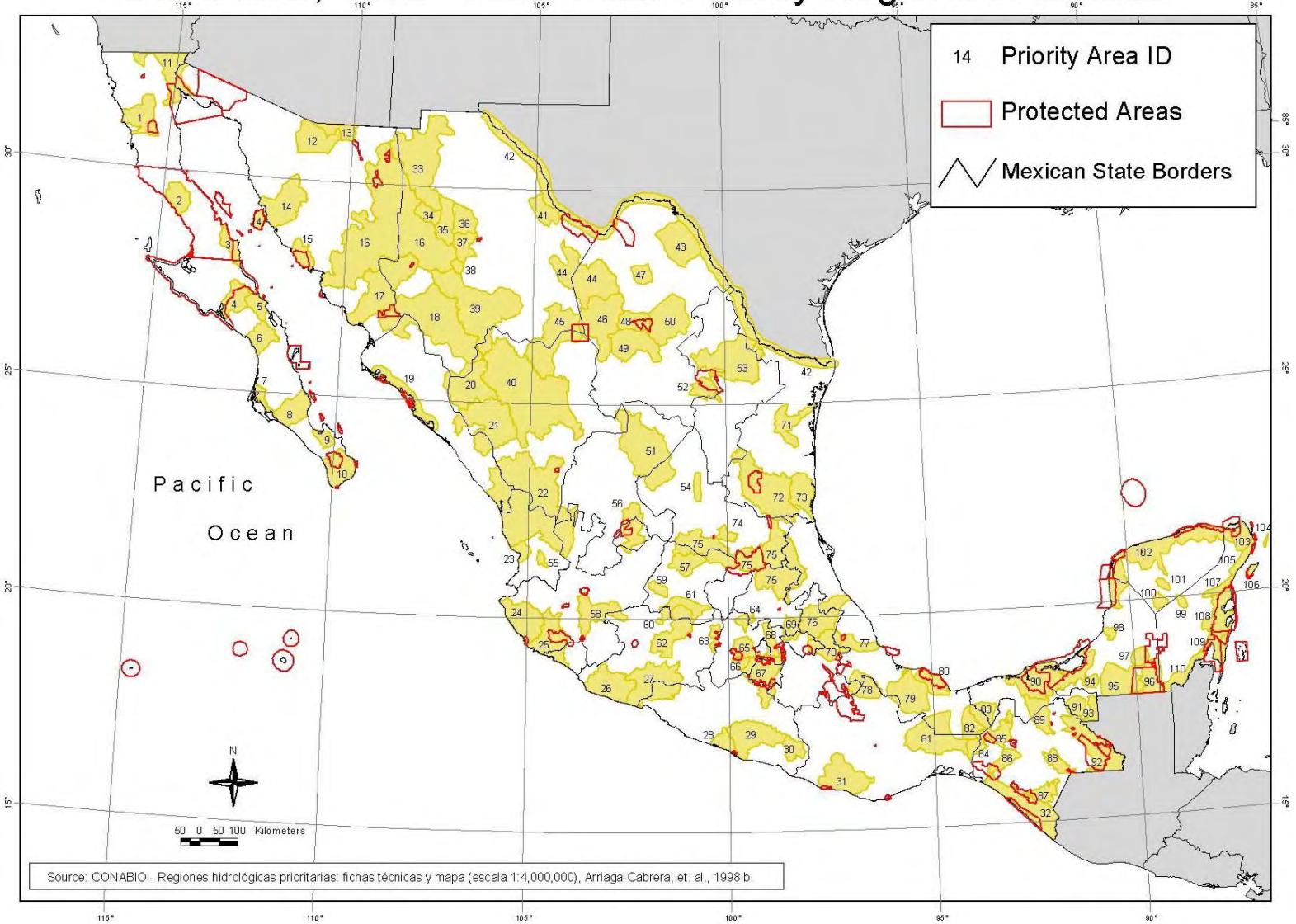
Se identificaron 110 regiones hidrológicas prioritarias por su biodiversidad, de las cuales 82 corresponden a áreas de uso (AU) y 75 son de alta riqueza biológica (AAB) con potencial para conservación; entre estas dos categorías, 75 presentan algún tipo de amenaza (AA). Se identificaron también 29 áreas que son importantes biológicamente pero carecen de información científica (AD) suficiente sobre su biodiversidad.

AAB = Regiones de alta biodiversidad
AA = Regiones amenazadas
AU = Regiones de uso por sectores
AD = Regiones de desconocimiento científico

Clave	Nombre de la Región				
1.	San Pedro Mártir	AAB	AU		
2.	Ríos estacionales de Baja California - Cataviña				AD
3.	Sierra de la Libertad		AU	AA	AD
4.	Sierra de San Francisquito - Oasis San Ignacio	AAB	AU		
5.	Mulegé - Sta. Rosalía				AD
6.	La Purísima	AAB			
7.	Bahía Magdalena		AU		
8.	Oasis San Pedro de la Presa - El Pilar - Las Pocitas	AAB	AU		
9.	Sierra del Novillo - La Paz		AU		
10.	Sierra de la Laguna y oasis aledaños	AAB	AU		
11.	Delta del Río Colorado	AAB	AU	AA	
12.	Subcuenca del Río Asunción				AD
13.	Subcuencas del Río San Pedro y Río Sta. Cruz	AAB	AU	AA	
14.	Isla Tiburón - Río Bacoachi			AA	AD
15.	Cajón del Diablo	AAB		AA	
16.	Río Yaqui - Cascada Bassaseachic	AAB	AU	AA	
17.	Río Mayo	AAB	AU	AA	
18.	Cuenca alta del Río Fuerte	AAB	AU	AA	
19.	Bahía de Ohuira - Ensenada del Pabellón	AAB	AU	AA	
20.	Cuenca alta de los Ríos Culiacán y Humaya	AAB	AU	AA	
21.	Cuenca alta del Río San Lorenzo - Minas de Piaxtla	AAB	AU		AD
22.	Río Baluarte - Marismas Nacionales	AAB	AU	AA	
23.	San Blas - La Tovara	AAB	AU	AA	
24.	Cajón de Peñas - Chamela	AAB	AU	AA	
25.	Río Purificación - Manantlán	AAB	AU	AA	
26.	Ríos Coalcomán y Río Nexpa	AAB	AU		
27.	Cuenca baja del Río Balsas	AAB	AU	AA	
28.	Río Atoyac - Laguna de Coyuca	AAB	AU	AA	
29.	Río Papagayo - Acapulco	AAB	AU	AA	
30.	Cuenca alta del Río Ometepec				AD
31.	Río Verde - Laguna de Chacahua			AA	
32.	Soconusco	AAB	AU	AA	
33.	Samalayuca	AAB	AU	AA	
34.	Lago Babícora	AAB	AU	AA	
35.	Cuenca alta del Río Sta. María	AAB	AU	AA	
36.	Cuenca alta del Río Carmen	AAB	AU	AA	
37.	Lago Bustillos	AAB	AU	AA	
38.	Lago Los Mexicanos	AAB	AU	AA	
39.	Cuenca alta del Río Conchos y Río Florido	AAB	AU	AA	
40.	Río Nazas	AAB	AU	AA	
41.	Cuenca baja del Río Conchos	AAB	AU	AA	
42.	Río Bravo Internacional	AAB	AU	AA	
43.	Río Bravo - Piedras Negras	AAB			AD
44.	El Guaje		AU	AA	AD
45.	La India		AU	AA	AD
46.	El Rey		AU	AA	AD
47.	Sierra de Santa Rosa		AU		AD
48.	Cuatro Ciénegas	AAB	AU	AA	
49.	Valle Hundido		AU	AA	AD
50.	Río Salado de los Nadadores	AAB	AU	AA	

