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CONVENTION SUR LE COMMERCE INTERNATIONAL DES ESPECES
DE FAUNE ET DE FLORE SAUVAGES MENACEES D'EXTINCTION

Dix-septième session de la Conférence des Parties
Johannesburg (Afrique du Sud), 24 septembre – 5 octobre 2016

EXAMEN DES PROPOSITIONS D'AMENDEMENT DES ANNEXES I ET II

A. Proposition

Transfert de l'Annexe I à l'Annexe II de la population de *Crocodylus acutus* (Cuvier, 1807) du District de gestion intégrée des mangroves de la Baie de Cispata, Tinajones, La Balsa et régions voisines du département de Cordoba, République de Colombie, en vertu de la résolution Conf. 11.16 (Rev. CoP 15) *Élevage en ranch et commerce des spécimens élevés en ranch d'espèces transférées de l'Annexe I à l'Annexe II*.

Annotation

Inscription à l'Annexe II de la population de *Crocodylus acutus* du District de gestion intégrée des mangroves de la Baie de Cispata, Tinajones, La Balsa et régions voisines (DGI-BC) de Colombie, aux fins exclusives d'autoriser le commerce international des peaux provenant d'élevages en ranch. Ces peaux seront marquées selon règles définies par la CITES et en respectant le système d'identification unique de *Crocodylus acutus* dans le programme d'élevage en ranch du DGI-BC.

B. Auteur de la proposition

Colombie[*].

C. Justificatif

1. Taxonomie

1.1 Classe: Reptilia

1.2 Ordre: Crocodylia

1.3 Famille: Crocodylidae

1.4 Espèce: *Crocodylus acutus* (Cuvier, 1807)

1.5 Synonymes scientifiques: *Crocodilus acutus* (Cuvier, 1807) et *Crocodylus americanus*

1.6 Noms communs: anglais : American Crocodile
Français : Crocodile d'Amérique, Crocodile Américain
Espagnol : Caimán, Caimán aguja, Caimán del Magdalena, Cocodrilo Americano, Cocodrilo de río, Lagarto, Lagartoamarillo,

[1] *Ce document a été soumis dans ces langues par l'auteur.*

[*] *Les appellations géographiques employées dans ce document n'impliquent de la part du Secrétariat CITES (ou du Programme des Nations Unies pour l'environnement) aucune prise de position quant au statut juridique des pays, territoires ou zones, ni quant à leurs frontières ou limites. La responsabilité du contenu du document incombe exclusivement à son auteur.*

Caimán de la costa, Caimáncaretabla, et Kayuüshiamong autres

1.7 Numéros de code: A-306.002.001.001

2. Vue d'ensemble

L'inscription de l'espèce à l'Annexe I de la CITES et la réglementation de son commerce a permis le rétablissement de quelques populations naturelles (Etats-Unis, Costa-Rica et Cuba). En 2004, à la 13e Conférence des Parties, celles-ci on approuvé la proposition d'amendement visant à transférer la population de Cuba de l'Annexe I à l'Annexe II, conformément aux dispositions de la résolution Conf. 9.24 (Rev CoP 12) autorisant le commerce des peaux provenant de l'élevage en ranch.

En Colombie, *C. acutus* est protégé depuis 1965 ce qui, ajouté à d'autres actions de protection de la nature, a permis le rétablissement de quelques populations ces dernières décennies (…et al., 2006). La situation est la même pour la population de *C. acutus* vivant dans la mangrove de la Baie de Cispata, au sein de la zone protégée du *District de gestion intégrée de la mangrove de la Baie de Cispata, Tinajones, La Balsa et régions voisines* (DGI-BC)[2] situé dans les municipalités de San Antero, San Bernardo del Viento et Santa Cruz de Lorica, dans le département de Cordoba, sur la façade caribéenne de la Colombie (**Annexe Ia, figure 1b**) (Ulloa-Delgado et Sierra-Díaz, 2012). Depuis 2003, les habitants, en particulier le groupe communautaire (Asocaiman), se sont activement impliqués dans des actions de recherche, de surveillance, de gestion et d'éducation à l'environnement en vue du rétablissement et de la conservation de l'espèce (Ulloa-Delgado et Sierra-Díaz, 2012).

Les actions de conservation du DGI-BC ont permis la progression des effectifs de *C. acutus* qui ont permis d'atteindre une capacité de charge (voir ci-dessous la discussion au point 4.2) (Ulloa-Delgado, 2015). Les actions de conservation et de suivi mises en place dans le DGI-BC sur une période de 12 ans par les autorités régionales et la communauté locale (Asocaiman) ont montré une diminution des pressions, ce qui fait qu'il devenait possible d'envisager une utilisation durable de la population, ce qui permettrait d'améliorer les moyens d'existence des communautés locales, de façon ordonnée et structurée, par une stratégie d'élevage en ranch à partir de collectes d'œufs, ce qui est considéré comme une stratégie très prudente et sûre (Rice *et al.* 1999 ; Larriera, 2004 ; Jenkins *et al*. 2006 ; McShane *et.al.* 2011).

La collecte maîtrisée des œufs, respectueuse des lignes directrices nationales et internationales, est la meilleure stratégie propre à garantir la conservation durable de la population rétablie du DGI-BC. L'Autorité régionale de l'environnement compétente et la Corporation régionale autonome des vallées de Sinu et de San Jorge (CVS selon l'acronyme en espagnol) dirigeront le programme et sa mise en place sera poursuivie avec les membres des communautés locales. Dans ce sens, le transfert de la population de *C. acutus* du DGI-BC de l'Annexe I à l'Annexe II sera un exemple de ce qui peut être obtenu par l'implication des communautés dans la gestion des ressources naturelles, expérience qui pourrait être à l'avenir étendue à d'autres populations de Colombie.

3. Caractéristiques de l'espèce

3.1 Répartition géographique

3.1.1 Populations de *Crocodylus acutus*

C. acutus se place au deuxième rang des crocodiles les plus largement répartis dans le nouveau monde. Sa répartition naturelle englobe 29 pays, de la province de Tumbes dans le sud-ouest du Pérou à la pointe méridionale de la Floride aux Etats-Unis, en passant par l'Amérique centrale (Panama, Costa Rica, Nicaragua, El Salvador, Honduras, Belize, Guatemala et Mexique), la région sud-américaine des Caraïbes (Equateur, Colombie et Venezuela) et les Caraïbes (Cuba, Jamaïque, Haïti et République dominicaine) (Ponce-Campos *et al*, 2012) **(Annexe Ia, figure 2).**

[2] *Un District de gestion intégrée est une zone protégée définie comme un « espace géographique dans lequel le paysage et l'écosystème maintiennent leur composition et leurs fonctions, alors même que leur structure a été modifiée et dont les valeurs naturelles et culturelles sont mises à la disposition de la population humaine pour son utilisation durable, sa préservation, sa restauration, ses savoirs et sa jouissance » (Décret 2372 de 2010). Cette catégorie cherche à combiner les actions de protection et de conservation des zones réservées avec les possibilités d'une utilisation durable. Suivant les descriptions des catégories de gestion des zones protégées de l'UICN, les DGI correspondent à la catégorie VI Aire protégée pour l'utilisation durable des ressources naturelles (UICN, 2015).*

3.1.2 Populations de *Crocodylus acutus* en Colombie

L'aire de répartition actuelle de *C. acutus* en Colombie comprend la façade caribéenne (fleuves et rivières Atrato, Las Piedras, Catatumbo, Nuevo Presidente, San Miguel, Sardinata, Sinu et Tibu), le bassin de la Magdalena et les mangroves et deltas des fleuves et rivières de la façade pacifique (Medem, 1981 ; Rodríguez-Melo, 2000 ; Ulloa-Delgado, 2011 ; Morales-Betancourt *et al*, 2013). Des signalements récents indiquent la présence de populations établies dans de nouvelles régions comme le Parc naturel national de Tayrona dans le département de Magdalena (El Heraldo, 2012 ; Balaguera-Reina, 2012 ; Balaguera-Reina *et al*, 2014 ; Morales-Betancourt, 2013; Gómez-González, 2014 ; Vargas-Ortega, 2014).

3.2 Habitat

En Colombie, C. *acutus* habite les zones humides continentales et côtières et est considéré comme une espèce très adaptable vivant aussi bien dans les eaux douces que dans les eaux saumâtres des estuaires, à l'embouchures des grands fleuves, dans les lacs et mares, marais, mangroves et même sur certains atolls coralliens éloignés de la côte (Thorbjarnarson, 1992 ; Thorbjarnarson*et al*, 2006 ; Morales-Betancourt *et al*, 2013).

3.3 Caractéristiques biologiques

C. acutus présente un dimorphisme sexuel marqué par la taille. Les mâles adultes atteignent 5 à 6 mètres, tandis que les femelles sont plus petites (approximativement 4 mètres) ; les individus vivant dans les îles tendent à être plus petits que ceux des zones côtières et marécageuses (Schmidt, 1924 ; Medem, 1981 ; Thorbjarnarson, 1992 ; Ulloa-Delgado et Sierra-Díaz, 2012). La taille moyenne de *C. acutus* au sortir de l'œuf est de 25 cm et dépend de celle de l'œuf (Rueda-Almonacid*et al*, 2007 ; Meraz*et al*, 2008 ; Morales-Betancourt *et al*, 2013).

La reproduction est sexuelle (Ross, 1988) et quelle que soit leur taille définitive, la maturité sexuelle est différente chez les deux sexes ; chez certains auteurs, les femelles doivent atteindre la taille de 2 mètres au minimum tandis que pour les mâles, cette taille est de 2,5 m. Les femelles pondent 14 à 60 œufs par an dans des nids creusés dans le sol ou dans des monticules de taille moyenne faits de terre, de sable, de feuilles mortes et d'herbes (Medem, 1981 ; Rueda-Almonacid*et al,* 2007 ; Thorbjarnarson, 2010 ; Fundación Biodiversa, 2011 ; Morales-Betancourt *et al*, 2013).

L'éclosion coïncide avec le début de la saison des pluies (avril à juillet) après une période d'incubation d'environ 90 jours, en fonction de la température (Rodríguez-Melo, 2000 ; Thorbjarnarson, 2010 ; Fundación Biodiversa, 2011 ; Gómez-González, 2014). Le sexe du jeune crocodile dépend de la température de la chambre d'incubation : à 31,5°C, les deux sexes sont à proportion égale, au-dessous, la proportion de mâles s'accroît et au-dessus c'est la proportion de femelles qui s'accroît (Morales-Betancourt *et al*, 2013 ; Medrano-Bitar et Ulloa-Delgado, com. pers. 2014).

