CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES
OF WILD FAUNA AND FLORA

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# COMPLEMENTARY INFORMATION ON THE STATUS AND MANAGEMENT OF MORELET´S CROCODILE *CROCODYLUS MORELETII* WILD POPULATIONS IN MEXICO

1. This document has been submitted by Mexico*, in relation to amendment proposal to delete the "zero quota for wild specimens traded for commercial purposes" from the Appendix-II listing of the population of Mexico of *Crocodylus moreletii* (CoP17 Prop. 22).

2. The rationale behind said amendment proposal is based on the healthy status of wild populations of *C. moreletii*, which are currently listed in Appendix II. Therefore, it does not constitute a ranching proposal *sensu* Resolution Conf. 11.16 (Rev. CoP15).

3. This document summarizes the main outcomes of the "Workshop to review results and advances on monitoring, ranching and preparations of CoP17 of CITES on *Crocodylus moreletii*"(Mexico City, August 3rd-4rd 2016), held after submission deadline of working documents and amendment proposals for consideration at CoP17 (April 27th, 2016).

## A) Population trends estimated with data from 2011 to 2015 of the "Monitoring Program of Morelet's Crocodile in Mexico"

4. The workshop, attended by around 50 experts from academic institutions, national authorities, NGO, local communities and producers, as well as from the Crocodile Specialist Group of IUCN (CSG-IUCN), who focused on analyzing the population trends derived from data corresponding to the 2011-2015 period of the "Monitoring Program of Morelet´s Crocodile in Mexico".

5. The 73 permanent monitoring sites of the Program cover 50 water bodies along the distribution range of the species in Mexico (**Figure 1**).

6. In order to analyze trends on the average Encounter Rate (TE) per year, it was firstly verified that data fulfilled the assumptions and criteria proposed by Woodward and Moore (1993), as well as with observations from James Perran Ross (comm. pers. 2016; CSG-IUCN), regarding data and surveys characteristics, variable co-relation and confidence levels. Also, non-parametric statistical tests were applied in every analysis using *SPSS Statistics IBN* Software (ver. 24).

7. Through Spearman co-relations and Kruskall-Wallis tests, a significant relation among encounter rates and co-variables was discarded (habitat quality, water depth and vegetation type), encounter rate trend was analyzed for each water body using a one-tale Pearson regression with no co-variable corrections, and population structure trends were also analyzed through a Friedman ANOVA test with a two-tale alfa level of

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0.3 (recommended for timely detection of negative trends in crocodilian populations; James Perran Ross, comm. Pers. 2016).

8. It was found that 40% of water bodies (19/48) have clear trends on encounter rates per year. Of these, 13 water bodies (13/19) have increasing trends, 1 is stable, and 5 are decreasing. Likewise, 79% of water bodies (38/48) have stable (23/48) or increasing (15/48) population structures, 7 are decreasing on hatchlings and big adults[1], and in 3 there was no clear trend.