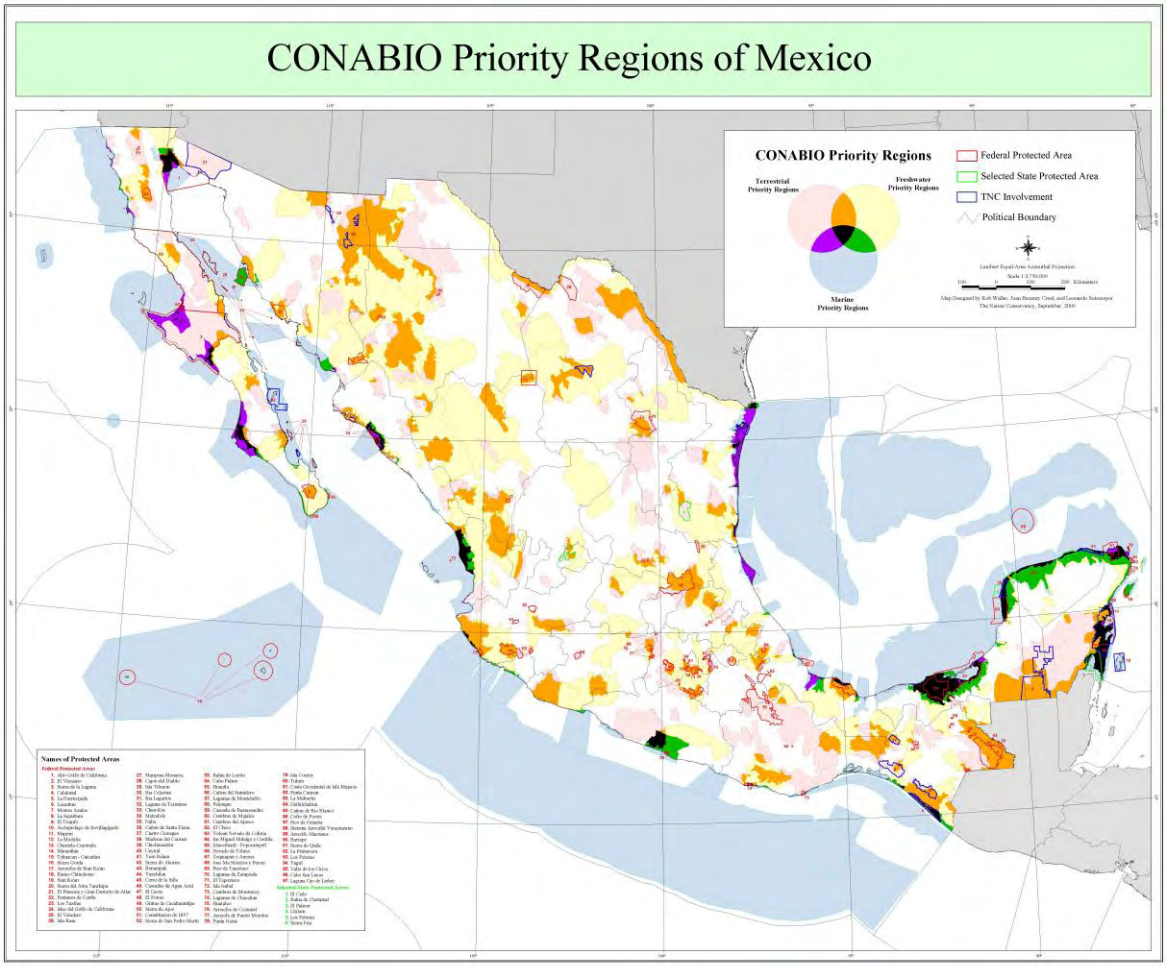
51. Camacho - Gruñidora		AU	AA	
52. Cumbres de Monterrey	AAB	AU	AA	
53. Río San Juan y Río Pesquería	AAB	AU	AA	
54. Venado - Moctezuma			AA	AD
55. Lagos cráter de Nayarit		AU		
56. Valle de Aguascalientes – Río Calvillo	AAB	AU	AA	
57. Cabecera del Río de la Laja	AAB			
58. Chapala – Cajititlán – Sayula	AAB	AU	AA	
59. Presas Río Turbio			AA	
60. Zacapu	AAB	AU		
61. Lagos cráter de Valle de Santiago				AD
62. Pátzcuaro y cuencas endorreicas cercanas	AAB	AU	AA	
63. Los Azufres	AAB	AU		
64. Humedales de Jilotepec – Ixtlahuaca	AAB			
65. Cabecera del Río Lerma	AAB	AU	AA	
66. Lagos cráter del Nevado de Toluca		AU	AA	
67. Río Amacuzac – Lagunas de Zempoala	AAB	AU	AA	
68. Remanentes del complejo lacustre de la cuenca de México		AU	AA	
69. Llanos de Apan		AU	AA	AD
70. Cuenca Oriental		AU	AA	
71. Río San Fernando	AAB	AU		
72. Río Tamesí	AAB		AA	
73. Cenotes de Aldama	AAB	AU	AA	AD
74. Lago de La Media Luna		AU		
75. Confluencia de las Huastecas	AAB		AA	
76. Río Tecolutla	AAB	AU	AA	
77. Río La Antigua	AAB			
78. Presa Miguel Alemán – Cerro de Oro		AU	AA	
79. Humedales del Papaloapan, San Vicente y San Juan	AAB		AA	
80. Los Tuxtlas	AAB	AU	AA	
81. Cuenca media y alta del Río Coatzacoalcos	AAB	AU	AA	AD
82. Cuenca media y alta del Río Uxpanapa	AAB	AU	AA	AD
83. Cabecera del Río Tonalá	AAB	AU	AA	
84. Chimalapas	AAB			AD
85. Malpaso - Pichucalco	AAB		AA	AD
86. La Sepultura - Suchiapa	AAB	AU		AD
87. Motozintla	AAB			AD
88. Comitán – Lagunas de Montebello	AAB			
89. Río Tulijá - Altos de Chiapas	AAB			
90. Laguna de Términos - Pantanos de Centla	AAB	AU	AA	
91. Balancán		AU	AA	AD
92. Río Lacantún y tributarios	AAB	AU	AA	
93. Río San Pedro		AU	AA	
94. Cabecera del Río Candelaria				AD
95. Sur de Campeche	AAB	AU	AA	
96. Calakmul	AAB		AA	
97. Cabecera del Río Champotón				AD
98. Boca del Río Champotón		AU	AA	
99. Laguna Chichancanab	AAB		AA	AD
100. Cono Sur - Peto		AU		AD
101. Zona citrícola		AU	AA	AD
102. Anillo de cenotes	AAB	AU	AA	
103. Contoy	AAB		AA	
104. Isla Mujeres		AU		
105. Corredor Cancún - Tulum	AAB	AU	AA	
106. Cozumel		AU		
107. Cenotes Tulum - Cobá	AAB	AU	AA	
108. Sian Ka´an	AAB	AU	AA	
109. Humedales y lagunas de la Bahía de Chetumal	AAB	AU	AA	
110. Río Hondo		AU	AA	

CONABIO, 1998 - Freshwater Priority Regions of Mexico



4.1.2 CONABIO PRIORITY REGIONS ANALYSIS

CONABIO´s three exercises are superimposed in this map in order to visualize overlap of their individual results. This overlap map should be interpreted with caution since the superimposition of all three habitats can't be automatically assumed to contain the most important sites for biodiversity in Mexico, since a complete overlap can only occur only in coastal regions, only two element can overlap inland and no overlap can occur in offshore marine sites.



4.2.1 SITE IDENTIFICATION AND PRIORITY SETTING EXERCISES

Áreas Prioritarias para la Conservación de la Diversidad Biológica en México

The Conservation Foundation, Breve Reporte de Actividades, 1987 (Ramos 1987)

Impor-tancia. Interna-cional.	Nombre o Localidad	Estado	Categoría de Manejo 2000
	Sierra de San Pedro Mártir,	B.C.	PN
X	**Valle de los Cirios**	B.C.	APFF
X	**Sebastián Vizcaíno**	B.C.S.	RB
X	**Sierra de la Laguna**	B.C.S.	RB
	El Pinacate	Son.	RB
	Islas del Golfo de California	Varios estados (B.C. ,B.C.S. Son. ,Sin., Nay. y Jal.)	APFF
	Cuenca hidrográfica del sur de Sonora	Son.	
	Cuenca del Río Fuerte	Chih.	
X	**Cuatro Ciénagas**	Coah.	RB
	Cañón de San Lorenzo	Coah.	
	Sierra del Carmen	Coah.	RB
	Sierra de los Lirios	Coah., N.L.	
	Cerro Potosí	N.L.	
X	**El Cielo**	Tamps.	RB Estatal
	Sierra de Maratines	Tamps.	
	Sierra San Carlos	Tamps.	
	Identificar área	Sin.	
X	**La Michilía**	Dgo.	RB
X	**Mapimí**	Dgo.	RB
	Sierras del centro del Estado	Dgo.	
	Llanura del Río Verde	S.L.P.	
	Sierra de Santa Marta y San Martín	Ver.	RB
X	**Huayacocotla**	Ver.	
X	**Uxpanapa - Chimalapas**	Ver., Oax.	
	El Morro de la Mancha	Ver.	Est. Biol.
	Barranca de las Minas (investigar)	Ver.	
	Zona bosque tropical caducifolio	Ver.	
	Mesa del Nayar	Nay.	
X	**Manglares Teacapán - Agua Brava**	Nay.	
	Sierra de San Juan, vertiente Occ.	Nay	RCyEEyRMA Estatal
X	**Sierra de Manantlán**	Jal. (Col.)	RB
	Chamela y ampliación costera	Jal.	RB
	Nevado de Colima	Jal., Col.	PN
	Mexiquillo	Mich	ZRPCTM
	Sierra Chíncua y el Campanario	Mich., (Edo. Mex.)	RB
	Tancítaro y Los Azufres	Mich	PN y APRN
	Sierra de Santa Rosa	Gto.	RC Estatal
	Cuenca del Río Estoráx	Qro.	
X	**Sierra de Tlanchinol**	Hgo.	
	El Chico	Hgo.	PN