Il semble que le taux de mortalité des œufs soit élevé dans les nids, suite à la prédation, aux inondations, à la dessiccation ou à la surchauffe (exposition directe aux rayons du soleil). De même, les nouveau-nés connaissent un fort taux de mortalité dans leur première année (Ross, 1998 ; Gómez-González, 2014). On estime que seuls 20% des œufs seront représentés dans la population des un an (Moler, 1992 ; Ross, 1998). Si l'on part du constat que pour maintenir une population sauvage stable, il faut qu'une femelle produise seulement un à deux jeunes qui survivent (Ross, 1998 ; Abercrombie *et al.* 2000), ces faibles taux de survie ne seraient pas un problème, et en fait il est de notoriété publique qu'un grand nombre d'œufs peuvent être prélevés pour l'élevage avec un impact minimum sur les populations (Rice *et al.* 1999 ; Jenkins *et al*. 2006). Chez au moins certaines espèces de crocodiles, l'impact des prélèvements d'œufs semble être compensé par les taux de survie qui dépendent de la densité des nouveau-nés (Webb et Manolis 1992) : les taux de survie décroît avec l'augmentation du nombre de nouveau-nés.

Cependant, la longévité, la grande taille de *C. acutus* et leur qualité d'ectothermes sont des caractéristiques qui font que les adultes de grande taille deviennent très résistants parce qu'ils tolèrent des fluctuations de leur habitat qui pourraient être catastrophique pour les nouveau-nés (Ross, 1998 ; Abercrombie *et al*, 2000).

3.4 Caractéristiques morphologiques

La première caractéristique de *C. acutus* est son museau relativement étroit. Le schéma typique des ostéodermes cervicaux montre deux rangées, la première comptant quatre grands ostéodermes, tandis que la seconde n'en compte que deux, avec d'importantes variations (Morales-Betancourt *et al*., 2013). Contrairement aux caïmans et crocodiles, *C. acutus* est un « crocodile vrai » et la cinquième dent mandibulaire reste exposée lorsque les mâchoires sont fermées au lieu de s'insérer dans une cavité de la mâchoire supérieure (Ulloa-Delgado et Sierra, 2012).

3.5 Rôle de l'espèce dans son écosystème

Comme tous les autres crocodiles, *C. acutus* est considéré par tous les auteurs comme un prédateur au sommet de la chaîne alimentaire ; ses proies sont très variées et son influence sur le réseau trophique est considérable (Mazzotti et Brandt, 1994). Aux premiers stades (œufs, nouveau-nés et juvéniles) ils sont d'importantes source de nourriture pour d'autres espèces et le cannibalisme pourrait jouer un rôle important (en élaborant et transformant l'espèce) dans le contrôle des populations et, comme les autres crocodiliens, *C. acutus* pourrait contribuer au maintien de la structure et du fonctionnement des divers écosystèmes (Fittkau, 1970 ; Craighead, 1968 ; King, 1988 ; Thorbjarnarson, 1992 ; Ross, 1998 ; Ripple et Beschta, 2012). Ces crocodiles pourraient être un indicateur de l'état de conservation de leur écosystème (Sergio *et al*.2008).

4. Etat et tendances

4.1 Tendances de l'habitat

La transformation des pratiques d'occupation des sols suite au développement économique de la Colombie a accéléré la disparition de l'habitat de *C. acutus* dans les écosystèmes terrestres ou humides. Il est possible que des facteurs tels que l'accroissement de la population humaine et le changement climatique puissent aggraver la situation.

Sur la côte Pacifique, Medem (1981) a décrit une distribution discontinue de l'espèce en raison du type d'habitat (côtes rocheuses) ; Balaguera-Reina *et al* (2012) suggèrent que les cours d'eau de la zone d'occurrence calculée pour l'espèce en Colombie seraient plus ou moins connectés (Medem, 1981 ; Thorbjarnarson *et al*, 2006).

4.2 Tendance, taille et structure des populations

Les études récentes menées dans le pays sur l'abondance de *C. acutus* ne concernent que les populations de la zone caribéenne de la Colombie incluses dans le DGI-BC et la Baie de Portete (département de La Guajira) où la composante communautaire a été développée (... 2010 ; Balaguera-Reina *et al*, 2012) **Annexe I b, tableau 1**.

Bien que les conditions générales du recensement national des crocodiles effectué entre 1994 et 1997 par le Ministère de l'environnement aient révélé des individus isolés et des populations réduites et fragmentées, Rodriguez-Melo (2000) ont décrit la Baie de Cispata, dans le département de Cordoba, comme l'une des région possédant un potentiel environnemental et social apte à restaurer et maintenir des populations saines de *C. acutus* ; malgré une abondance relative faible et une structure de population indéterminée à l'époque (Rodriguez-Melo, 2000).

En 2002, Ulloa-Delgado et Sierra-Díaz ont écrit que la structure et la dispersion correspondaient à une population fragmentée et déséquilibrée, caractérisée par une relative rareté des classes de taille des nouveau-nés et juvéniles, mais avec suffisemment d'adultes pour remonter la population.

Considérant ce qui précède, l'autorité régionale de la CVS (Corporation régionale autonome des vallées du Sinu et San Jorge) a lancé en 2003 un programme expérimental pour la gestion de *C. acutus* dans la Baie de Cispata (Ulloa-Delgado et Sierra-Díaz, 2012). Ce sont essentiellement les communautés locales qui l'ont mis en œuvre, communautés organisées dans le cadre d'Asocaiman, association formée par un groupe communautaire de 18 membres, essentiellement d'anciens chasseurs, chargés de la surveillance de *C. acutus* par des comptages nocturnes de la population sauvage et de repérer les nids dans environ 80% de son habitat naturel. Une zone difficile d'accès d'environ 20% des terrains humides n'a pas été incluse, bien qu'il soit connu qu'on y trouve des animaux, des nids et des couvées (Ulloa-Delgado et Sierra, 2012-2015).

Dans le cadre de stratégies de conservation innovantes, des rives artificielles ont été construites dans les zones de mangrove et les femelles les utilisent pour faire leur nid. Parallèlement, le programme prévoyant le prélèvements d'œufs, leur incubation artificielle et l'élevage en captivité des nouveau-nés devant tous être relâchés dans la nature en vue du repeuplement a obtenu des résultats (Thorbjarnarson, 2010 ; Ulloa-Delgado et Sierra-Díaz, 2012).

Entre 2004 et 2014, environ 8 437 individus ont été relâchés, dont 2 510 représentant essentiellement des juvéniles de classe II (longueur totale de 0.7 à 1,2m et quelques individus des classes I et III) et 1 857 œufs incubés artificiellement prêts à éclore et 4 070 œufs fécondés réintroduits dans les nids quelques jours après leur collecte (incubation essentiellement réalisée dans la nature) ce qui fait la différence entre les deux groupes d'œufs (Ulloa-Delgado et Sierra- Diaz, (2015)). A partir d'un échantillon d'œufs incubés dans un environnement contrôlé, le taux d'éclosion de ces œufs a été extrapolé pour obtenir une valeur approximative de 69,6%.

Les actions de surveillance continue de la population sauvage et la récolte annuelle d'œufs sont organisées dans une zone de 1 436ha de plans d'eau ou un périmètre de 112 km. Les résultats laissent penser que l'abondance de *C. acutus* observée au cours des comptages nocturnes réguliers dans les zones échantillons du DGI-BC (voir le point 8.1.5 : surveillance continue de la population) s'est progressivement accrue (**Annexe Ia, figure 3)**, avec un taux d'observations de 0,6 individus au kilomètre.

Selon les comptages nocturnes (**Annexe Ia, figure 4**), la structure de la population de *C. acutus* confirme que toutes les classes de taille (classes d'âge) sont représentées et les juvéniles sont presque toujours plus abondants que les adultes. Ces résultats considérés dans d'autres populations comme indiquant généralement une population en phase de récupération et d'équilibre (Ulloa-Delgado et Peláez-Montes 2011) montrent l'importance d'une surveillance continue de la population.

Lorsqu'au cours de ces comptages nocturnes il n'y a pas de rives découvertes ou de végétation riparienne apparentes en raison des grandes marées et que les crocodiles sont dispersés dans les palétuviers, on peut s'attendre à ce que la proportion d'observations par rapport à la population réelle soit très faible (fraction visible) (Messel *et al.* 1981).

Dans le cas du DGI-BC, la taille estimée de la population se situe entre 800 et 2 356 individus, chiffre calculé à l'aide d'une formule tenant compte des estimations de la population de base dans le cas de diverses répétitions et en supposant que le suivi annuel est une répétition (King *et al*. 1990 et Cerrato, 1991, in Morales-Betancourt *et al.* 2013). De même, on peut estimer que la fraction visible de la population est de 7 à 20% (calculs effectués à partir d'un échantillon ou d'une année) en notant que le pourcentage pourrait être plus faible et donc mener à une sous estimation de la population ; ceci correspond aux évaluations effectuées au cours d'autres expériences sur des crocodiles où les chiffres de la fraction visible sont inférieurs à 1% (Alejandro Larriera GSC-UICN com pers.)

Le repérage annuel des nids effectué par la communauté est une tâche intense indépendante des comptages nocturnes (recensement) de la population sauvage. Entre 2004 et 2014, une moyenne de 54,6 nids (variabilité observée de 47 et 67 nids selon les années) (**Annexe Ia, figure 5a**) ont été observés, ce qui est notablement stable et cohérent avec la population adulte stable (Ulloa-Delgado et Sierra-Díaz 2012). Le fait que la taille de la couvée n'ait pas progressé pourrait être lié au phénomène de domination sociale et au fait que les femelles sont exclues de la population (Hines et Abercrombie, 1987). La taille moyenne des couvées s'est accrue entre 2003 et 2013, passant de 28,4 à 30,46 œufs, pour une moyenne de 27,11 œufs dans 56,4 nids trouvés en moyenne **(Annexe Ia, figure 5b**).

Le programme de surveillance continue a montré que ces trois dernières années de petites couvées ont été observées, ce qui laisse penser que des femelles ont été recrutées dans le cheptel reproducteur de la population sauvage. Néanmoins, de petites couvées ont été observées pour chaque année d'échantillonnage ce qui pourrait indiquer des pontes ininterrompues ou des femelles de petite taille (Mazzotti 1989).

La construction de sites artificiels de nidification a été l'une des stratégies de gestion les plus payantes dans la mesure où sur les 13 années de suivi de l'abondance des nids, la communauté a obtenu près de 64% des nids (400 nids). De même, cette stratégie a participé aux dispositifs d'atténuation et d'adaptation ayant permis de neutraliser les effets de l'envahissement des sites naturels de ponte par l'eau de mer.