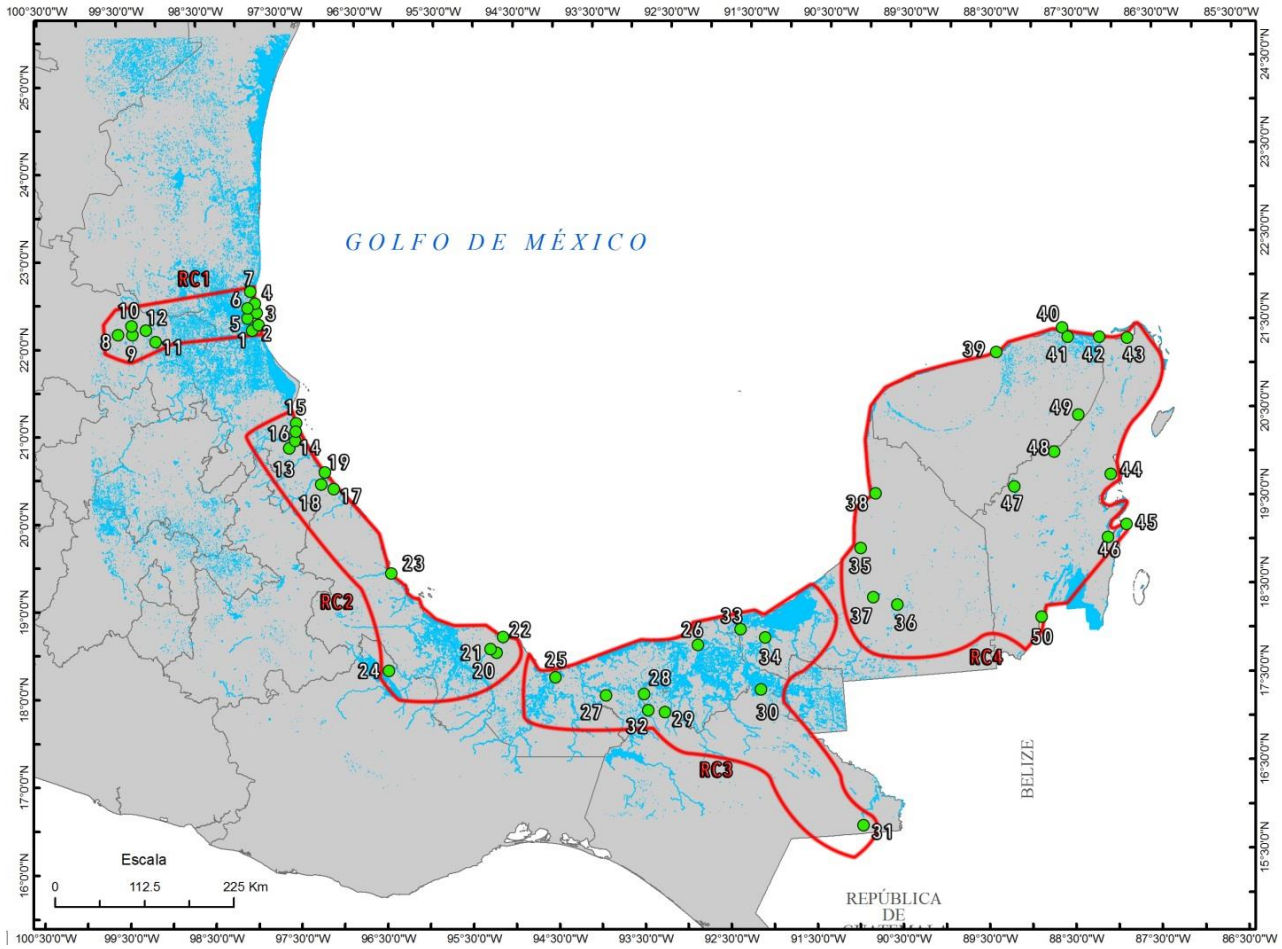


**Figure 1.-** Location of the 50 water bodies with monitoring sites of *C. moreletii* in Mexico (green dots) and Coordination Regions (RC) of the National Monitoring Program of the species. Red polygons correspond to Coordination Regions of the Program (RC1 – North Gulf, RC2 – Centre Gulf, RC3 – South, RC4 – Yucatan Peninsula). CONABIO, 2016.

9. In order to have an uncertainty value on the national encounter rate (TEN) and to increase its precision, a Bootstrap analysis was performed (Efron, 1979) using stratified (layer = water body) replacement sampling (1,000 samples) , with 95% confidence intervals for each average annual encounter rate (**Table 1**, **Figure 2**). The result was a national encounter rate of 3.23 ± 1.46 ind/km.