	Barranca de Tolantongo (Mextitlan)	Hgo.	RB
X	**Iztaccíhuatl - Popocatépetl**	Edo. Mex. (Pue., Mor.)	PN
Impor-tancia. Interna-cional.	Nombre o Localidad	Estado	Categoría de Manejo 2000
	Nevado de Toluca	Edo. Mex.	PN
	Nanchititla y Temascaltepec	Edo. Mex.	PNR, Estatal
	Lagunas de Zempoala	Edo. Mex. (Mor.)	PN
	Miguel Hidalgo	Edo. Mex.	PN
	Barranca de Contreras	D.F.	ZPF
	Pedregal de San Ángel	D.F.	UNAM
	Derrama del Chichinautzin	Mor.	APFF
X	**Valle de Tehuacán**	Pue. (Oax.)	RB
X	**Omiltemi y áreas adyacentes**	Gro.	
	Cerro de Teotepec	Gro.	
	Acahuizotla	Gro.	
X	**Cañón del Zopilote**	Gro.	
X	**Chimalapa - Uxpanapa**	Oax.,Ver. (Chis.)	
	Sierra de Juárez	Oax.	
	Lagunas de Chacahua	Oax.	PN
X	**Loxicha - Pluma Hidalgo**	Oax.	
X	**Sierra de Zaachilac**	Oax.	
	Lagunas de Montebello	Chis.	PN
X	**Selva Lacandona**	Chis.	RB
X	**El Triunfo**	Chis.	RB
X	**El Ocote**	Chis.	RB
	Volcán Tacaná	Chis.	En proceso
	Cerro Tres Picos	Chis.	
	La Encrucijada	Chis.	RB
	Zona de la Selva Negra, Solistahuacán	Chis.	
X	**Delta Usumacinta - Grijalva**	Tab.	RB, APFF
	Laguna de Chascos	Tab.	
	Mecoacán y Río González	Tab.	
	Los Petenes	Camp.	RB
X	**Calakmul**	Camp.	RB
	Palizada - Laguna de Términos	Camp.	RB
	Ría Lagartos	Yuc.	RB
	Ría Celestúm	Yuc.	RB
	Punto Puuk (Put)	Yuc.	
X	**Sian Ka'an**	Q. Roo	RB
	Río Azul y Río Hondo	Q. Roo	

PN = Parque Nacional, RB = Reserva de la Biosfera, APFF = Área de Protección de Flora y Fauna, APRN = Área de Proteción de Recursos Naturales, ZPF = Zona Protectora Forestal ZRPCTM = Zonas de Reserva y Sitios de Refugio para la protección, conservación, repoblación, desarrollo y control de las diversas especies de tortuga marina, RC = Reserva de Conservación Cuenca de la Esperanza, Guanajuato, PNR = Parque Natural de Recreación Popular Nanchititla, RCyEEyRMA = Reserva de Conservación y Equilibrio Ecológico y Regeneración del Medio Ambiente Cerro San Juan, Nay.

PROYECTO ÁREAS NATURALES PROTEGIDAS DE MEXICO

Selección de sitios prioritarios identificados en los talleres regionales

(SEDESOL 1994, Gómez-Pompa y Dirzo 1994)

Mediante este ejercicio se seleccionaron sitios prioritarios para la conservación de la biodiversidad en México utilizando como metodología el desarrollo de talleres con la presencia de expertos regionales. El listado que se anexa a continuación constituye el resultado de la primera depuración de sitios prioritarios a nivel nacional, excluyendo aquellas zonas que en el año 2000 ya cuentan con decreto de área natural protegida. En ***negrillas** se indican la áreas resultantes de la depuración final del ejercicio, en la cual se seleccionaron las 30 áreas más importantes por proteger. De estas 30, se excluyen 6 que actualmente ya cuentan con decreto federal: Los Petenes, Valle de Tehuacán-Cuicatlán, Bahías de Chacahua, Barranca de Mextitlan, Holbox (Yum Balam) y Sierra de Álamos.

*** Sierra de Guajolotes**
(Barranca Los Planes), Ags. (Estatal)
- Punta Banda B.C.
*** Sierra de la Giganta, B.C.S.**
- Punta Arena-Cabo Falso B.C.S
- Rancho Sandoval, Camp.
- Laguna de Cabildos, Chis. (Estatal)
- Zona Barretos-Pereira Buenavista, Chis.
- Sierra el Francés, Chis.
- Altos de Simojovel, Chis.
*** Cañón de la Venta, Chis.**
*** El Manzanillal, Chis.**
*** Laguna Miramar, Chis.**
- Laguna Bélgica, Chis.

*** Barrancas del Cobre, Chih.**
- Sierra del Diablo, Chih.
- Playas Volantín, Tepalcates y Chupadero Boca de Apiza, Col.

*** Sierra del Promontorio, Dgo.**
*** Omiltemi, Gro. (Estatal)**
*** Cañón de Zopilote, Gro.**
- Papalutla, Gro. .
*** Barranca del Río Santiago, Jal.**
*** San Sebastián del Oeste, Jal.**
- Tulancingo-Malinalco, Edo. Mex.
- Zumpahuacán, Edo. Mex.
*** La Tovara, Nay.**
*** Marismas Nacionales, Nay.**
*** Teacapán, Nay.**
- Sierra de San Juan, Nay. (Estatal)
- Chimalapas, Oax.
*** Sierra de Juárez, Oax.**
*** Región de Santa Elena, Oax.**
*** Cerro Guiengola, Oax.**
- La Chinantla, Oax.
- Lagos de la Cuenca Oriental de Puebla
*** Sierra La Mariquita, Río San Pedro, Son.**
*** Bahía de Lobos, Son.**
- El Carrizo, Son.
- Sierra Bacha, Son.
- Sierra Campanero-Arroyo el Reparo, Son.
- Sierra de Mazatán, Son.

*** Sierra de San Luis, Son.**
- La Sierra (Sierra de Madrigal, Sierra Poaná y Sierra de Tapinijuilapa), Tab.
- Playa de Rancho Nuevo. Tamps. (Acuerdo, 1977)
- La Mancha, Ver. (UNAM)
- Laguna de Alchichica, Ver.

*** Huayacocotla Ver.**
*** Sierra de Otontepec, Ver**.
*** Uxpanapa, Ver.**
*** San José de los Molinos, Ver.** (Res.Forestal)
- Punto Put, Yuc.

*** Dzilan, Yuc. (Estatal)**
*** Cerro de Piñones, Zac.**
- Sierra de Órganos, Zac.

WWF - FRESHWATER ECOREGIONS OF NORTH AMERICA (Abell *et al.* 2000)
Important Sites for the Conservation of Freshwater Biodiversity in North America.

FW Ecoreg. #	Site #	**Site Name**
12	93	Colorado River Delta wetlands, Baja and Sonora, Mexico
14	99	Cajon Bonito, Sonora, Mexico
14	102	San Pedro River and Aravaipa Creek, Arizona
14	103	Headwaters of Santa Cruz, Santa Cruz, AZ through Sonora & back into Santa Cruz County
14	104	Wilcox / Upper Yaqui, southeast Arizona / Northeast Sonora, Mexico
61	105	Quitobaquito/Rio Sonoyta, Sonora, Mexico
61	106	Rio Bavispe, from Morelos to headwaters (above La Angostura Reservoir, Sonora, Mexico
61	107	Rio Sonora headwaters to south of Cananea, Sonora, Mexico
61	108	Rio Yaqui headwaters, Sonora, Mexico
61	109	Headwaters of Rios Papigochic / Aros / Sirupa, Mexico
16	110	Rio Casas Grandes, Chihuahua, Mexico
16	111	Laguna Guzmán, northern Chihuahua, Mexico
16	112	Laguna Bavícora, Chihuahua, Mexico
16	113	Sauz Basin, Chihuahua, Mexico
21	121	Chorro, southeast Saltillo, Mexico
21	122	Zona Carbonífera from Del Rio / Eagle Pass to Muzquiz /Sabinas, Coahuila, Mexico
22	123	Cuatro Ciénegas, Coahuila, Mexico
17	124	San Diego, near San Diego de Alcola, Chihuahua, Mexico
17	125	Bustillos, central Chihuahua, Mexico
17	126	Upper Rio Conchos, including headwaters, Chihuahua, Mexico
19	127	Rio Cadena, southeast from Chihuahua City, Chihuahua, Mexico
19	128	Upper Nazas, Durango, Mexico
19	129	Mayran - Nazas complex, Durango, Mexico
19	130	Santiaguillo, 40-80km north of Durango City, Durango, Mexico
19	131	La Concha spring and canyon, near Peñón Blanco, Durango, Mexico
19	132	Parras Basin, Coahuila, Mexico
19	133	Upper Aguanaval, north Zacatecas, Mexico
19	134	Potosí, Ejido Catarino Rodriguez, Zacatecas, Mexico
23	135	Parque Cumbres de Monterrey, Nuevo León, Mexico
66	136	Iturbide, 100 km south of Monterrey, Nuevo León, Mexico
66	137	Sandía, Llanos de Salas, San Luis Potosí, Mexico
66	138	Venado, north San Luis Potosí, Mexico
66	139	Estorax, East San Luis Potosí, Mexico
67	140	Media Luna / Rio Verde, East San Luis Potosí, Mexico
68	141	Panuco, Queratarо / Hidalgo, Mexico
63	142	Mezquital, around Durango City, Durango, Mexico
65	143	Chapala wetlands, Jalisco, Mexico
69	144	Cuitzeo wetlands, Michoacan, Mexico
69	145	Lerma River swamps, Mexico State, Mexico
73	146	Grijalva / Usumacinta delta swamps, Tabasco, Mexico