La surveillance continue par la communauté de l'abondance, de la structure et de la taille de la population de *C. acutus* assurera la continuité de la mise en place des actions de conservation et d'information au regard d'un préjudice possible au sein de la zone de gestion communautaire du DGI-BC.

4.3 Tendances géographiques

L'aire de répartition de *C. acutus* s'est modifiée au fil du temps. Certaines données suggèrent de possibles disparitions localisées dans les années 1970 (Medem, 1981), y compris sur des sites comme Isla Fuerte, Tortuguilla et l'archipel de Nuestra Señora del Rosario et San Bernardo (Parc national). A l'inverse, des études récentes ont rapporté la présence de l'espèce dans des zones nouvelles comme le Parc naturel national de Tayrona, dans le département de Magdalena et, curieusement, dans le département des îles de San Andres (Balaguer-Reina et González-Maya, 2008 ; El Heraldo, 2012 ; Morales-Betancourt *et al,* 2013 ; Balaguera-Reina *et al,* 2014 ; Gómez-González, 2014 ; Vargas-Ortega, 2014). Les limites actuelles de la répartition de l'espèce en Colombie se situent au nord-est à Hondita et la Baie de Castilletes dans le département de La Guajira (Medem, 1981 ; Balaguera-Reina *et al*, 2014), ainsi que dans le bassin du Catatumbo où une population frontalière a été signalée (Ulloa-Delgado et Pelaez-Montes 2011).

5. Menaces

La principale menace pesant sur *C acutus* est la dégradation et la disparition de son habitat. Les autres menaces sont les captures incidentes (Castaño-Mora 2002 ; Fundación Biodiversa, 2011 ; Ulloa-Delgado et Sierra-Diaz 2012 ; CORPORGUAJIRA et INVEMAR, 2012), mais l'impact en est inconnu (Thorbjarnarson*et al*, 2006 ; Balaguera-Reina *et al*, 2012 ; Morales-Betancourt *et al*, 2013). De même, le changement climatique peut être une menace, comme la hausse du niveau de la mer qui pourrait aussi affecter la stabilité et la continuité de l'habitat, ainsi que la hausse des températures qui pourrait affecter la détermination des sexes et donc le sex-ratio (Ulloa-Delgado y Sierra, 2012).

6. Utilisation et commerce

6.1 Utilisation au plan national

Comme les autres crocodiles, *C.acutus* est utilisé depuis toujours par certaines communautés locales comme source de protéines et parfois comme source de matière brute pour l'artisanat et la pharmacopée traditionnelle. (Morales-Betancourt *et al*, 2013 ; Gómez-González, 2014). Sa principale utilisation était dans l'industrie du cuir (peaux sauvages) qui a généré un commerce international réglementé pour l'essentiel ces dernières années par la CITES. Plus récemment *C. acutus* a été utilisé comme attraction touristique, ce qui permet la mise en place certaines initiatives, comme celle du DGI-BC (Thorbjarnarson, 2010 ; Ulloa-Delgado et Sierra-Díaz, 2012 ; Morales-Betancourt *et al*, 2013).

6.2 Commerce licite

Depuis les années 1990, la Colombie a favorisé la création d'élevages pour la production de peaux de *C. acutus.* Après avoir été enregistrées comme provenant d'élevages d'une espèce inscrite à l'Annexe I, les 100 premières peaux ont été exportées en 2001 (Ulloa-Delgado et Sierra, 2012 ; De La Ossa *et al*, 2013). De 2012 à juillet 2015, l'organe de gestion a délivré des permis d'exportations pour 5 502 peaux provenant d'établissements élevant *C. acutus* en captivité (MADS, 2015). On estime qu'entre 1976 et 2011, la Colombie a exporté environ 16 191 679 peaux de crocodiles, dont 95,8% provenant d'établissements d'élevage en captivité, réparties comme suit : 97,7% de peaux de *Caiman C. fuscus*, 2,07% de *Caiman C. crocodilus* et seulement 0,03 % de C. *acutus* (De La Ossa *et al*. 2013).

Il y a actuellement en Colombie sept fermes d'élevage enregistrées auprès du Secrétariat de la CITES et deux en cours d'enregistrement (**Annexe Ib, tableau 2**) (MADS, 2015). Selon les données disponibles, on estime à ce jour à 43 709 le nombre de spécimens de *C. acutus* (y compris le cheptel reproducteur) élevés dans ces fermes (MADS, 2015).

6.3 Parties et produits commercialisés

Selon les données sur les exportations de l'organe de gestion (Ministère de l'environnement et du développement durable de la Colombie), les produits de *C. acutus* exportés par la Colombie sont exclusivement des peaux, essentiellement brutes ou salées (MADS, 2015). Toutes les peaux exportées ont été identifiées par le code de chacune des fermes d'élevage enregistrées en tant qu'établissement de reproduction en captivité à des fins commerciales d'espèces inscrites à l'Annexe I, et les principales destinations sont la France, l'Italie, le Japon et Singapour.

6.4 Commerce illicite

Un commerce illégal, ponctuel et de faible ampleur, a été observé par le passé pour *C. acutus*. Vu la régression de l'espèce sur le territoire national et le fait que les premières interdictions datent de 1965, on peut dire qu'il n'y avait pas de population sauvage faisant l'objet d'un commerce illégal. Certaines utilisations illégales de faible ampleur et à caractère local (peuples autochtones, communautés afro-américaines et fermiers) ont pourtant été repérées. Actuellement de strictes mesures de contrôle nationales, comme l'obligation de génotyper les reproducteurs de toutes les nurseries faite par le Ministère de l'environnement, du logement et du développement territorial (Résolution n° 1772 de 2010 ; Medrano-Bitar, com. pers. 2014 ; Résolution 1316 de 2014). Dans les zones protégées telles que le DGI-BC, l'implication de la communauté et le fait qu'elle se soit appropriée la conservation de l'espèce laissent penser que la probabilité est faible de voir se développer un commerce illicite.

6.5 Effets réels ou potentiels du commerce

Il y a actuellement des indices selon lesquels globalement l'élevage en ranch à partir d'une utilisation à des stades précoces (les œufs) est sûr et durable, et qu'il serait un moyen, en lien avec la densité, de compenser le prélèvement des œufs (Ross, 1998 ; Abercrombie *et al*. 2000 ; Larriera *et al.* 2004 ; Jenkins *et al.* 2006). Même si 50 à 80% des œufs pondus sont prélevés, ou 5 à 10% de la population adulte, ces taux restent durables (David, 1994 ; Webb *et al.* 1992 in Ross 1998 ; Woodward *et al*., 1992 in Ross, 1998 ; Jenkins *et al.* 2006).

En Australie, l'élevage à partir du prélèvement maximal d'œufs de *Croocodylus porosus* dans certaines régions (2 000 par an) n'empêche pas la population sauvage de poursuivre son rétablissement (Webb *et al*. 1992 in Ross, 1998). D'autres programmes d'élevage de crocodiliens comme *Alligator mississippiensis* en Floride (USA) (Rice *et al.* 1999), ou *Caiman latirrostris* en Argentine (Larriera et Imhof 2006) ont utilisé d'autres pourcentages pour décider des niveaux de prélèvements.

En ce sens, le commerce de produits d'élevage en captivité à partir de la collecte maîtrisée d'œufs de *C. acutus*, en respectant les lignes de conduite CITES, la législation colombienne et l'implication de la communauté, profitera aux populations locales, fera baisser la probabilité de voir se développer une utilisation illicite et rapportera la preuve des avantages tangibles de la conservation de *C. acutus*, des zones humides et des autres espèces de faune et de flore avec lesquelles il partage ces habitats.

7. Instruments juridiques

7.1 Au plan national

La Colombie possède une solide législation régissant la gestion, l'utilisation et le commerce de la faune sauvage, notamment des lois portant une attention particulière à l'utilisation et au commerce de *Crocodylus acutus*. Premièrement, la constitution de la Colombie, datant de 1991, charge l'État de protéger les ressources naturelles de la nation et prévoit un plan étatique de gestion et utilisation des ressources naturelles visant au développement durable et à la conservation (articles 8 et 80). Le pays dispose aussi de politiques, lois et lignes directrices locales visant à la protection des habitats naturels, tels que la mangrove, qui précisent que ces habitats font l'objet d'actions de conservation et de régulation des écosystèmes (Ulloa-Delgado et Sierra-Díaz, 2012).

Outre la réglementation prévue dans le Code des ressources naturelles et le Décret 1608 de 1978 réglementant les questions touchant à la faune sauvage, la loi 611 de 2011 précise les règles de base de la gestion durable des espèces de la faune sauvage et aquatique dont l'objet est de

réglementer la gestion durable des espèces de la faune sauvage et aquatique et leur utilisation, ainsi que leurs produits, ce qui peut se faire par prélèvements directs dans la nature ou via l'élevage et/ou en circuit ouvert.

D'un autre côté, le Décret 2372 de 2010 déclarant que l'administration de gestion intégrée du district relève de la compétence de l'Autorité environnementale et que la même autorité est en charge de la délivrance des permis, licences et autorisations en matière de ressources naturelles, entre autres, laquelle est pour ce qui nous occupe l'Autorité régionale (CVS). D'autres lois, décrets et accords en vigueur en matière de conservation, d'utilisation et de contrôle des espèces sont résumés à l'**Annexe Ib tableau 3, Annexe II Res. 11.16 (b,ii, d,iii).**

Si la proposition d'amendement était approuvée, d'autres dispositifs nationaux de réglementation et de gestion du programme d'élevage en ranch seront élaborés pour compléter les mesures de préservation.

7.2 Au plan international

Le commerce de *C. acutus* est réglementé par la CITES qui garantit que la Colombie et les Parties disposent de suffisemment d'outils pour appliquer les dispositions de la Convention. Par ailleurs, la Colombie est également membre de la Convention sur la diversité biologique (CDB) et de la Convention de Ramsar qui disposent d'un cadre légal suffisant pour garantir leur respect sur le territoire national, y compris sur les questions de conservation et de répartition des bénéfices.

8. Gestion de l'espèce

8.1 Mesures de gestion : Proposition d'élevage en ranch à partir de prélèvements maîtrisés des œufs

Le programme de gestion et de conservation de *C. acutus,* créé en 2003 par l'autorité régionale compétente de la Baie de Cispata - aujourd'hui le DGI-BC – (CVS) et avec la participation des communautés locales, a prélevé des œufs et élevé des juvéniles en captivité pour les relâcher ensuite dans la nature, avec la conservation pour seul objectif. La réussite de ce programme peut être évaluée à la nette progression de la fraction visible de la population et à l'hétérogénéité et la représentation des classes de taille de la population **(Annexe Ia, figure 4**).