[1] *Emphasis was done in observing trends of these two categories, considering that hatchlings represent a population segment that overcome first winter (which is the season with the highest mortality; 75% according to Merediz-Alonso, 1999) and has the higher probability of recruitment; and that impact on big adults (Category V) can lead to a collapse of the populations (Merediz-Alonso, 1999).*

**Table 1.-** Estimated TEN through *Bootstrap* method for each year with confindence intervales (i.c.) at 95%

| Year | TEN ind/km i.c. 95% | | |
|---|---|---|---|
| | Min | Average | Max |
| 2011 | 1.34 | 1.97 | 2.7 |
| 2012 | 2.09 | 3.23 | 4.42 |
| 2013 | 1.99 | 2.98 | 4.11 |
| 2014 | 2.28 | 3.42 | 4.77 |
| 2015 | 2.27 | 4.59 | 7.47 |
| **Average** | **1.99** | **3.23** | **4.69** |

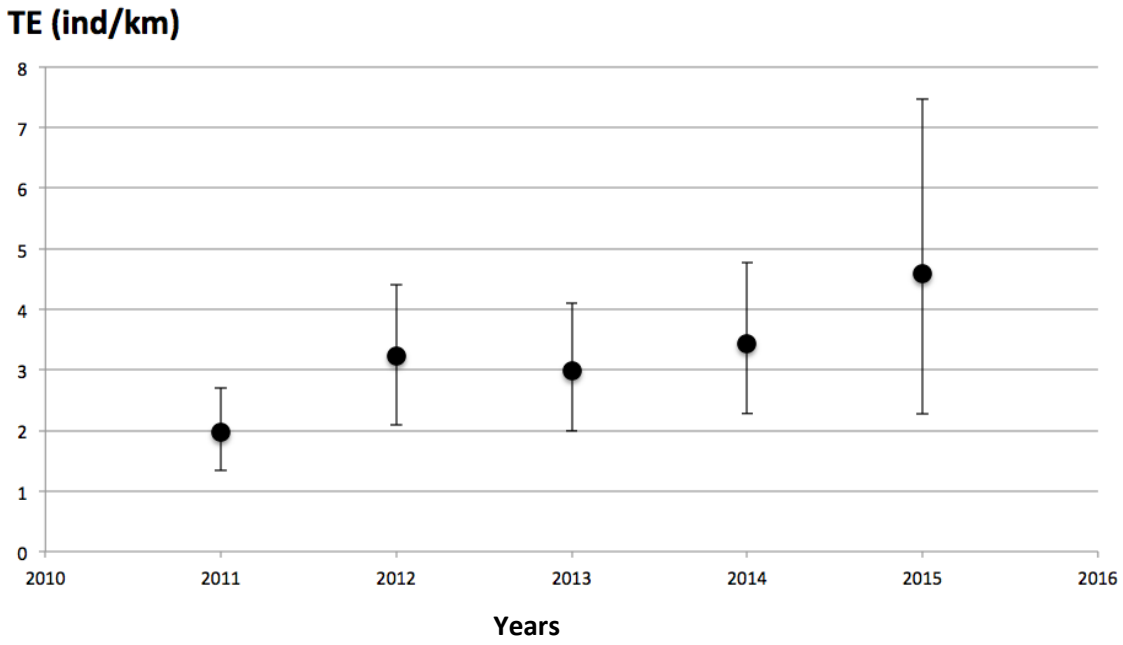


**Figure 2.-** National Encounter Rate (TEN) and confidence interval at 95% per year estimated through Bootstrap method considering re-sampling with 1,000 samples stratified by water body.

10. When considering TEN estimations through Bootstrap analysis and updated potential distribution range of the species (22,833 ± 24 km; see details on 2016 MaxEnt modelling in CoP17 Prop. 22), the estimated population size of *C. moreletii* in Mexico range between 44,842 (minimum value of confidence interval) and 104,925 (maximum value of confidence interval) wild individuals with an average of 73,960 ± 78 wild individuals in 5 years (**Table 2**).