IDENTIFICACIÓN DE LAS PRIORIDADES DE CONSERVACIÓN DE LA ZONA COSTERA Y MARINA DE MÉXICO

World Wildlife Fund 1992, (Almada-Villela 1992)

Este ejercicio de priorización se llevó a cabo mediante la participación de expertos en una encuesta para la detección de sitios de importancia para México y su posterior evaluación y jerarquización mediante un taller llevado a cabo en Mazatlán, Sin. en el que se reunieron mas de 40 expertos de mas de 17 estados costeros de México y el Distrito Federal. Se analizaron un total de 82 áreas, seleccionándose finalmente un total de 29 de ellas, las cuales fueron calificadas en función de su importancia, en el siguiente orden.

1o. Encrucijada - Chantuto - Panzacola, Chis.
2o. Región de las Grandes Islas del Golfo de California, B.C.
3o. Alto Golfo de California, B.C., Son.
4o. Lagunas de San Blas - Teacapán - Marismas Nacionales, Sin. Nay..
5o. Sian Ka'an, Q. Roo.
6o. Morro Ayutla - Chacahua, Oax.
7o. Petenes de Campeche, Camp.
8o. Ría Lagartos, Yuc.
9o. Bahía Magdalena - Bahía Almejas, B.C.S.
10o. Pantanos de Centla, Tab.
11o. Corredor Cancún-Tulum, Q.Roo
12o Laguna Ojo de Liebre - Laguna San Ignacio, B.C.S.
13o Banco Chinchorro, Q. Roo
14o. Sistema Estuarino de Términos, Camp.
15o. Lagunas Costeras de Sinaloa y Sonora
16o. Corredor los Cabos - Estero San José - Cabo Pulmo
17o. La Joya - Joaquín Almaro, Chis.
18o. Laguna Madre, Tamps.
19o. Sistema Arrecifal Veracruzano, Ver.
20o. Celestún, El Palmar, Camp. Yuc.
21o. Zona Costera de Baja California Sur (Golfo de California) B.C.S.
22o. Tierra Colorada, Gro.
23o. Yalahau, Q. Roo
24o. Mismaloya - La Joya, Jal.
25o. Ecosistemas de Cancún, Q.Roo
26o. Bahía de San Quintín, B.C.
27o. Colola - Maruata, Mich.
28o. Cajón del Diablo, Son.
29o. Mexiquillo, Mich.

TALLER DE PRIORIDADES DE CONSERVACIÓN
ZONA COSTERA Y MARINA DE MÉXICO

Wetlands International, México para World Wildlife Fund 1996

Este ejercicio de priorización toma como referencia el documento desarrollado y producido por WWF como resultado del Taller realizado en Mazatlán, Sin. en 1992 (Almada-Villela 1992). Para este ejercicio se efectuaron cuatro talleres regionales, con la participación de 60 expertos. Como resultado del proceso de análisis y producto de los talleres se enlistaron 312 sitios que por motivos de disponibilidad de información se redujeron a 187. Utilizando como criterio a la biodiversidad, estos fueron reducidos a 64, determinando entre estos los 16 sitios prioritarios para México que son los que se enlistan a continuación ya que la selección final de 5 se identifica expresamente para el programa de WWF.

1) Sistemas Lagunarios - Estuarinos (cuencas y microcuencas terminales)

Océano Pacífico
- Bahía Magdalena, B.C.
- Marismas Nacionales, Nay.
- Chamela Cuitzamala, Jal.
- La Encrucijada, Chis.

Golfo de México
- Laguna Madre, Tamps.
- Laguna de Alvarado, Ver.
- Pantanos de Centla, Camp.
- Petenes de Campeche, Camp.
- El Palmar, Yuc.
- Yum Balam, Q. Roo

2) Islas Costeras y Oceánicas incluyendo arrecifes de coral.

Océano Pacífico y Golfo de California
- Las Grandes Islas, B.C. Son.
- Cabo Pulmo, B.C.S.
- Archipiélago Revillagigedo

Golfo de México y Mar Caribe.
- Sistema Arrecifal Veracruzano Sur, Ver.
- Banco Chinchorro, Q. Roo.

3) Ecosistemas y regiones únicas.

Océano Pacífico
- La Escobilla, Oax.

A GLOBAL REPRESENTATIVE SYSTEM OF MARINE PROTECTED AREAS

GBRMPA - The World Bank - IUCN (Kelleher *et al.* 1995)

Regional Priority

RB Alto Golfo de California y Cuenca del Río Colorado, Son, BC.
ZRRAN Islas del Golfo de California, BC. BCS, Son, Sin.
RB La Encrucijada, Chis.
Belize Barrier Reef (Mexico's fringing reefs are the northernmost component of the reef system)

National Priority

Bahia de San Quintín, BC.
RB El Vizcaíno, BCS
Bahía Magdalena - Bahía Almejas Complex, BCS.
PN Cabo Pulmo, BCS
Corredor Los Cabos-Estero San José-Cabo Pulmo BCS.
ZRSFFyCEF Cabo San Lucas, B.C.S
Reserva de Caza Cajón del Diablo, Son.
Lagunas Costeras de Sinaloa y Sonora
San Blas - Teacapán - Marismas Nacionales, Sin, Nay.
Maruata - Colola, Mich
Mexiquillo, Mich.
Mismaloya, La Joya, Jal.
Tierra Colorada, Gro.
Morro de Ayutla - Chacahua, Oax
Lagunas La Joya - Joaquín Amaro, Chis.
PN Sist. Arrecifal Veracruzano, Ver.
RB Rio Lagartos. Yuc.
PN Isla Contoy, Q.Roo
PN COI Mujeres Cancún y Nizuc Q.Roo
PN Arrecifes de Cozumel, Q.Roo
RB Sian Ka'an y Arrecifes de Sian Ka'an, Q.Roo

THE LIST OF WETLANDS OF INTERNATIONAL IMPORTANCE

Designated by the Contracting Parties to the RAMSAR Convention on Wetlands

(RAMSAR Convention Bureau 2000)

RAMSAR Number	RAMSAR Site	Date of Designation	Surface	Protected Area Cat.
332	Ría Lagartos, Yuc.	04/07/1986	47,840 ha.	BR
732	Marismas Nacionales, Sin. Nay.	22/06/1995	200,000 ha.	Unprotected
733	Pantanos de Centla, Tab.	22/06/1995	302,706 ha	BR
734	Cuatrociénegas, Coah.	22/06/1995	150,000 ha.	BR
814	Humedales del Delta del Río Colorado, BC. Son.	20/03/1996	250,000 ha.	BR
815	La Encrucijada, Chis.	20/03/1996	144,868 ha.	BR

HUMEDALES PRIORITARIOS

Humedales de México

Conservación Internacional para el USFWS, 1992

Océano Pacífico y Golfo de California

Delta del Río Colorado, B.C
Laguna Ojo de Liebre, B.C.S.
Bahía de San Quintín, B. C.
Bahía de San Ignacio, B.C.S.
Bahía Magdalena, B.C.S
Estero El Soldado, Son.
Topolobampo, Sin.
Bahía de Santa María, Sin.
Pabellón, Sin.
Marismas Nacionales, Nay.
La Encrucijada, Chis.