Le principau objectif de la proposition d'amendement est également d'assurer la continuité du programme en optimisant le processus d'utilisation durable (Dutton *et al.* 2004) de *C. acutus* sous la direction du CVS de la région définie (DGI-BC) avec la participation des communautés locales. La proposition renforcera l'économie et la conservation en les rendant viables grâce au programme d'élevage à partir des œufs et au commerce des peaux. Ce modèle d'utilisation de l'espèce dans le DGI-BC sera poursuivi avec les données fournies par la surveillance continue des populations sur lesquelles s'appuieront les décisions relatives au niveau des quotas pour les animaux d'élevage.

8.1.1 Collecte des œufs et fixation des quotas

Le programme d'élevage en ranch sera réservé aux œufs de *C. acutus* de la population du DGI-BC. Les groupes communautaires, comme Asocaiman, seront seuls responsables de la collecte qui sera approuvée par les autorités environnementales locales et les autorités scientifiques nationales. Ni les personnes privées ni aucun autre organisme ne seront autorisés à opérer ces collectes.

D'autres expériences d'élevage de crocodiles en ranch (Hutton et Webb, 1992 ; Ross, 1998 ; Jenkins *et al*. 2006, Larriera et Webb, com. pers.) ont montré que des collectes limitées d'œufs peuvent être compensées par la progression des taux de survie des œufs non prélevés.

Divers modèles d'élevages sont possibles pour les crocodiles : *Alligator missipensis* en Floride (Rice *et al.* 1999), *C. porosus* en Australie (Webb *et al.*, 1992 in Ross, 1998) et *Caiman latirostris* en Argentine (Larriera et Imhof 2006). Pour ce qui concerne le modèle du DGI-BC pour la collecte d'œufs de *C. acutus* et en tenant compte des conclusions du groupe d'experts sur l'élevage des Crocodylia, il est recommandé que « là où la collecte est considérée comme élevée, les programmes de gestion peuvent exiger que soient renvoyés dans leur environnement naturels des individus assez grands pour qu'ils courent peu de

risques d'être victimes de la prédation à hauteur de 5 à 17% du nombre d'œufs prélevés » (Ulloa com. pers.) L'impact des prélèvements est ainsi réduit et il est possible que les effets soient bénéfiques sur la population sauvage (Hutton and Webb. 1992).

Au vu de ce qui précède, les œufs du DGI-BC seront prélevés dans la zone d'échantillonnage suivant le plan de gestion qui sera élaboré pour une utilisation durable de *C. acutus*. Les œufs prélevés seront transportés pour être incubés à la station de recherche CIMACI Amaya du CVS située au sein du DGI-BC, afin d'obtenir des individus des deux sexes, ce qui permettra aussi bien de contribuer aux réintroductions dans la nature qu'au commerce. A partir de l'expérience du programme de surveillance continue du DGI-BC, un pourcentage initial de 10% pour les réintroductions dans la nature est envisagé.

Ces10% d'individus seront élevés pour être lâchés dans la nature, suivant un plan de gestion tenant compte de la taille (environ 100cm) du sexe et de l'origine. Ce pourcentage sera réexaminé suivant les résultats de la surveillance de la population et des tendances observées, selon les critères biologiques appropriés.

Actuellement, le programme a recensé 857 juvéniles et subadultes dans les établissements de l'autorité régionale CVS **(Annexe Ia, figure 6**), et reconnaît également que le niveau des capacités des communautés devrait être renforcé pour permettre l'abattage des animaux. Un quota initial expérimental de 200 peaux exportées par an est proposé, jusqu'à la fin de l'inventaire (2019-2020).

Après l'inventaire en cours, les quotas commerciaux seront fixés à partir des données scientifiques de la surveillance continue des populations dirigée par le CVS, accompagné des communautés locales, et après examen des experts et des autorités CITES de Colombie. Le quota sera analysé et ajusté chaque année pour l'adapter aux contextes biologiques et juridiques ce qui permettra l'adoption de mesures appropriées et garantira que les prélèvements ne se font pas au détriment des populations et qu'ils contribueront à la conservation de l'espèce.

8.1.2 Identification et marquage

Les œufs prélevés dans les nids seront incubés et chacun sera marqué d'un numéro en séquence croissante, sans répétition pour chacune des collectes annuelles.

Ils seront placés dans l'incubateur de la station de recherches CIMACI Amaya du CVS, située dans le DGI-BC.

Tous les animaux seront marqués à la naissance par amputation des écailles de la queue marquant le numéro de l'œuf et l'année de la collecte **Annexe II résolution 11.16 b (ii). Figure 1**. Tous les animaux seront élevés à la station de recherches CIMACI Amaya.

Une description détaillée du système 'identification des espèces faisant l'objet de l'élevage et du programme d'élevage en ranch figure à l'**Annexe II résolution 11.16 b (ii).**

8.1.3 Produits/articles commercialisés

Les produits obtenus sont des peaux de *C. acutus*. Celles-ci seront marquées au moment de l'abattage selon le système universel d'identification des peaux de crocodiliens incluant une étiquette CITES marquant l'origine : ACUTUS CISPATA COLOMBIA (Res. Conf. 11.12, Rev. CoP 15). Toute nouvelle méthode de traçabilité recommandée par les Parties à la CITES sera incluse.

8.1.4 Abattage et traitement sans cruauté

L'abattage sera effectué dans des locaux appropriés au sein de la station de recherche de CIMACI Amaya par des méthodes propres à garantir l'absence de cruauté et dans le respect de la législation nationale pertinente. Plusieurs codes de pratiques de traitements non cruels des crocodiles captifs sont disponibles (NRMCC, 2009 ; CFAZ2012 ; LDWFY LSU 2011). La réglementation particulière aux traitements non cruels figure à l'**Annexe II, résolution 11.16 d (iii).**

8.1.5 Surveillance continue de la population

La méthode normalisée actuellement applicable de surveillance continue (incluant les recensements nocturnes et les repérages des nids) tient compte des évolutions nationales (Inderena, 1994) et de l'avis d'experts de l'UICN/CSE (John Thorbjarnarson, Wayne King et José Ayarzagüena) et d'autres documents tels que Ayargüena (1983) « Ecologie du caïman à lunettes dans les plaines de l'Apure ». Sur l'ensemble de la superficie du DGI-BC, environ 1436 hectares de plans d'eau sont échantillonnés, soit un périmètre de 112km correspondant à l'habitat du crocodile. L'échantillonnage de la population est effectué par des comptages nocturnes le long de neuf routes normalisées où les individus observés sont enregistrés par des biologistes accompagnés de membres de la communauté ayant reçu une formation **(Annexe Ia, figure 1b)**. Le recensement et le repérage des nids sont effectués une fois par an, à divers moments de l'année. La saison de ponte débute en février et se poursuit sur 3 mois, et la surveillance est effectué sur 20 jours, entre juillet et décembre essentiellement.

Les actions de surveillance par repérage des nids et recensements nocturnes de la population sauvage pourraient être renforcées par d'autres méthodes. Dans le cadre des protocoles de gestion *ex-situ* du modèle d'élevage en captivité, une liste (actualisée) des animaux sera dressée et un suivi sera réalisé par échantillonnage jusqu'à l'abattage (groupes homogènes et ajustements aux tableaux de nutrition). L'organe de gestion CITES disposera d'un accès permanent aux données.

Le programme soumettra un rapport annuel au CVS, l'organe de gestion et l'autorité scientifique de Colombie, qui précisera les données relatives au programme, y compris mais pas seulement, les résultats de la surveillance continue de la population (chiffres, tendances et structure), le nombre de nids et le nombre d'œufs prélevés, les taux d'éclosion, la répartition par taille du cheptel captif, les taux de mortalité, le nombre d'animaux abattus et de peaux produites (avec leurs données d'identification) et, conformément aux dispositions de sauvegarde en cas de régression de la population consécutive au programme d'élevage en ranch, le nombre des animaux relâchés (avec leurs données d'identification).

En tant qu'organe de gestion CITES, le Ministère de l'Environnement et du Développement durable de Colombie soumettra un rapport annuel au Secrétaire de la CITES conformément aux dispositions de la résolution Conf. 11.16 (Rev. CoP 15) ; ledit rapport sera joint au rapport annuel présenté par la République de Colombie pour l'année correspondante.

8.2 Supervision de la population

La protection directe de l'espèce au niveau national relève en dernière analyse de la responsabilité du Ministère de l'environnement et du développement durable, l'organe de gestion CITES de la Colombie, assisté des autorités scientifiques CITES et des autorités environnementales régionales (corporations autonomes régionales du pays).

Dans le cas de la population de *C. acutus* soumise à un élevage en ranch (dans le DGI-BC), le CVS sera l'autorité environnementale directement responsable de la bonne santé de la ressource, de la coordination du programme d'utilisation et de la délivrance des permis aux autorités locales, y compris l'Asocaiman. Les rapports sur le programme fourniront des données aux autorités environnementales nationales qui serviront à démontrer le respect des quotas et des mesures imposées propres à bénéficier à la conservation de la population, sans préjudice pour les populations sauvages.

8.3 Mesures de contrôle

8.3.1 Au plan international

Les mesures de contrôle au niveau international prévues dans la Convention CITES seront une priorité et elles fourniront les outils pour la mise en place de ces mesures, notamment la réduction du trafic illicite (Ulloa-Delgado et Sierra-Díaz, 2012).

Par ailleurs, tous les pays de l'aire de répartition de *C. acutus* sont Parties à la CITES et son commerce est réglementé par la Convention. Qui plus est, le Protocole relatif aux zones et à la vie sauvage spécialement protégées (SPAW) prévoit des dispositifs supplémentaires pour

C. acutus dans le sous-programme d'appui à la conservation et à l'utilisation durable des espèces menacées.

8.3.2 Au plan national

La Colombie s'est dotée d'un cadre légal réglementant l'utilisation de la faune sauvage qui a permis la promulgation d'une série de lois sur l'utilisation des crocodiles, parmi d'autres composantes de la biodiversité (**Annexe I b, tableau 3, Annexe II Res. 11.16 (b,ii, d,iii)**. Le pays s'est aussi doté de plusieurs institutions publiques responsables de la gestion, de la protection, de la conservation, de l'utilisation et de la manipulation des ressources naturelles renouvelables chargées d'appliquer strictement diverses mesures de gestion, de contrôle et de supervision aux niveaux local, régional et international. Ce sont notamment le Ministère de l'Environnement et du Développement durable (organe de gestion CITES), l'Autorité nationale des permis environnementaux (ANLA), les Corporations régionales autonomes (CAR) les cinq instituts de recherche qui constituent l'autorité scientifique CITES du pays, la police de l'environnement, la police de la route et le Bureau du contrôleur (MAVDT 2005).