**Table 2.-** Population size estimated through National Encounter Rates (TEN) of the 5 monitoring seasons 2011-2015 and confidence interval of the potential distribution model by MaxEnt algorithm.

| Year | Minimum (ind.) | Average (ind.) | Maximum (ind.) |
|---|---|---|---|
| 2011 | 44,842.59 | 44,889.77 | 44,936.96 |
| 2012 | 73,736.37 | 73,813.96 | 73,891.55 |
| 2013 | 68,054.43 | 68,126.04 | 68,197.65 |
| 2014 | 78,075.19 | 78,157.34 | 78,239.49 |
| 2015 | 104,705.26 | 104,815.43 | 104,925.60 |
| **Average** | **73,882.77** | **73,960.51** | **74,038.25** |

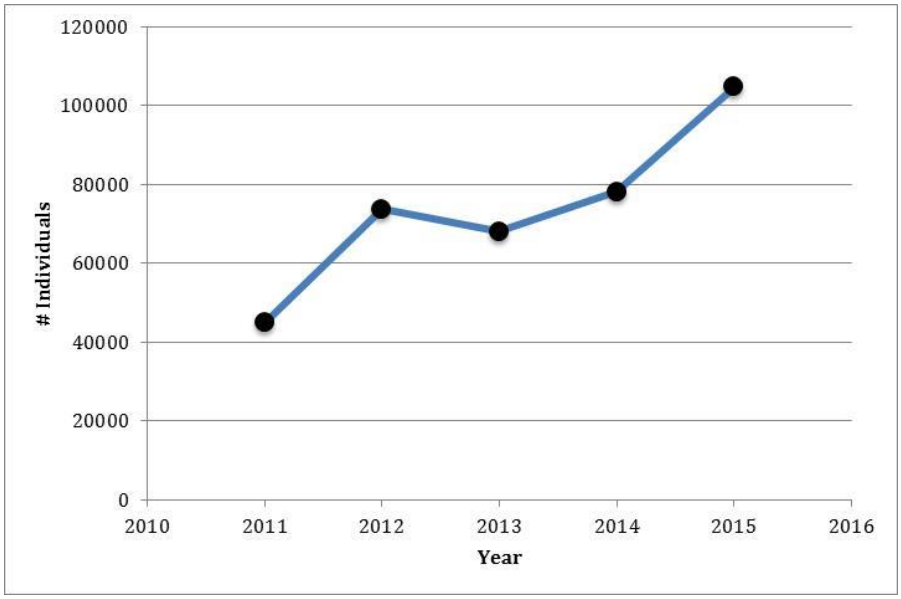


**Figure 3.-** Population size estimated through National Encounter Rates (TEN) of the 5 monitoring seasons 2011-2015.

11. These results and analysis support the conclusions presented by Mexico at the 28th meeting of the Animals Committee (AC28 Doc. 22.2) as well as the amendment proposal (CoP17 Prop. 22) that Mexico has set forward for consideration of Cop17, and suggest that wild populations of *C. moreletii* in Mexico have a wide distribution, a healthy size and population structure and an overall stable population which represent an opportunity for its sustainable management and use, whilst yielding benefits and conservation incentives to local communities.

**B) Progress achieved on the implementation of the "Pilot project on sustainability, production systems, and traceability of Morelet's crocodile skins in Mexico"**

12. As an additional precautionary measure to the lifting the zero quota (CoP17 Prop. 22), Mexico will start nest/egg harvesting in a small number of pilot sites under the framework of the "Pilot project on sustainability, production systems, and traceability of Morelet's crocodile skins in Mexico", for which progress was presented at the 28th meeting of the Animals Committee (AC28 Doc. 22.2).

13. The project involves local communities in the conservation of the species and its habitat through ranching (in situ Management Units for the Conservation of Wildlife, known as UMA, see details ahead), supported by sustainable harvest quotas authorized by the General Directorate of Wildlife of the Environment Ministry (DGVS-SEMARNAT, Mexico's CITES Management Authority) as well as Non-Detriment Findings (NDFs) issued by CONABIO (Mexico's CITES Scientific Authority), in compliance with both CITES and the national legal framework.