Golfo de México y Mar Caribe

Laguna Madre, Tamps.
Tamiahua, Ver
Laguna de Alvarado, Ver.
Centla, Tab.
Laguna de Términos, Camp.
Celestún, Yuc.
El Palmar, Yuc.
Ría Lagartos El Cuyo, Yuc.
Yalahau, Q. Roo
Sian Ka'an, Q. Roo

Interiores

Lagunas Fierro y Redonda, Chih.
San José Babícora, Chih.
Laguna Bustillos, Chih.
Laguna de los Mexicanos, Chih.
Laguna de Santiaguillo, Dgo.
Cuatro Ciénegas, Coah.
Guadalupe Victoria, Jal.
Chapala, Jal. Mich.
Cuitzeo, Mich.
Zonas Húmedas de Guanajuato, Gto.
Tlahuac, D.F.

4.2.2 SITE IDENTIFICATION AND PRIORITY SETTING EXERCISES COMPARISON TABLES

Ramos, 1987	SEDESOL, 1994, Gómez-Pompa y Dirzo
	Sierra de Guajolotes (Barranca Los Planes), Ags. (Estatal)
	Punta Banda B.C.
	Sierra de la Giganta, B.C.S.
	Punta Arena-Cabo Falso B.C.S
	Rancho Sandoval, Camp
Volcán Tacaná, Chis.	**Volcán Tacaná, Chis.**
	Cañón de la Venta, Chis.
	El Manzanillal, Chis.
	Laguna Miramar, Chis.
Cerro Tres Picos, Chis.	
Zona Selva Negra, Solistahuacán, Chis.	
	Laguna de Cabildos, Chis. (Estatal)
	Zona Barretos-Pereira Buenavista, Chis.
	Sierra el Francés, Chis.
	Altos de Simojovel, Chis.
	Laguna Bélgica, Chis.
	Barrancas del Cobre, Chih.
	Sierra del Diablo, Chih.
Cañón de San Lorenzo, Coah.	
	Playas Volantín, Tepalcates y Chupadero Boca de Apiza, Col.
Barranca de Contreras, D.F.	
Pedregal de San Ángel, D.F.	
Sierras del centro del Estado, Dgo.	**Sierra del Promontorio**, Dgo.
Omiltemi y áreas adyacentes, Gro.	**Omiltemi**, Gro. (Estatal)
Cañón del Zopilote, Gro.	**Cañón de Zopilote, Gro.**
Cerro de Teotepec, Gro.	
Acahuizotla, Gro.	
	Papalutla, Gro.
Sierra de Santa Rosa, Gto.	
Sierra de Tlanchinol, Hgo.	
	San Sebastián del Oeste, Jal.
	Barranca del Río Santiago, Jal.
Nanchititla y Temascaltepec, Edo. Mex.	
	Tulancingo-Malinalco, Edo. Mex.
	Zumpahuacán, Edo. Mex.
Mexiquillo, Mich	
Los Azufres, Mich	
Manglares Teacapán - Agua Brava, Nay	**La Tovara**, Nay. **Marismas Nacionales**, Nay. **Teacapán**, Nay.
Sierra de San Juan, vertiente Occ., Nay	Sierra de San Juan, Nay. (Estatal)
Mesa del Nayar, Nay.	
Sierra de los Lirios, Coah., N.L.	

Cerro Potosí, N.L.	
Chimalapa - Uxpanapa, Oax.,Ver. (Chis.)	Chimalapas, Oax.
Sierra de Juárez, Oax.	**Sierra de Juárez, Oax.**
Loxicha - Pluma Hidalgo, Oax.	
Sierra de Zaachilac, Oax.	
	Región de Santa Elena, Oax.
	Cerro Guiengola, Oax.
	La Chinantla, Oax.
Llanura del Río Verde, S.L.P.	
Identificar área, Sin.	
	Sierra de San Luis, Son.
	Sierra La Mariquita, Río San Pedro, Son.
	Bahía de Lobos, Son.
	El Carrizo, Son.
	Sierra Bacha, Son.
	Sierra Campanero-Arroyo el Reparo, Son.
	Sierra de Mazatán, Son.
La Sierra (Sierra de Madrigal, Sierra Poaná y Sierra de Tapinijuilapa), Tab.	
El Cielo, Tamps.	
Sierra de Maratines, Tamps.	
Sierra San Carlos, Tamps.	
	Playa de Rancho Nuevo. Tamps. (Acuerdo, 1977)
Uxpanapa-Chimalapas, Ver., Oax.	**Uxpanapa, Ver.**
Huayacocotla, Ver.	**Huayacocotla**, Ver.
El Morro de la Mancha, Ver.	La Mancha, Ver. (UNAM)
	Sierra de Otontepec, Ver.
	San José de los Molinos, Ver. (Res. Forestal)
Barranca de las Minas (investigar), Ver.	
Zona bosque tropical caducifolio, Ver	.
Punto Puuk (Put), Yuc. (Q.Roo)	Punto Put, Yuc. (Q.Roo)
	Dzilan, Yuc. (Estatal)
	Cerro de Piñones, Zac.
	Sierra de Organos, Zac.
Cuenca hidrográfica del sur de Sonora Son.	
Cuenca del Río Fuerte, Chih.	
Río Azul y Río Hondo, Q. Roo	
Mecoacan y Río González, Tab.	
Laguna de Chascos, Tab.	
Cuenca del Río Estorax, Qro.	
	Lagos de la Cuenca Oriental de Puebla
	Laguna de Alchichica, Ver.

RESUMEN DE LOS EJERCICIOS DE PRIORIZACIÓN DE SITIOS QUE INCLUYEN HUMEDALES DE MEXICO

	CI	WWF 1	WWF 2	DUMAC WF	DUMAC SB	CONABIO T	CONABIO M	CONABIO AD	GBRMPA	RAMSAR	Mangrove Olson,96
Océano Pacífico y Golfo de California											
Delta del Río Colorado, B.C	X	X			X	X	X	X	R	X	-
Bahía de San Quintín, B. C.	X	X		X	X	X	X	X	N		-
Laguna Ojo de Liebre, B.C.S.	X	X		X	X	X	X		N		-
Bahía de San Ignacio, B.C.S.	X	X		X	X	X	X		N		
Bahía Magdalena, B.C.S	X	X	X	X	X	X	X	X	N		
Estero San José,Cabo B.C.S.		X					X	X	N		
Estero El Soldado, Son.	X	X					?				
Bahía Lobos, Son				X	X						
Isla Tobari, Son.				X	X						
Santa Bárbara, Son.				X							
Agiabampo, Son.				X	X						
Bahía Yábaros, Son					X						
Lags. Costeras Son. y Sin.		X							N		
Topolobampo, Sin.	X	X		X	X						
Bahía de Santa María, Sin.	X	X		X	X						
Pabellón, Sin.	X	X		X	X						
Bahía Guadalupana, Sin.					X						
El Dorado, Sin.				X							
Laguna Caimanero, Sin.				X							
Marismas Nacionales, Nay.	X	X	X	X	X	X	X	X	N	X	X
Chamela Cuitzamala, Jal.			X			X	X	X			
Manzanillo, Col					X						
Morro Ayutla-Chacahua, Oax.		X							N		
Mar Muerto, Oax					X		X				
La Joya-Joaquín Amaro, Chis		X			X				N		X
La Encrucijada, Chis.	X	X	X			X	X	X	R	X	X
Golfo de México y Mar del Caribe											
Delta del Río Bravo, Tamps.				X							
Laguna Madre, Tamps.	X	X	X	X	X	X	X	X			
Delta Tamesí/Pánuco T./Ver.				X							
Laguna Tamiahua, Ver	X			X		X	X				
Laguna de Alvarado, Ver.	X		X	X							
Pantanos de Centla, Tab.	X	X		X		X	X	X		X	
Lagunas de Tabasco			X	X							X
Laguna de Términos, Camp.	X	X				X	X	X			X
Los Petenes, Camp.		X		X	X	X	X	X			
Ría Celestún, Yuc.	X	X		X	X						
El Palmar, Yuc.	X	X		X	X						
Ría Lagartos El Cuyo, Yuc.	X	X		X		X	X	X	N	X	
Yum Balam -Yalahau Q. Roo	X	X				X	X	X			
Sist.Lagunar Nichupté Q. Roo		X									
Corredor Cancún-Tulum, Q.R.		X									
Sian Ka'an, Q. Roo	X	X				X	X	X	N		X
Cuencas Interiores											
Lags. Fierro y Redonda, Chih.	X	-							-		-
San José Babícora, Chih.	X	-		X					-		-
Laguna Bustillos, Chih.	X	-		X	X				-		-
Laguna de Mexicanos, Chih.	X	-		X	X				-		-
Laguna el Cuervo, Chih.					X						
Laguna Ascensión-O.Ferico Ch.					X						
Laguna de Santiaguillo, Dgo.	X	-		X	X				-		-
Cuatro Ciénegas, Coah.	X	-							-	X	-
Laguna Sayula, Jal		-		X	X				-		-
Guadalupe Victoria, Jal.	X	-							-		-
Lago de Chapala, Jal. Mich.	X	-		X					-		-
Laguna de Cuitzeo, Mich.	X	-		X					-		-
Zonas Húmedas de Gto.	X	-							-		-
Tlahuac, D.F.	X	-							-		-