En tenant compte de ce qui précède, d'autres dispositifs de contrôle permettant de garantir une collecte durable de spécimens de *C. acutus* sont :

- un programme de développement qui sera doté d'un plan de gestion/plan commercial qui fournira les orientations en vue du développement et de la gestion financière, ainsi que les orientations sur les fonctions et obligations, et la répartition des bénéfices du programme.

  la collecte des œufs et les opérations d'élevage confiées à des personnes agréées, choisies sur des critères définis par les autorités scientifiques et environnementales et ces actions seront dûment autorisées. Les personnes privées ou tout autre organisme privé ne sera pas autorisé à mener ces opérations.

  tous les produits du programme destinés au commerce international seront identifiés par des systèmes de numérotation et de marquage.

- si nécessaire, le Secrétaire de la CITES pourra se rendre sur les lieux des opérations d'élevage.

Des dispositifs de sauvegarde suffiants, y compris le génotypage des individus élevés en ranch (résolution n° 1772 de 2010 et 1316 de 2014), seront mis en place afin de distinguer clairement le commerce des produits issus du programme d'élevage du DGI-BC des produits issus de fermes d'élevage en circuit fermé.

8.4 Élevage en captivité et reproduction artificielle

En Colombie, sept établissements d'élevage en captivité de *C. acutus* à des fins commerciales sont enregistrés auprès de la CITES et ont commencé les opérations de vente. Actuellement, ce sont en moyenne 800 peaux qui sont exportées annuellement pour satisfaire une partie de la demande internationale (en cours de révision) (MADS, 2015).

8.5 Mesures de sauvegarde

Les spécimens de *C. acutus* vivant hors des limites du DGI-BC, où est mis en place le programme d'élevage en ranch des espèces inscrites à l'Annexe II, resteront inscrits à l'Annexe I et seront soumis à la réglementation sur les contrôles créée pour les espèces colombiennes inscrites à l'Annexe I. Ils se distingueront facilement des spécimens provenant des élevages grâce aux systèmes visibles de marquage (**Annexe II Res. 11.16 (b(ii) Figure 1)**.

Par mesure de précaution, au cas où les résultats de la surveillance continue de la population indiqueraient une régression de celle-ci suite au programme d'élevage en ranch, le pourcentage des individus devant être réintroduits dans la nature (voir le point 8.1.1) sera révisé, ainsi que les quotas et, en outre, les paramètres de la population et ceux touchant à la reproduction seront révisés à titre conservatoire (**Annexe II Res. 11.16 (d (i) Table 1**).

La proposition ne concerne que la zone du DGI-BC du département de Cordoba et la Colombie ne prévoit pas dans l'immédiat d'étendre le programme d'élevage à d'autres régions ; cependant, au cas où un intérêt se manifesterait pour la mise en place d'un programme de conservation à partir de la collecte d'œufs provenant d'une autre population nationale vivant hors des limites du DGI-BC, ce plan ne pourra être examiné sans i) une évaluation des critères spécifiques concernant la surveillance continue de la population, les lois locales en vigueur et les bénéfices pour *C. acutus,* ses habitats et les habitants de la région, y compris l'analyse par les autorités CITES et autres groupes d'experts, comme le groupe des spécialistes des crocodiles de l'UICN/CSE, démontrant qu'ils considèrent qu'un tel programme bénéficierait à la conservation de l'espèce en Colombie, ii) l'évaluation du rapport coûts-bénéfices par les autorités environnementales et iii) l'approbation du Comité permanent de la CITES.

9. Information sur les espèces semblables

La Colombie abrite six des 23 espèces de crocodiliens du monde, dont deux seulement appartiennent au genre Crocodylus : *C. actus* et C. *intermedius* (Rodríguez 2000 ; Martin, 2008). La présente proposition n'affecterait cependant pas la conservation et/ou la gestion de l'une ou l'autre des espèces de crocodiles de Colombie non incluses dans la proposition. Bien qu'elles se ressemblent, la peau de *C.intermedius* porte 20 à 25 rangées transversales d'écailles ventrales, tandis que *C. acutus* en porte 25 à 35 (Fajardo-Patiño *et al.*, 2013). Par ailleurs, l'aire de répartition de C. *intermedius* est plus réduite, presque confinée au bassin de l'Orénoque en Colombie et au Venezuela. Les caractères morphologiques de *Caiman crocodilus, Melanosuchus niger, Paleosuchus. Palpebrosus,* et *P. trigonatus* sont très différents de ceux de *C. acutus*, notamment par la présence d'un plus grand nombre d'ostéodermes et les peaux sont donc facilement reconnaissable sur les marchés, sans possibilité de confusion ou de fraude.

10. Consultations

La présente proposition a été soumise pour consultations aux États de l'aire de répartition (ces lettres sont jointes à la présente proposition).

Références

Abercrombie, C.L., Rice, K.G., Hope, C.A. (2000). The great alligator-caiman debate: meditations on crocodilian life-history strategies. Pp 409-418. *En:* Grigg, G.C., Seebacher, F., Franklin C.E. (Ed). Crocodilian Biology and Evolution. Surrey Beauty & Sons, Chiping Norton.

Ayarzagüena J. 1983. Ecología del caimán de anteojos o baba en los llanos de Apure. Doñana Acta Vert.; 10(3):1-36.

Balaguera-Reina, S. (2012). Ecology, population status and human interactions of *Crocodylus acutus* at Zapatosa and Costilla swamps, Cesar department, Colombia. Crocodile Specialist Group Newsletter CSG 31: 7–9. http://www.iucncsg.org/ 365_docs/attachments/protarea/31(3-a540a41a.pdf.

Balaguera-Reina, S., Vanegas-Anaya, M. & Densmore, L. D. (2014). The Biology and Conservation Status of the American Crocodile in Colombia. *Journal of Herpetology*, 49 (1). In Press.

Castaño-Mora, O.V. (Ed.). (2002). Libro rojo de reptiles de Colombia. Instituto de Ciencias Naturales-Universidad Nacional de Colombia, Ministerio de Medio Ambiente, Conservación Internacional – Colombia. Bogotá, Colombia. 160 pp.

CFAZ (Crocodile Farmers Association of Zimbabwe) (2012). Codes of Practice. CFAZ Publication: Harare.

CORPOGUAJIRA e INVEMAR. (2012). Atlas marino-costero de La Guajira. Serie de Publicaciones Especiales de Invemar No. 27. Santa Marta, Colombia. 199 pp.

Craighead, F.C. (1968). The role od the alligator, in shaping plant communities and maintaining wildlife in the southern everglades. Florida Naturalist, 41 (1 y 2): 13 pp.

Da Silveira, R., Magnusson, W.E. & Campos, Z. (1997). Monitoring the Distribution, Abundance and Breeding Areas of *Caiman crocodilus crocodilus* and *Melanosuchus niger* in the Anavilhanas Archipelago, Central Amazonia, Brazil. *Journal of Herpetology*, 31: 514-520.

De La Hoz-Villareal, D., Patiño-Flores, E., Gómez-González, J., Mejía-López, F. & Baez, L. (2008). Population diagnosis and some reproductive aspects of "Caimán Aguja" (*Crocodylus acutus*) in Bahía Portete, La Guajira peninsula, Colombia. Proceedings of the 19th Working Meeting of the Crocodile Specialist Group, Gland, Switzerland. 450–466 pp.

De La Ossa, J., Fajardo-Patiño, A., Velasco, A., De La Ossa-Lacayo, A. & Valencia-Parra, E. (2013). Zoocría de los Crocodylia en Colombia. Pp. 231-257. *En:* Morales-Betancourt, M.A., Lasso, C.A., De La Ossa, J., y Fajardo-Patiño, A. (Ed). VIII. Biología y conservación de los Crocodylia de Colombia. Serie Editorial Recursos Hidrobiológicos y Pesqueros Continentales de Colombia. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt (IAvH). Bogotá, Colombia.

Dutton H. J., A. M. Brunell, D. A. Carbonneau, L. J. Hord, S. G. Stiegler, C. H. Visscher, J. H. White & A. R. Woodward (2004). Florida's Alligator Management Program: an Update 1987 to 2001. Florida Fish and Wildlife Conservation Commission 620 South Meridian Street, Tallahassee, Florida 32399-1600, USA. 10pp.

El Heraldo, Redacción Regional. (2012). Coralina justifica sacrificio de cocodrilo en San Andrés. Publicado el 4 de Septiembre del 2012.

Espinosa, M.I., Bertin, A., Gómez, J., Mejía, F., Guerra, M., Baez, L., Gouin, N. & Patiño, E. (2012. A three-year mark-recapture study in a remnant population of *Crocodylus acutus* Cuvier un Portete Bay (Guajira, Colombia). *Guayana* 76 (1): 52-58.

Fajardo-Patiño, A., De La Ossa, J., Morales-Betancourt, M.A. (2013). Clave para la identificación de especies, pieles y productos de los Crocodylia de Colombia. Pp 71-83. *En:* Morales-Betancourt, M.A., Lasso, C.A., De La Ossa, J., y Fajardo-Patiño, A. (Ed). VIII. Biología y conservación de los Crocodylia de Colombia. Serie Editorial Recursos Hidrobiológicos y Pesqueros Continentales de Colombia. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt (IAvH). Bogotá, Colombia.

Fittkau, E.J. (1970). Role of caimans in the nutrient regime of mouth-lakes of Amazon affuents (An hypothesis). Biotropica 2(2): 138-142.

Fundación Biodiversa. (2011). Informe sobre estudio de *Crocodylus acutus* en el Municipio de Puerto Badel - Bajo Canal del Dique, Bolívar. Informe Final. Corporación Autónoma Regional Del Canal del Dique (CARDIQUE). 55 pp.

Gómez-González, J. (2014).El kayuüshi (*Crocodylus acutus*) en la bahía de Portete: aportes al conocimiento del estado de conservación . Pp. 300-315. En: Báez, L. y F. Trujillo (Eds.). 2014. Biodiversidad en Cerrejón. Carbones de Cerrejón, Fundación Omacha, Fondo para la Acción Ambiental y la Niñez. Bogotá, Colombia. 352 p.

Hines, T. C. & Abercrombie, C. L. (1987). The management of alligators in Florida, USA. Pp. 43-47 *En:* Wildlife Management: Crocodiles and Alligators. Webb, G.J.W., Manolis, S.C. and Whitehead, P.J. (Ed). Surrey Beauty & Sons, Chipping Norton.

Hutton, J.M. & Webb, G.J.W. (1992). An introduction to the farming of crocodilians. Pp. 1-39 *En*: Luxmoore, R.A. (Ed). Directory of crocodilian farming operations. Second Edition. IUCN, Gland, Switzerland and Cambridge. UK. 350 pp.