14. The hatchlings obtained by the communities will be sold to nearby farmers (or captive breeders) registered as intensive UMA, for the harvest of high quality skins destined to the international market, in collaboration with fashion industries. All of this, under the framework of Previous Informed Consent (PIC) and Mutually Agreed Terms (MAT) to promote the fair and equitable sharing of benefits along stakeholders of the production chain, and baked up by a traceability system which is complementary to CITES provisions, and which will ensure the legal acquisition and sustainable origin of the skins (see details in document CoP17 Doc. 46).

15. Ranching activities under the project's framework will begin in 2017, in two pilot sites located on the "Ejido Santa Isabel" (Palizada, Campeche) and the "Ejido Chacchoben" (Bacalar, Quintana Roo) (**Annex 1**). Likewise, it is possible that a third pilot site will be added to the 2018 ranching season. In this process of obtaining and analyzing new information from these sites, the possibility of adding new ones will be assessed.

16. The UMA management scheme is subject to the provisions of the General Wildlife Act (Ley General de Vida Silvestre –LGVS), which states:
    a) The proprietaries of the land (or "ejido") have the right to undertake activities on the sustainable use of wildlife as well as the obligation to contribute to the conservation of the habitat, for which they shall register as UMA (*in situ* or intensive/captive breeding)
    b) The UMA register process requires proof of the legal possession of the land, information of the geographic location, surface and limits of the property, and a management plan.
    c) The management plan must specify: specific objectives and goals on a short, medium and long term, as well as success indicators; biological information on the species to managed; physical and biological description of the area and the infrastructure for the management of the species; monitoring methods, activity work plan; management measures for the habitat, populations, and specimens, contingency measures; vigilance mechanisms; and the means and ways of the use and labeling proposed to identify the specimens, parts and derivatives to be sustainably harvested.
    d) The management plan shall be developed by the technical responsible of the UMA, who in collaboration with the holder of the registered UMA will be responsible of the sustainable harvest of wildlife, its conservation and that of its habitat.
    e) The technical responsible of the UMA shall register before SEMARNAT, and provide proof of experience, knowledge, capacitation, technical profile or professional expertise in conservation and harvest of wildlife and its habitat.
    f) The technical responsible shall provide SEMARNAT periodical reports on its activities, incidents and contingencies, achievements in line with the success indicators, and in the case of harvest, the socioeconomic data to be used for statistical purposes.
    g) The harvest authorizations will be subject to the presentation of periodic reports.
    h) The harvest shall require SEMARNAT's authorization, which will determine the harvest rate and its valid period, for which it must be proven that the requested rates are sustainable.
    i) The register of the UMA and the technical responsible, as well as the harvest authorizations can be revoked if they violate the provisions of the legal framework, for example: the management plan is not being properly implemented; there are duplicities or inconsistencies in the reported data; if they fail to comply with the authorized harvest quota and its validity; if during the supervision activities carried out by SEMARNAT, violations or omissions to the legal provisions are detected; if annual reports are not presented; if the harvest has a negative impact on the wild populations or the habitat; etcetera.