4.3 ECOREGIONAL LEVEL PLANS OR SELECT ECOREGIONAL PRIORITIES

An Ecological Analysis of Conservation Priorities in the Sonoran Desert Ecoregion

The Nature Conservancy / IMADES / Sonoran Institute (Marshall *et al.* 2000)

Cons Site #	Conservation Site Name	Total Cons. Targets	Proport of Ecoreg Targets	Total # of Taxa Repre-sented
13	Pinacate / Organ Pipe / Goldwater Complex	69	14.9%	7
8	Cerro Borrego / San Felipe	38	8.2%	5
10	Colorado River Delta	35	7.6%	7
3	Bahía de Kino / Isla Tuburón / Sierra Bacha	33	7.1%	5
38	Colorado River / Río Hardy	31	6.7%	6
1	Rancho El Único	28	6.1%	6
4	Sierra Bacha / Sierra del Viejo	27	5.8%	5
53	Atascosa Mountains	22	4.8%	6
57	Puerto Lobos	13	2.8%	4
2	Isla San Esteban	12	2.6%	4
61	San Simón / Sonoyta Valley	11	2.4%	5
63	Sunrise Butte /Guadalupe Canyon	10	2.2%	3
43	Isla San Pedro Nolasco	9	1.9%	2
37	Central Gulf Coast	8	1.7%	3
7	Carrizo Plains / Arroyo Bacoachito	8	1.7%	3
50	Río Sonora / Río San Miguel	6	1.3%	4
22	Río Magdalena / Río Asunción	6	1.3%	3
5	Cañones de la Pintada / Tetabejo	3	0.6%	2
42	Sierra La Jojoba	3	0.6%	2
60	Sierra Cubabi	3	0.6%	2
46	Cerro Agualurca	3	0.6%	2
39	Sierra de López	3	0.6%	2
58	Altar Valley	2	0.4%	2
47	La Poza / Southwest Hermosillo	2	0.4%	2
52	Cañón La Palma	2	0.4%	2
36	Palen Dry Lake	2	0.4%	2
6	Sierra Tordilla /Puerto El Orégano	2	0.4%	2
62	Ejido Salada	2	0.4%	1
40	Cueva el Tigre	2	0.4%	1
101	Ciénega de Saracachi	2	0.4%	1
44	Río Matape	2	0.4%	1
45	Las Guásimas	2	0.4%	1
49	Sierra de Mazatán	2	0.4%	1
89	La Cíenega	1	0.2%	1
64	Laguna Salada	1	0.2%	1
51	El Pápago	1	0.2%	1
56	No site name designated	1	0.2%	1
55	Sierra el Alamo	1	0.2%	1
54	Tubutama	1	0.2%	1
104	Cerro Prieto Ponds	1	0.2%	1
48	South Ures	1	0.2%	1
41	Sierra La Cobriza	1	0.2%	1
59	Quitovac	1	0.2%	1

Sonoran Desert Ecoregion

EXISTING PROTECTED AREAS

RB El Pinacate y Gran Desierto de Altar Son.
RB Alto Golfo de California y Delta del Rio Colorado, Son, B.C.
Isla Tiburón, Son.
Islas del Golfo de California, Son

TERRESTRIAL EXERCISES (Includes some coastal sites)

Bahía de Lobos, Son.
El Carrizo, Son.
Sierra Bacha, Son.
Sierra de Mazatán, Son.

CONABIO
Delta del Río Colorado
Gran Desierto de Altar - El Pinacate
Bahía de San Jorge
Sierra Seri
Cajón del Diablo
Sierra Libre
Sierra El Bacatete

FRESHWATER EXERCISES

Colorado River Delta wetlands, Baja and Sonora, Mexico
Quitobaquito/Rio Sonoyta, Sonora, Mexico

CONABIO
Delta del Río Colorado
Subcuenca del Río Asunción
Isla Tiburón - Río Bacoachi
Cajón del Diablo
Río Yaqui - Cascada Bassaseachic

WETLANDS EXERCISES

Delta del Rio Colorado, B.C.
Estero El Soldado, Son.
Bahía Lobos, Son

Identification of Priority Sites for Conservation in the Northern Gulf of Mexico an Ecoregional Plan

The Nature Conservancy, DRAFT - August 2000

The aim of this work was to identify sites within the northern Gulf of Mexico ecoregion that if protected would fully represent the biological diversity of the nearshore waters of this region. The northern Gulf of Mexico ecoregion extends from Anclote Keys, FL to the southern extent of the Laguna Madre de Tamaulipas, Mexico, a region which is also identified as the Louisianian Province. It is a rich and productive subtropical environment that supports extensive wetland and seagrass habitats. Much of the nearshore waters of the Gulf are divided into bays and estuaries behind barrier islands, which form a ring of sites around the northern Gulf of Mexico.

The northern Gulf of Mexico is divided into three broad subregions: the western subregion extends south from Galveston Bay; the central subregion is from Galveston Bay, TX to Mobile Bay, AL; and, the eastern subregion encompasses the northwest Florida coast. The western subregion is characterized by low freshwater input, sandy sediments, and clear waters; ideal conditions for the growth of seagrasses. In general, freshwater input decreases southward, and in the southern portions of this subregion evaporation is greater than freshwater input. These conditions in combination with shallow waters limit exchange with the Gulf and create the hypersaline bays of the Laguna Madre of Texas and Mexico. Taken together, the embayments of the Laguna Madre comprise the largest hypersaline lagoon in the world. Salinities are generally much higher, 35-70 parts per thousand (ppt), than typical marine waters (34-35 ppt).

As a preliminary goal, it was decided that the network of priority sites should contain at least 20% of the current distribution of each habitat and imperiled species target in each subregion. It was also decided that potential sites should generally encompass entire bays and estuaries as landscape-scale sites. These estuarine landscapes are assemblages of many species and communities with dynamics that are tied to variability in salinity (and associated physical-chemical conditions) created by the interaction between freshwater drainage and tidal influx.

Two primary tools were used to choose a set of high priority sites for conservation (i) a reserve selection algorithm, Sites v1.0, and (ii) expert interviews and an expert's workshop. The final portfolio of sites integrated information on the known distribution of targets and information provided by many local experts. As part of the assembly process, we also identified some high priority sites (= action sites) contained within the priority bays and estuaries. These high priority sites encompassed the best examples of the conservation targets in the northern Gulf of Mexico.

A preliminary analysis was done at the priority sites to assess the likely stresses to the conservation targets. It is likely that the importance of some of the stresses and their sources will be revised upon closer examination during the more detailed process of site conservation planning.

The following list includes the targets for the western subregion:
Primary habitat targets Seagrass, Tidal Freshwater Grasses ,Oyster Reefs, Salt Marsh, Tidal Fresh Marsh Flats, Intertidal Scrub/Forest
Secondary habitat targets: Muddy-bottom Habitats, Coquina Beach, Rock Beaches & Bars, Intertidal/subtidal beaches & bars, Serpulid Worm Reefs.
Imperiled Species: Kemp's ridley turtle, Texas pipefish, Opossum pipefish, Dwarf seahorse, Diamondback terrapin.

Twenty priority sites were identified, only one of them located within Mexico. The Laguna Madre de Tamaulipas priority site is described together with the other two priority US priority sites as a system.

1. **Laguna Madre de Tamaulipas**
   Principle targets: Seagrasses, tidal flats, Kemp's ridley turtle, intertidal shrub/forest (mangrove)
   Principle stresses: direct target destruction (overfishing)
2. **Lower Laguna Madre**
   Principle targets: Seagrasses, tidal flats, Kemp's ridley turtle, dwarf seahorse
   Principle stresses: Nutrification (from Arroyo Colorado), pollution (from Arroyo Colorado), direct target destruction (dredging, incompatible development)
3. **Upper Laguna Madre**
   Principle targets: Seagrasses, tidal flats, Kemp's ridley turtle
   Principle stresses: Nutrification

The Laguna Madre of Texas and Tamaulipas is the only set of coastal, hypersaline lagoons on the North American continent and one of only five worldwide. Extending along 277 miles of shoreline in South Texas and northeastern Mexico, the lagoons are separated by 47 miles of Rio Grande Delta. Each lagoon is about 115 miles in length and each is further divided into subunits, the upper and lower Laguna Madre in Texas, separated by the Land-Cut tidal flats, and the northern and southern Laguna Madre de Tamaulipas, separated by the El Carrizal tidal flats. The lagoons are protected on the east by barrier islands and peninsulas, and bound on the mainland side by vast cattle ranches, farmlands, and the brush country of the Tamaulipan Biotic Province. South Padre Island is a nesting area for Kemp's ridley turtles.