INDERENA. 1994. Manual para la evaluación de poblaciones del Cocodrylia en Colombia. Aleyda Martínez; Instituto Nacional de los Recursos Naturales ed. Bogotá;

IAvH y CVS. (2006). Delimitación y formulación de un distrito de manejo integrado de los recursos naturales (DMI) de los manglares de la Bahía de Cispatá, Tinajones, La Balsa y sectores aledaños. Instituto Nacional de Investigaciones Alexander von Humboldt, Corporación Autónoma Regional de los Valles del Sinú y del San Jorge. Convenio No. 056. 299 pp.

Jenkins, R.W.G, Jelden, D., Webb, G.J.W. & Manolis, S.C. (eds.) (2006). Review of Crocodile Ranching Programmes. Conducted for CITES by IUCN-SSC Crocodile Specialist Group. AC22 Inf. 2, www.cites.org/eng/com/AC/22/index.shtml.]

King, F.W. (1988). Crocodiles: Keystone wetland species. *En:* Dalyrymple, G.H., Loftus, W.F., Bernardino, F.S. (Ed). Wildlife in the Everglades and Latin American wetlands. Abstracts of the Proceedings of the First Everglades Nat. Park Symposium. Miami, 1985.

Larriera, A., Webb, G., Velasco, A., Rodríguez, M. & Ortíz, B. (2004). Mission to Colombia. Final report, IUCN-SSC Crocodile Specialist Group. 59 pp.

Larriera A. & A. Imhof. 2006. Proyecto Yacaré. Cosecha de huevos para cría en granjas del género Caiman en Argentina. En: Bolkovic, M. L. & D. Ramadori (Eds.). Manejo de fauna silvestre en Argentina. Programas de Uso Sustentable. Dirección de Fauna Silvestre, Secretaría de Ambiente y Desarrollo Sustentable,Buenos Aires. pp. 51-64.

LDWFY LSU (Louisiana Department of Wildlife and Fisheries, Louisiana State University (2011). Best Management Practices for Louisiana Alligator Farming. Louisiana Department of Wildlife and Fisheries and Louisiana State University Publication: Louisiana.

MADS. Ministerio de Ambiente y Desarrollo Sostenible. (2015). Base de datos de zoocría (*sin publicar*). Dirección de Bosques, Biodiversidad y Servicios Ecosistémicos, Ministerio de Ambiente y Desarrollo Sostenible. República de Colombia.

MAVDT. Ministerio de Ambiente, Vivienda y Desarrollo Territorial. (2005). Programa Nacional para la conservación del Caimán del Magdalena *Crocodylus acutus* (Cuvier, 1807). Convenio 065 del 2004. Ministerio de Ambiente y Desarrollo Territorial y Corporación Autónoma Regional de los Valles del Sinú y del San Jorge. 31 pp.

Martin, J.J. (2008). Estado actual de las investigaciones sobre cocodrilos Mexicanos. *Instituto Nacional de Investigaciones Pesqueras* -Comisión Nacional Consultiva de Pesca, 3 (52): 50.

Mazzotti, F.J.1989. Factors affecting the nesting success of the American crocodile, Crocodylusacutus, in Florida bay.Bulletin of Marine Science, 44: 220-228.

Mazzotti, F.J. (1999). The American crocodile in Florida Bay. *Estuaries* 22: 552–561.

Mazzotti, F.J. & Brandt, L.A. (1994). Ecology of the American alligator in a seasonally fluctuating environment. Pp 485-505. *En*: Davis, S.M., Ogden, J.C. (Ed). Everglades: The ecosystem and its restoration. St. Lucie Press. Boca Ratón, USA.

Mazzotti, F.J., Cherkiss, M.S., Parry, M.W., & Rice, K.G. (2007). Recent nesting of the American crocodile (*Crocodylus acutus*) in Everglades National Park, Florida, USA. *Herpetological Review* 38: 285-289.

Medem, F. (1981). Los crocodylia de Sur America, Volumen I: Los crocodylia de Colombia. Editorial Carrera 7 Ltda. ed., Bogotá, Colombia.

Meffe, G.K., Carroll, C.R. & Groom, M.J. (2006). What is conservation biology? En: Groom, M.J., Meffe, G.K., Carrol, C.R. Principles of Conservation Biology. Tercera Edición. Sinauer Associations, Inc. 779 pp.

Meraz J., Montoya, J. A., Ávila, E. & Reyes, L. (2008). Monitoreo del crecimiento del Cocodrilo americano *Crocodylus acutus*, durante su primer año de vida en condiciones de cautiverio. *Hidrobiológica*, 18 (2): 125-136.

Messel, H., Vorlicek, G.C., Wells, A.G. & Green, W.J. (1981). Surveys of Tidal River Systems in the Northern Territory of Australia and their Crocodile Populations. Monograph No. 1. The Blyth-Cadell River Systems Study and the Status of Crocodylus porosus in Tidal Waterways of Northern Australia. Methods for Analysis, and Dynamics of a Population of C. *porosus*. Pergamon Press: Sydney.]

McShane, T.O., Hirsch, P.D., Trung, T.C., Songorwa, A.N., Kinzig, A., Monteferri, B., Mutekanga, D., Van Thang, H., Dammert, J.L., Pulgar-Vidal, M., Welch-Devine, M., Brosius, J.P., Coppolillo, P. & O'Connor, S. (2011). Hard choices: Making trade-offs between biodiversity conservation and human well-being. *Biological Conservation*, Vo. 3 No.144: 966–972.

Morales-Betancourt, M.A., Lasso, C.A., De La Ossa, J., y Fajardo-Patiño, A. (Ed). (2013). VIII. Biología y conservación de los Crocodylia de Colombia. Serie Editorial Recursos Hidrobiológicos y Pesqueros Continentales de Colombia. Instituto de Investigación de Recursos Biológicos Alexander von Humboldt (IAvH). Bogotá, Colombia. 336 pp.

NRMCC (2009). Code of Practice for the Humane Treatment of Farmed and Wild Australian Crocodiles. DEWHA: Canberra.

Platt, S.G., Thorbjarnarson, J.B., Rainwater, T.R., & Martin, D.R. (2013). Diet of the American Crocodile (*Crocodylus acutus*) in Marine Environments of Coastal Belize. *Journal of Herpetology*, 47 (1): 1–10.

Ponce-Campos, P., Thorbjarnarson, J. & Velasco, A. (2012). *Crocodylus acutus*. (IUCN SSC Crocodile Specialist Group). The IUCN Red List of Threatened Species. Versión 2014.3. <www.iucnredlist.org>. Consultado Diciembre 09 del 2014.

Rice K.G., H. F. Percival, A. R. Woodward & M. L. Jennings. (1999). Effects of Egg and Hatchling Harvest on American Alligators in FloridaThe Journal of Wildlife Management, Vol. 63, No. 4. (Oct., 1999), pp. 1193-1200.

Ripple, J. & Beschta, R.L. (2012). Trophic cascades in Yellowstone: The first 15 years after wolf reintroduction. *Biological Conservation*, 145: 205–213.

Rodríguez-Melo, M.A. (2000). Estado y distribución de los Crocodylia de Colombia. Ministerio de Medio Ambiente, Instituto Alexander von Humboldt. Bogotá, Colombia. 71 pp.

Ross, J.P. (Ed) (1998). Crocodiles. Status Survey and Conservation Action Plan. 2nd Edition. IUCN/SSC Crocodile Specialist Group. IUCN. Gland, Switzerland, and Cambridge, UK. 96 pp.

Rueda-Almonacid, J.V., Carr, J.L., Mittermeier, R.A., Rodríguez-Mahecha, J.V., Mast, R.B., Vogt, R.C., Rhodin, A.G., De La Ossa, J., Rueda J.N., & Goettsch-Mittermeier, C. (2007). Las tortugas y los cocodrilianos de los paises andinos del trópico. Conservación Internacional. Bogotá, Colombia. 536 pp.

Sánchez-Pérez, H., Ulloa-Delgado, G.A. y Álvarez, R. (2000). Hacia la recuperación de los manglares del Caribe de Colombia. Ministerio del Medio Ambiente, ACOFORE, OIMT. Bogotá, Colombia. 290 pp.

Sánchez-Pérez, H., Ulloa-Delgado, G.A., Tavera-Escovar, H. y Gil, W. (2005). Plan de manejo integral de los manglares de la zona de usos sostenible del sector estuarino de la Bahía de Cispatá. Departamento de Córdoba, Colombia. Corporación Autónoma Regional de los Valles del Sinú y del San Jorge, Corporación Nacional de Investigaciones y fomento forestal, OIMT. Bogotá, Colombia.

Schmidt, K. (1924). Notes on Central American Crocodiles. *Field Museum Natural History, Zoological Series*, 12 (6): 79-92.

Sergio, F., Caro, T., Brown, D., Clucas, B., Hunter, J., Ketchum, J., McHugh, K. & Hiraldo, F. (2008). Top Predators as Conservation Tools: Ecological Rationale, Assumptions, and Efficacy. *Annual Review of Ecology, Evolution & Systematics*, 39: 1-19.

Thorbjarnarson, J.B. (1988). The status and ecology of the American Crocodile in Haiti. Bulletin of the Florida State Museum, Biological Sciences, 33 (1): 1-86.

Thorbjarnarson, J.B. (1992). Crocodiles: An action plan for their conservation. IUCN/SCC Crocodile Specialist Group. IUCN, Gland, Switzerland. 136 pp.

Thorbjarnarson, J.B., Mazzotti, F., Sanderson, E., Buitrago, F., Lazcano, M., Minkowski, K., Muñiz, M., Ponce, P., Sigler, L., Soberón, R. *et al.* (2006). Regional habitat conservation priorities for the American Crocodile. *Biological Conservation*, 128: 25–36.

Thorbjarnarson, J.B. (2010). American Crocodile *Crocodylus acutus*. Pp. 46-53 *En:* Crocodiles. Status Survey and Conservation Action Plan. Tercera Edición. (Ed) S.C. Manolis y C. Stevenson. Crocodile Specialist Group: Darwin.

UICN. Unión Internacional para la Conservación de la Naturaleza (2015). Categorías de manejo de áreas protegidas de la UICN. Página web: https://www.iucn.org/es/sobre/union/secretaria/oficinas/sudamerica/sur_trabajo/sur_aprotegidas/ap_categorias.cfm. Consultado en Septiembre del 2015.