17. Additionally, in the case of the project's pilot sites:
    a) The objectives, targets and success indicators of the UMA management plans were developed under a DGVS-CONABIO collaboration.
    b) The management plans and ranching rates will be aligned with the "Ranching protocol of *C. moreletii* in Mexico" (see **section C** ahead) developed by CONABIO in collaboration with experts and DGVS, particularly regarding: methods and monitoring periodicity of populations, nests and habitat; harvest rates assessment; management and extraction of nest/eggs, incubation and hatchlings care.
    c) Communities where *in situ* UMA will be stablished agreed to develop the pilot project under Assembly Minutes (PIC). Likewise, they will sign an agreement with CONABIO to support ranching activities and they will submit periodic reports (complementary to those under LGVS), including monitoring results, production inventories (hatching and survival percentages, sizes, marking, etc.) that will allow CONABIO to assess the population status (NDF issuing) and UMA performance.
    d) *In situ* UMA will agree with Intensive UMA (farms), and the later with the fashion enterprises, the conditions to secure fair and equitable sharing of benefits derived from the hatchling sale and the trade of skins and products (MAT).
    e) CONABIO, in collaboration with experts and producers, will provide training on monitoring, management and collection of nests/eggs, incubation and hatchling care to local communities (*in situ* UMA) participating in the project, together with the technical responsible of the UMA.
    f) CITES Authorities (CONABIO, DGVS and PROFEPA – Mexico's Enforcement Authority) will overview UMA activities under the pilot project framework, including visits to assess infrastructure, animals conditions, legal documentation, marking, internal procedures and registers, among others.

18. Likewise in collaboration with experts and producers, CONABIO is currently providing for training to local communities (in situ UMA) on monitoring, collection and transport of nests/eggs, incubation and hatchling care. It is worth mentioning that farms (intensive UMA), which have great experience in captive breeding, will support and accompany local communities (*in situ* UMA) to secure successful ranching and production of

hatchlings in the project. Moreover, baseline information (see **section C** ahead) is being compiled to estimate harvesting rates in 2017.

## C) Main elements of the "Ranching protocol on *Crocodylus moreletii* in Mexico"

19. Also during the above mentioned workshop, the content of the "Ranching protocol on *Crocodylus moreleti* in Mexico" (in press) financed by CONABIO was presented and validated, in which around 15 authors from academic institutions, experts and Mexican producers participate.

20. The Protocol will serve as a "technical manual" for ranching and hatchling production activities within *in situ* UMA and for them to develop management plans. It is mainly directed to technical responsible of UMA and it will be useful for the Authorities to assess and authorize harvest rates (including NDF issuing). Also, it constitutes the basis for local communities training.

21. Content of the protocol is divided in nine chapters, under the following outline: I) introduction, II) background, III) population monitoring, IV) nests monitoring, V) habitat monitoring and management, VI) estimation of harvest rates, VII) management of nests, collection and transport of eggs, VIII) incubation and IX) hatchling care until sale.

22. Methods for population, nests and habitat monitoring are basically those of the Procedures Manual of the "Monitoring Program of Morelet´s Crocodile Mexico-Belize-Guatemala" (Sánchez et al., 2011) reviewed in several workshops (Sánchez et al., 2012, 2015; Rivera-Tellez et al., 2016 under development), and available at CONABIO´s webpage (http://www.biodiversidad.gob.mx/planeta/cites/publicaciones.html).

23. In situ UMA will be monitored annually and independently from the national Monitoring Program.

24. From the monitoring data, key indicators to be used to estimate and adjust harvesting rates will be the Encounter Rate (TE) and number of nests.

25. In line with the precautionary principle, initial harvest rates of 50% of the registered nests will be authorized in the pilot sites of the project, and they will be re-evaluated 5 years after to adjust them according to monitoring data and key indicators trends, under an adaptive management scheme.

26. Finally, information in the Protocol regarding management of nests, eggs, incubation and hatchling care is based on the great experience of Mexican producers, literature and guidance of the CSG-IUCN (i.e. *Crocodilian Capacity Building Manual*, *Best Management Practices for Crocodilian Farming*).

**References**


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Woodward, A. y Moore, C.. 1993. Use of night count data for estimation of crocodilian population trends, in: Proceedings 2nd Regional Meeting Conference of the Crocodile Specialist Group, Species Survival Commission, IUCN. Darwin NT, Australia. pp. 12-19.

Merediz-Alonso, G.. 1999. Ecology, sustainable use by local people, and conservation of Morelet's crocodile (*Crocodylus moreletii*) in Sian Ka'an Biosphere Reserve, Quintana Roo, Mexico.