The historically recorded extreme salinities of over 100-ppt have been greatly moderated in recent decades due channel dredging and the cutting of passes. There has been less dredging in the Laguna Madre de Tamaulipas, and it has salinities closer to historical levels than the lagoons in Texas.

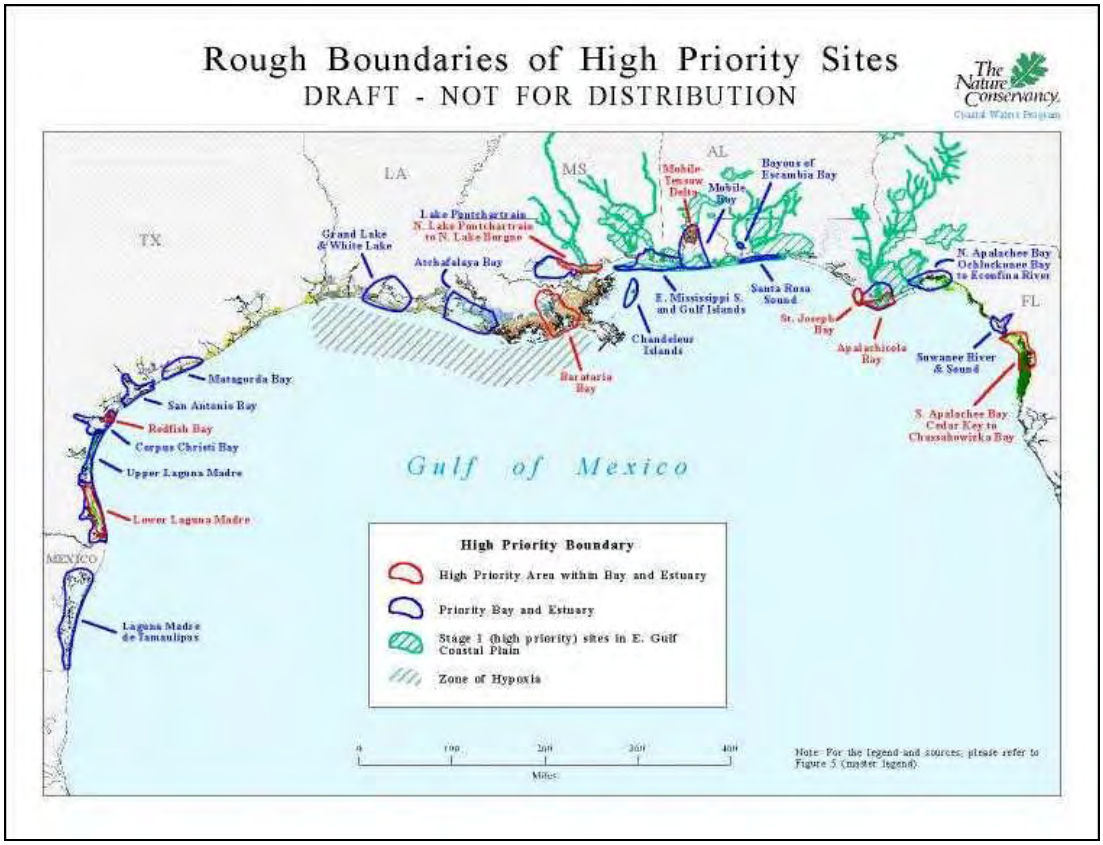
In Texas, almost 80% of all seagrass beds in the state are found in Laguna Madre and the historically, highly productive commercial fisheries have now given way to some of the best recreational fishing for red drum, black drum, and spotted sea trout in North America. In Tamaulipas, a boom and "bust cycle" of great fishery production alternated with briny, almost sterile waters before the 1970's.

The Laguna Madre also has the most extensive wind-tidal flats and clay dunes in North America. Wind-tidal flats occupy 354 miles of shoreline in the Texas Laguna Madre and 196 miles in Tamaulipas. A unique strain of oysters, adapted to the high salinity conditions of Laguna Madre, are found in South Bay, the southernmost portion of the lower Laguna Madre in Texas (Tunnell and Judd in press).

The highest priority of these three sites should be the seagrass and tidal flat communities of the Lower Laguna Madre. At present, Mexican partners are collecting and analyzing spatial information on the distribution of submerged habitats in the Laguna Madre de Tamaulipas, and this effort is expected to identify a smaller area of high priority sites within this Laguna.

The principal sources of stress on the Mexican side of the Laguna Madre are from overfishing. On the Texas side, the principal stresses are from nutrification and pollution, which come out of the Arroyo Colorado from agricultural, municipal, and shrimp aquacultural outflows. Direct and indirect target destruction on the Texas side arises from the dredging of the Intercoastal Waterway and from the use of ATVs on dunes and tidal flats.

(TNC 2000)


Rough Boundaries of High Priority Sites
DRAFT - NOT FOR DISTRIBUTION
The Nature Conservancy
Gulf of Mexico
TX
LA
MS
AL
FL
MEXICO
Grand Lake & White Lake
Lake Pontchartrain
N. Lake Pontchartrain to N. Lake Borgne
Atchafalaya Bay
Mobile-Tensaw Delta
Mobile Bay
Bayous of Escambia Bay
E. Mississippi S. and Gulf Islands
Santa Rosa Sound
Chandeleur Islands
Barataria Bay
St. Joseph Bay
Apalachicola Bay
N. Apalachee Bay Ochlockonee Bay to Econfina River
Suwanee River & Sound
S. Apalachee Bay Cedar Key to Chassahowitka Bay
Matagorda Bay
San Antonio Bay
Redfish Bay
Corpus Christi Bay
Upper Laguna Madre
Lower Laguna Madre
Laguna Madre de Tamaulipas
High Priority Boundary
High Priority Area within Bay and Estuary
Priority Bay and Estuary
Stage 1 (high priority) sites in E. Gulf Coastal Plain
Zone of Hypoxia
0
100
200
300
400
Miles
Note: For the legend and sources, please refer to Figure 3 (master legend).

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ANEXO I

Cambios efectuados al Mapa de Ecoregiones terrestres de WWF, 1998

El plano de WWF, 1998 fue originalmente modificado por Boucher en 1998 y posteriormente por Bezaury y Waller en el año 2000. Boucher incorpora modificaciones efectuadas por el "Grupo de Trabajo para el Cosido de las Ecoregiones Fronterizas Mex – EUA" adaptando el plano de ecoregiones proporcionado por el WWF con las ecoregiones de Bailey para los Estados Unidos. Bezaury y Waller posteriormente incorporan los siguientes cambios.

1) Se retomaron los límites de la ecoregión de los Bosques de Pino Encino de la Sierra Madre Occidental propuestas originalmente por el "Grupo de Trabajo para el Cosido de las Ecoregiones Fronterizas Mex - EUA " ya que en la zona fronteriza se presenta como matriz la transición entre el Desierto Chihuahuense y el Desierto de Sonora, siendo los bosques templados de las serranías aisladas (sky islands) las formaciones vegetales diferentes a la matriz que quedan insertas en la misma, conforme el mapa anexo.

2) Se modificó el límite sur de la ecoregión del Chaparral Costero de California, utilizando como fuente el mapa "Biotic Communities of the Southwest" (Brown y Lowe 1980).

3) Se modificaron los límites entre las ecoregiones Desierto de Sonora y Selvas Secas de Transición Sonora / Sinaloa de acuerdo a la vegetación indicada en el Mapa Digitalizado de Uso de Suelo y Vegetación 1:1,000,000 (INEGI 1996).

4) Se modificaron los límites del más norteño de los dos polígonos mas septentrionales de la ecoregión de la Sierra de Juárez y San Pedro Mártir, con el objeto de abarcar la totalidad del Bosque de Táscate de acuerdo con el Mapa Digitalizado de Uso de Suelo y Vegetación 1:1,000,000 (INEGI 1996).