Ulloa-Delgado, G. (2015). Informe Final en el marco del convenio de cooperación científico y tecnológico ASOCAIMAN-OMACHA-CVS-003 de 2015; con el objetivo de ”Desarrollar las actividades de fortalecimiento comunitario en el proyecto de estructurar poblaciones de Caimán con proyecciones hacia la obtención de beneficios ecológicos, sociales y económicos pertenecientes al Plan de Manejo del Distrito de Manejo Integrado de Cispatá, la Balsa y Tinajones, Departamento de Córdoba. 54 pp.

Ulloa-Delgado, G. (2014). Síntesis de información de las actividades desarrolladas en la Bahía de Cispatá –Estación Amaya- para el 2014. Proyecto de conservación del *Crocodylus acutus* de la Bahía de Cispatá con la participación de las comunidades locales del municipio de San Antero –Departamento de Córdoba, Caribe de Colombia. Corporación Autónoma Regional de los Valles del Sinú y del San Jorge CVS. Colombia. 35 pp.

Ulloa-Delgado G. A. y Sierra-Díaz, C.L., (2015). “Aunar esfuerzos técnicos, administrativos y financieros para fortalecer procesos de conservación y estrategias de uso sostenible de la población del *Crocodylus acutus* de la Bahía de Cispatá”. Dentro del marco del proyecto de conservación con la participación de las comunidades locales. Departamento de Córdoba. Caribe de Colombia. Convenio No 15-15-0075-107 Alcaldía Municipal de San Antero-Instituto de investigaciones Biológicas Alexander Von Humboldt IAVH y Asociación comunitaria para la conservación del caimán de la Bahía de Cispatá- ASOCAIMAN-CVS. PDF p.p. 108.

Ulloa-Delgado, G.A. y Cavanzo-Ulloa, D.L. (2009). Estudio de Caracterización y diagnóstico de las poblaciones de “Caimán” *Crocodylus acutus* (Cuvier, 1807) y su hábitat natural en la Ciénaga La Caimanera. CARSUCRE-FUNDACIÓN SABANAS. PDF, 24 pp.

Ulloa-Delgado, G.A. y Peláez-Montes, J.M. (2011). Plan de manejo preliminar para la conservación de las poblaciones del caimán aguja, *Crocodylus acutus*, (Cuvier, 1807) en los ríos Sardinata, San Miguel,

Nuevo Presidente y Tibú en el Departamento de Norte de Santander, Cuenca del Catatumbo de Colombia. Informe final consultoría. CORPONOR-ECOPETROL-VQ-INGENIERIA. PDF, 235 pp.

Ulloa-Delgado, G y Sierra-Díaz, C. (2012). Proyecto de conservación del *Crocodylus acutus* de la Bahía de Cispatá con la participación de las comunidades locales del municipio de San Antero – Departamento de Córdoba, Caribe de Colombia. Corporación Autónoma Regional de los Valles del Sinú y del San Jorge CVS. Colombia. 108 pp.

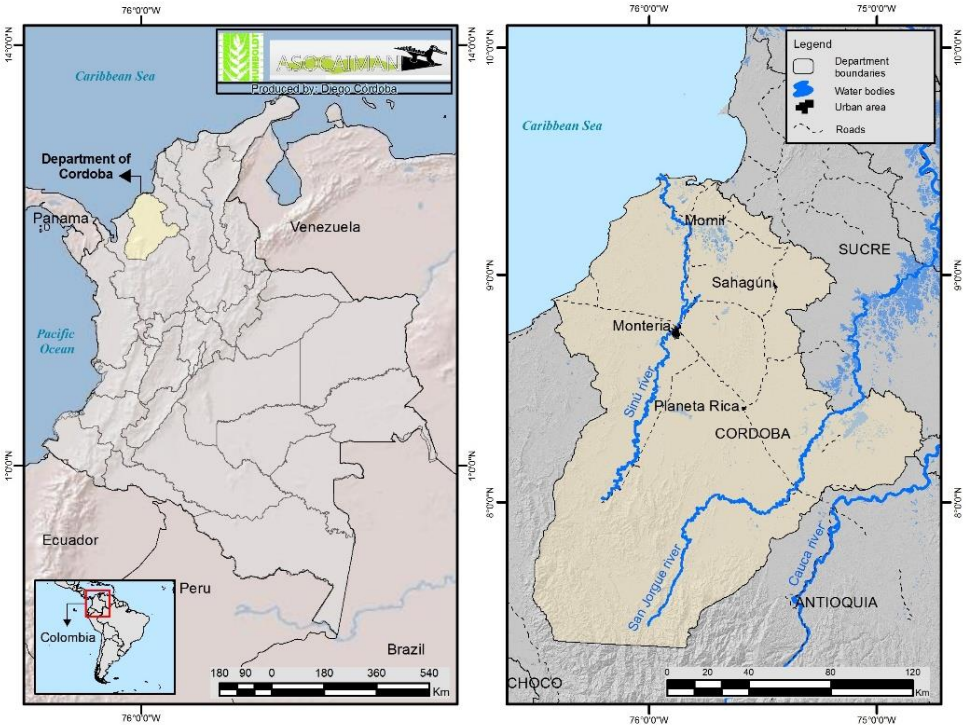
Ulloa-Delgado, G.A., Tavera-Escovar, H., Ponce de León, E., y Sierra-Díaz, C.L. (2011). Delimitación y formulación de un Distrito de Manejo Integrado de los Recursos Naturales (DMI) de los Manglares de la Bahía de Cispatá, Tinajones, La Balsa y Sectores Aledaños. Instituto Nacional de Investigaciones Alexander von Humboldt (IAvH) y Corporación Autónoma Regional de los valles del Sinú y del San Jorge (CVS). PDF, 299 pp.

Vargas-Ortega, D. (2014). Estructura poblacional, distribución espacial y estudio de hábitat de *Crocodylus acutus* (Cuvier, 1807) en el Parque Nacional Natural Tayrona, Caribe Colombiano. Trabajo de grado para obtener el título de Biólogo de la Universidad Pedagógica y Tecnológica de Colombia, Facultad de Ciencias Básicas. Tunja, Boyacá, Colombia.

Webb, G.J.W. & Manolis, S.C. (1992). Monitoring saltwater crocodiles (*Crocodylus porosus*) in the Northern Territory of Australia. Pp. 404-418 in Wildlife 2001: Populations, ed. by D.R. McCullough and R.H. Barrett. Elsevier Applied Science: New York.]

a. Figures

a.


Caribbean Sea
Produced by: Diego Córdoba
Department of Cordoba
Panama
Venezuela
Pacific Ocean
Ecuador
Peru
Colombia
Brazil
180 90 0 180 360 540
Km
Legend
Department boundaries
Water bodies
Urban area
Roads
Caribbean Sea
Monir
SUCRE
Sahagún
Montería
Sinú river
Planeta Rica
CORDOBA
San Jorgue river
Cauca river
ANTIOQUIA
CHOCO
0 20 40 80 120
Km

b.

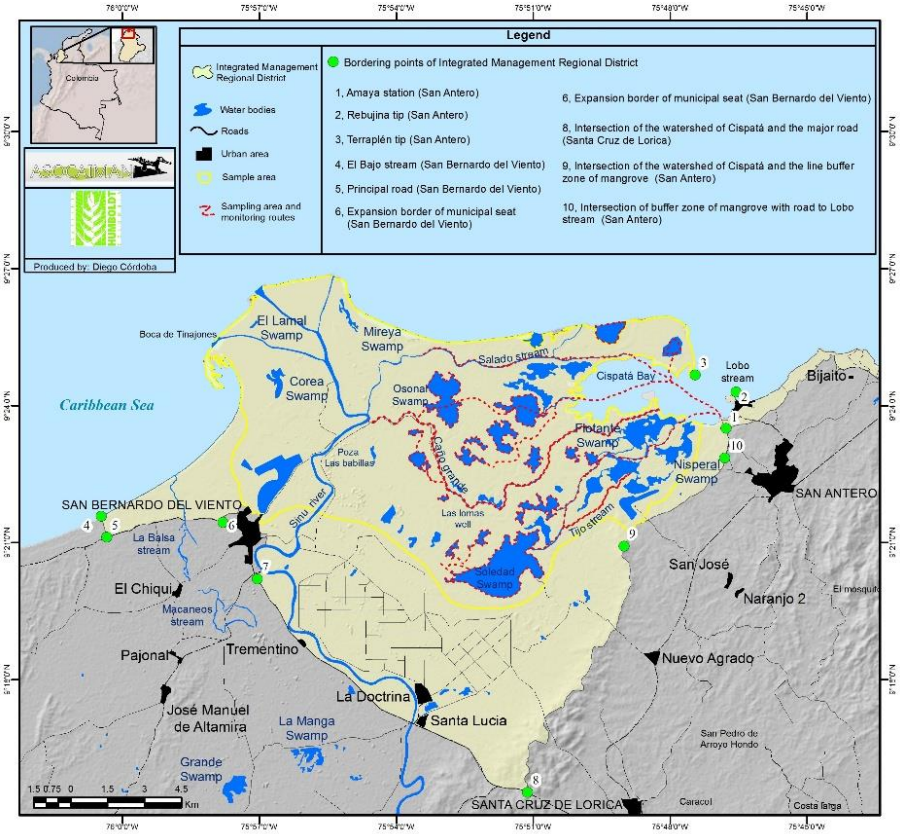

Legend
Integrated Management Regional District
Water bodies
Roads
Urban area
Sample area
Sampling area and monitoring routes
Bordering points of Integrated Management Regional District
1, Amaya station (San Antero)
2, Rebujina tip (San Antero)
3, Terraplén tip (San Antero)
4, El Bajo stream (San Bernardo del Viento)
5, Principal road (San Bernardo del Viento)
6, Expansion border of municipal seat (San Bernardo del Viento)
6, Expansion border of municipal seat (San Bernardo del Viento)
8, Intersection of the watershed of Cispatá and the major road (Santa Cruz de Lorica)
9, Intersection of the watershed of Cispatá and the line buffer zone of mangrove (San Antero)
10, Intersection of buffer zone of mangrove with road to Lobo stream (San Antero)
Produced by: Diego Córdoba
Caribbean Sea
Boca de Tinajones
El Lamal Swamp
Mireya Swamp
Salado stream
Corea Swamp
Osonal Swamp
Cispatá Bay
Lobo stream
Bijaito
Plotanía Swamp
Nisperal Swamp
SAN ANTERO
Poza Las babillas
Caño grande
Las lomas well
SAN BERNARDO DEL VIENTO
Sinú river
Tijo stream
La Balsa stream
El Chiquí
Macaneos stream
Pajonal
Trementino
San José
Naranjo 2
El mosquito
Nuevo Agrado
La Doctrina
José Manuel de Altamira
La Manga Swamp
Santa Lucia
San Pedro de Arroyo Hondo
Grande Swamp
SANTA CRUZ DE LORICA
Caracol
Costa larga
1.5 0.75 0 1.5 3 4.5
Km

Figure 1. a. Colombia, department of Cordoba with main water bodies **b.** Map of the limits of the Integrated Management Regional District of the Mangrove Area of Bay of Cispata and the Surrounding Area of the Estuary Delta of the Sinu River located in the department of Cordoba, Colombia, protected area homologous to category IV of IUCN. The sampling area and monitoring routes are shown.