**Anexo 1.-** Pilot sites in Mexico of the “Pilot project on sustainability, production systems, and traceability of Morelet’s crocodile skins in Mexico”

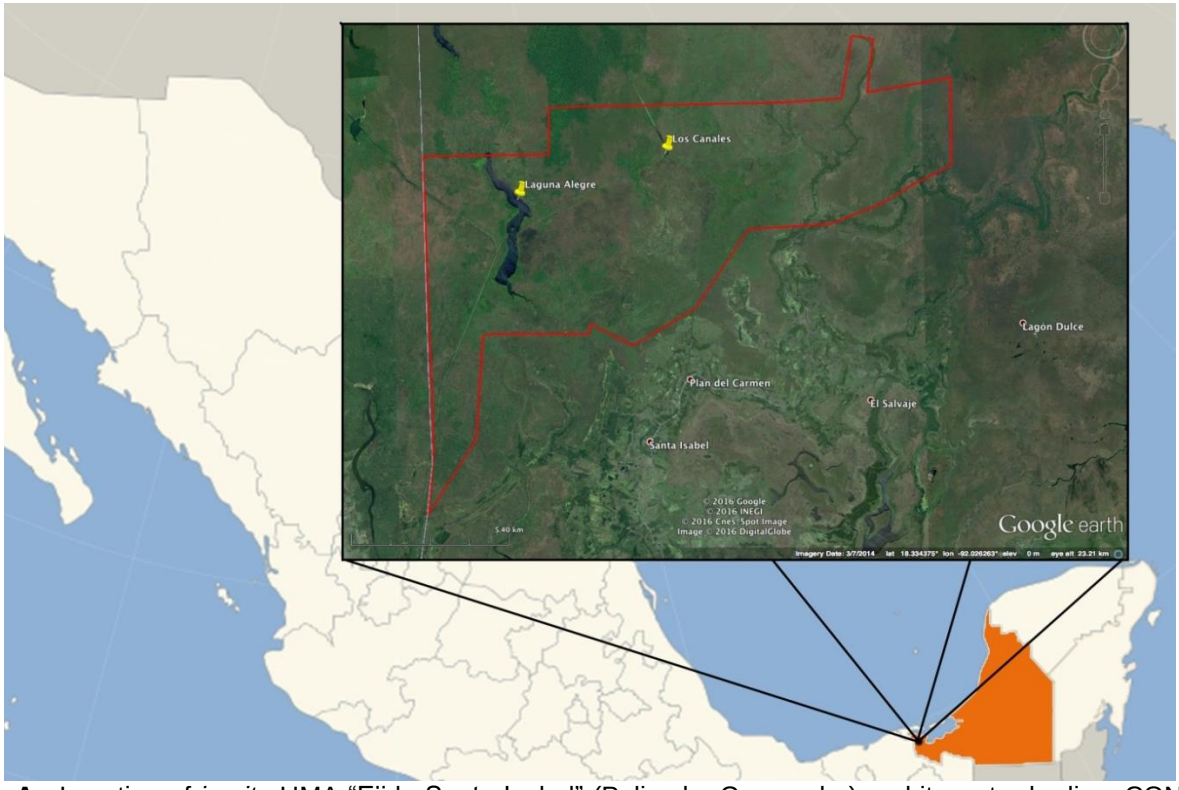


**Figure A.-** Location of *in situ* UMA “Ejido Santa Isabel” (Palizada, Campeche) and its water bodies. CONABIO, 2012. 'Political Estate división” 1:250,000. 2012'. Google Earth, 2016.


**Figure B.-** Location of *in situ* UMA “Ejido Chacchoben” (Chacchoben, Bacalar, Quintana Roo) and its water bodies. CONABIO, 2012. 'Political Estate división” 1:250,000. 2012'. Google Earth, 2016.