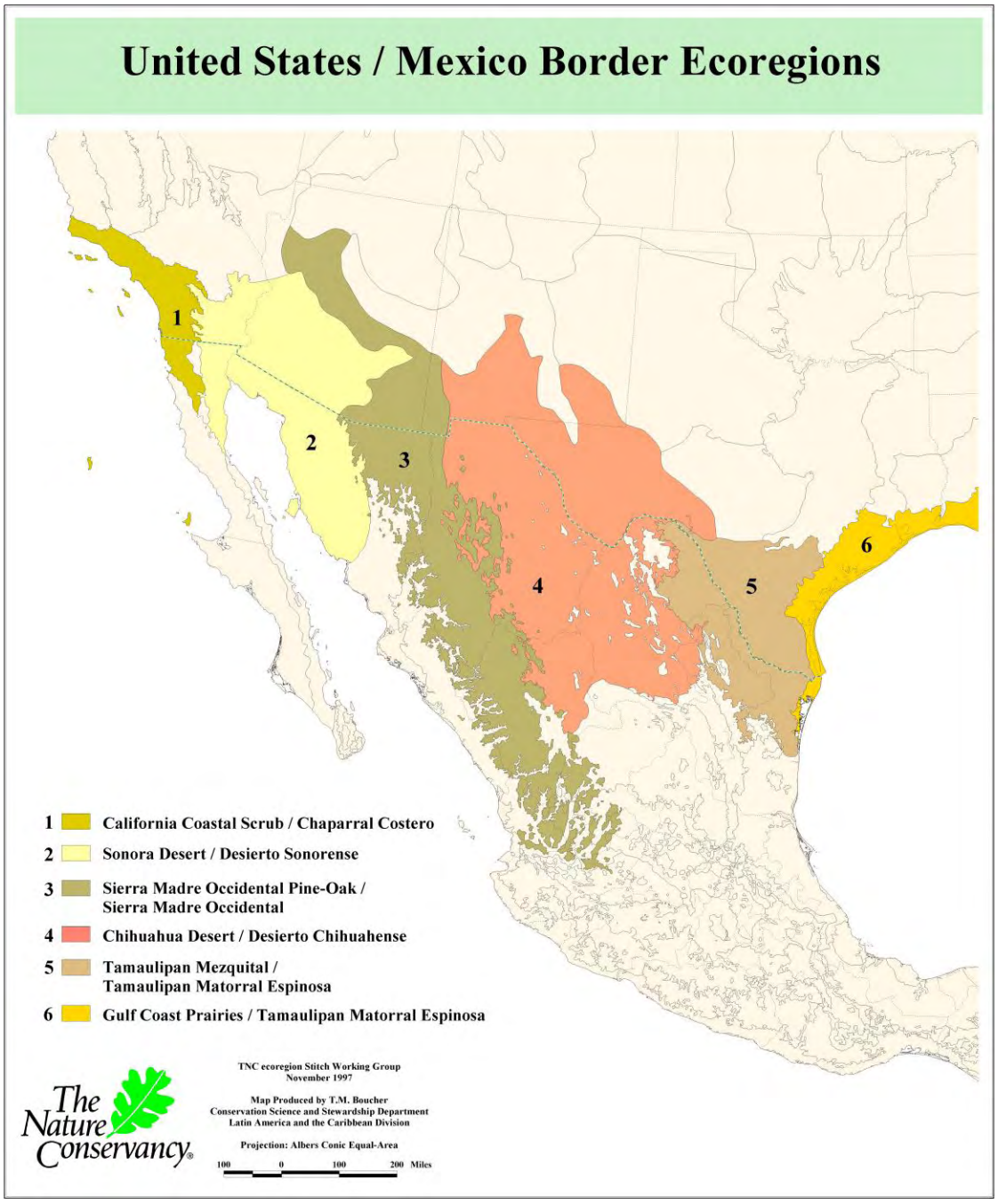
5) Se redujo considerablemente la extensión de los humedales que estaban representados al sur de Ría Lagartos en la zona nororiente del estado de Yucatán, ya que el humedal se desarrolla en paralelo a la costa y no ingresa a tierra adentro como lo indica el mapa. Asimismo fue borrada la porción de manglares que estaban indicados sobre las superficies acuáticas de las lagunas Yalahau (o Conil) y Chacmuchuc en Quintana Roo.

Cambios efectuados al Mapa de Regiones Biogeográficas Marinas de Sullivan y Bustamante, 1999

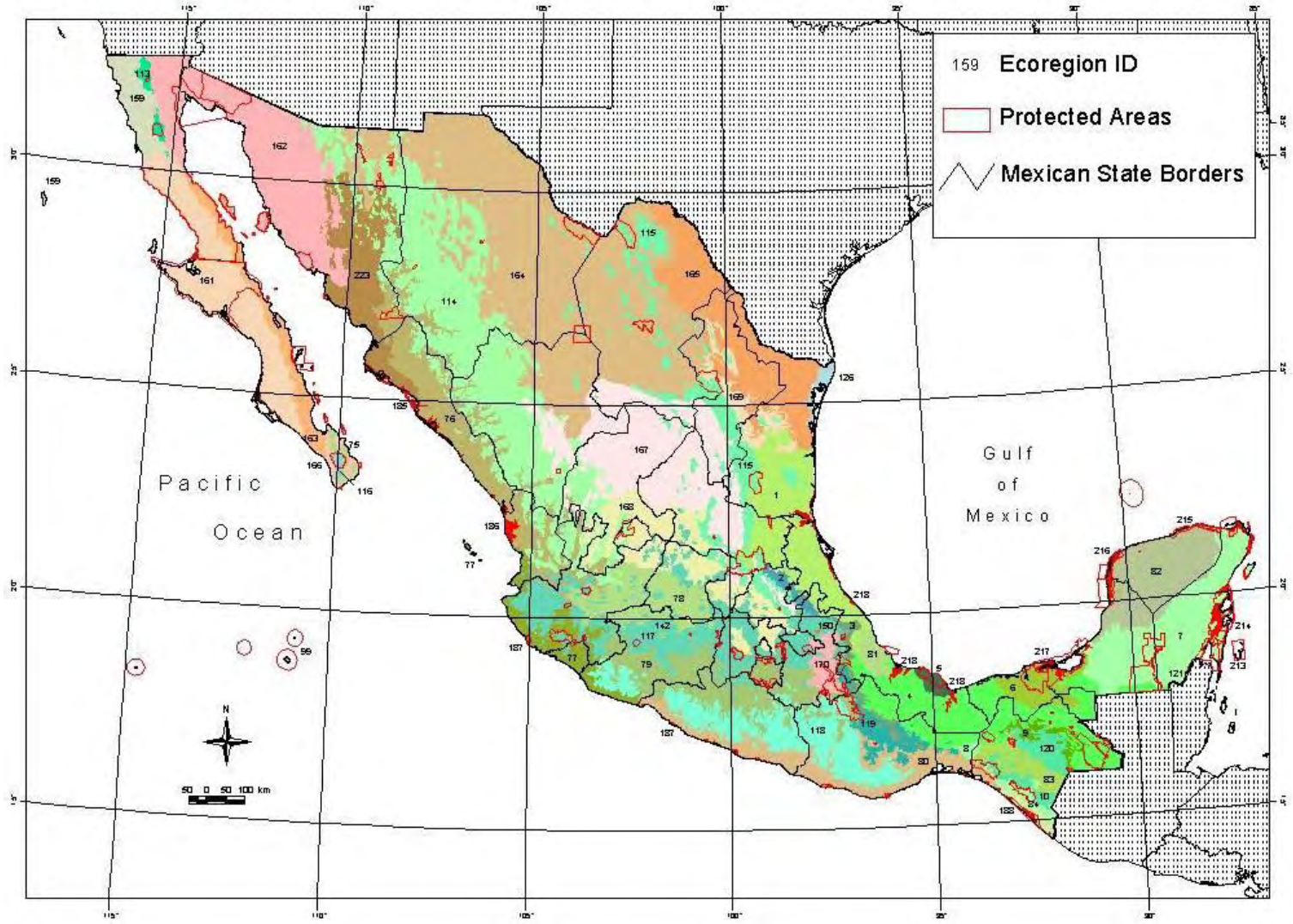
1) Se modificó el límite de la "región biogeografica" del Golfo de México, prolongando la respectiva al Norte del Golfo de México desde la frontera entre México y EUA hasta la desembocadura del Pánuco.

Cambios efectuados al Mapa de Ecoregiones de Agua Dulce de Olson *et al.,* 1998

1) Se agregó la ecoregión del Río San Pedro, misma que forma parte del complejo Gila- Río Colorado.


United States / Mexico Border Ecoregions
1
2
3
4
5
6
1 California Coastal Scrub / Chaparral Costero
2 Sonora Desert / Desierto Sonorense
3 Sierra Madre Occidental Pine-Oak / Sierra Madre Occidental
4 Chihuahua Desert / Desierto Chihuahense
5 Tamaulipan Mezquital / Tamaulipan Matorral Espinosa
6 Gulf Coast Prairies / Tamaulipan Matorral Espinosa
The Nature Conservancy
TNC ecoregion Stitch Working Group
November 1997
Map Produced by T.M. Boucher
Conservation Science and Stewardship Department
Latin America and the Caribbean Division
Projection: Albers Conic Equal-Area
100 0 100 200 Miles

Ecoregions of Mexico as Modified from World Wildlife Fund, 1998 by The Nature Conservancy, 2000



Ecoregions of Mexico as Modified from World Wildlife Fund, 1998 by The Nature Conservancy, 2000