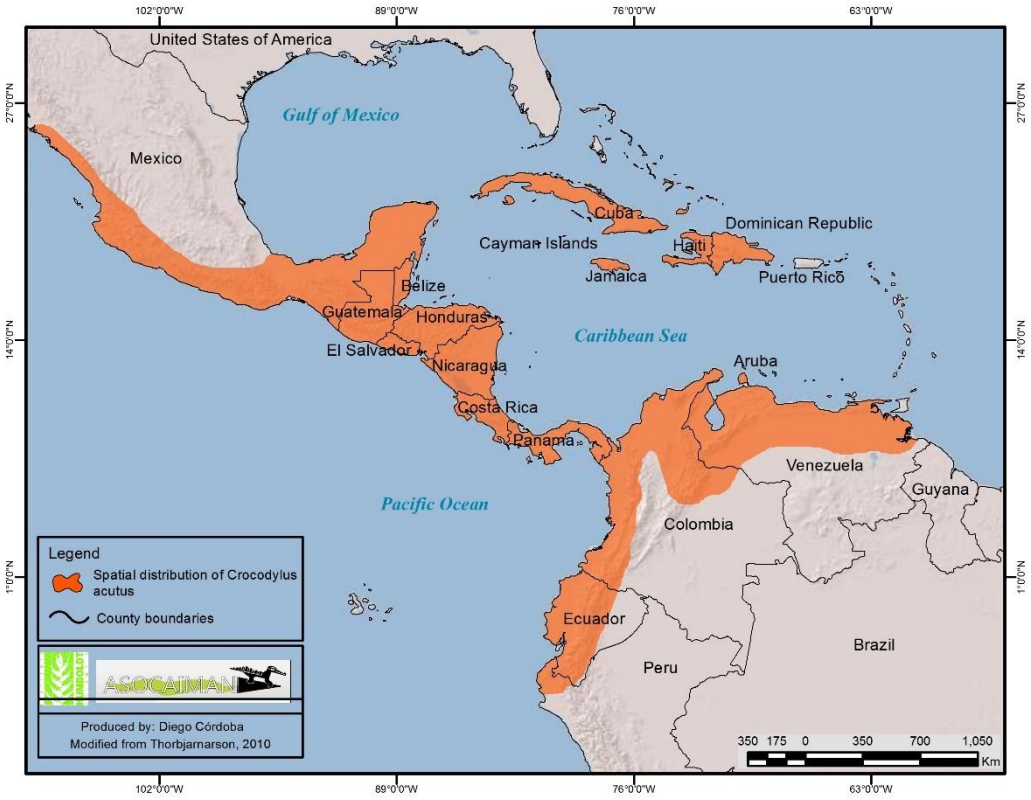
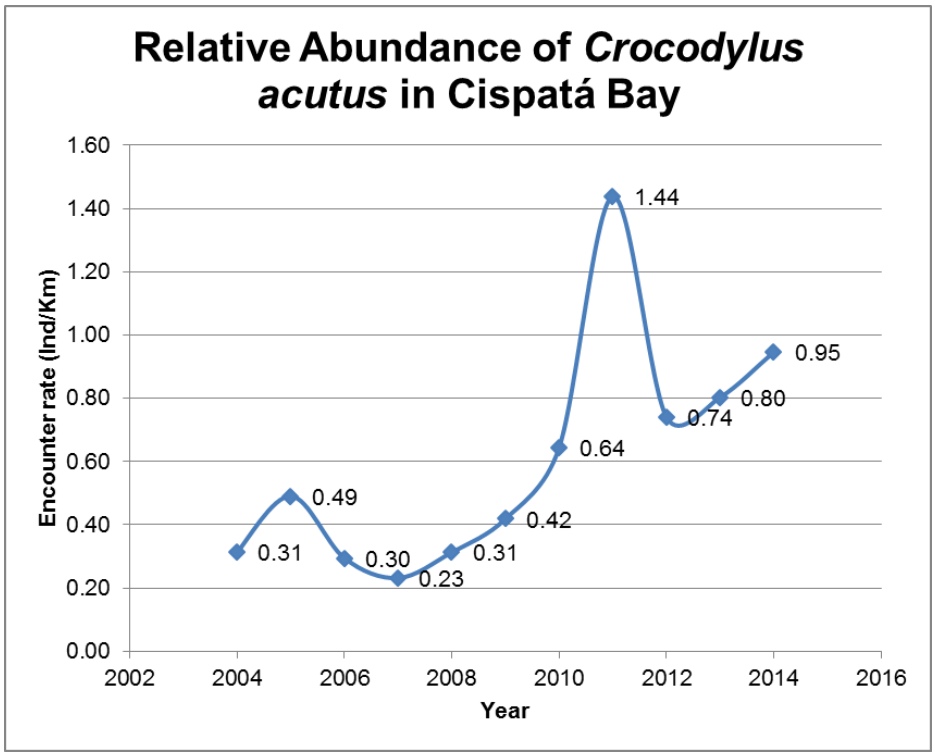


Figure 2. Map of the distribution of *Crocodylus acutus* at a global level (Taken from and modified from Thorbjarnarson, 2010).

a.



b.

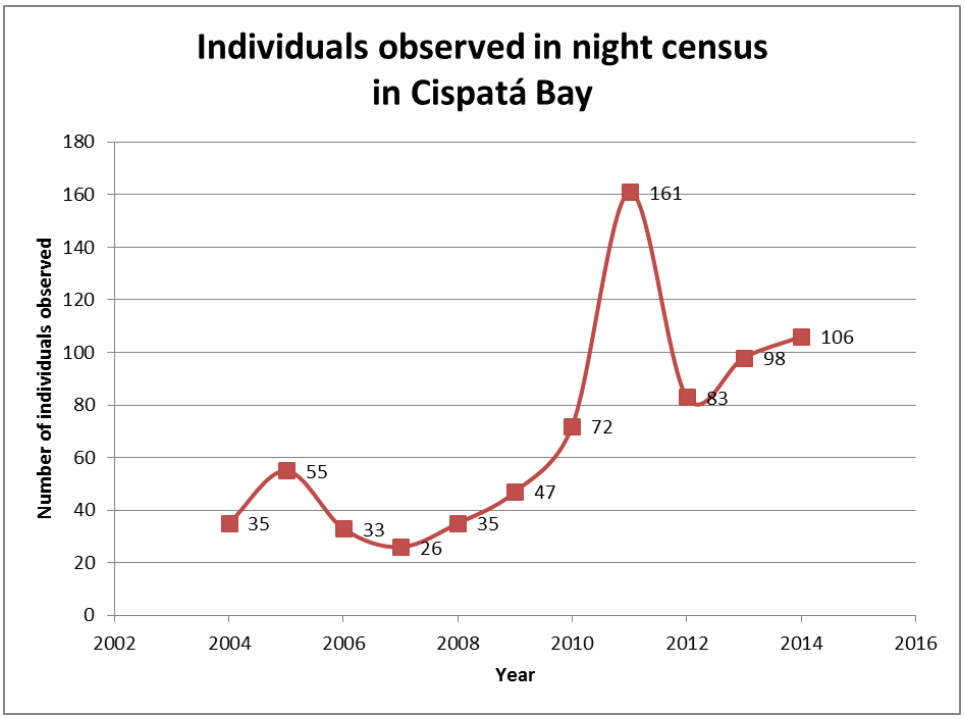


Figure 3. Average encounter rate (relative abundance) of *Crocodylus acutus* obtain from the night monitoring between 2004 and 2014 (a), and the total number of individuals observed (*b*). In both graphics it can be observed that both the encounter rate as well as the total number of individuals observed have been increasing since 2007. Integrated Management District of the Mangroves of Bay of Cispata, Department of Cordoba. Colombia. 2015.

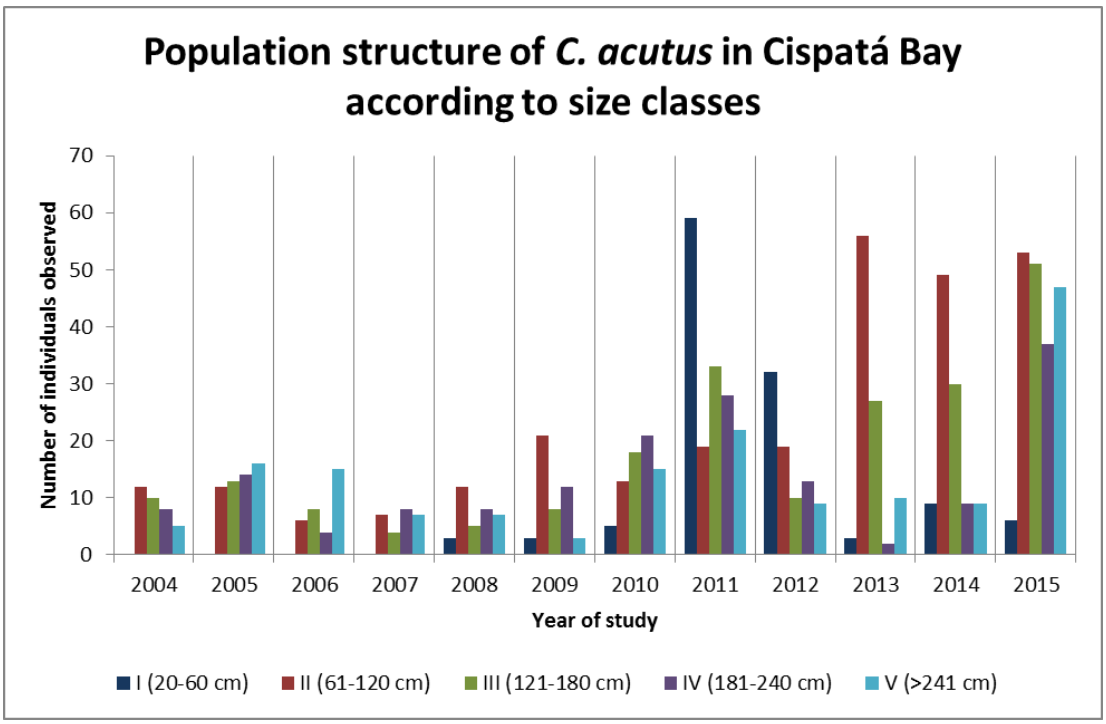
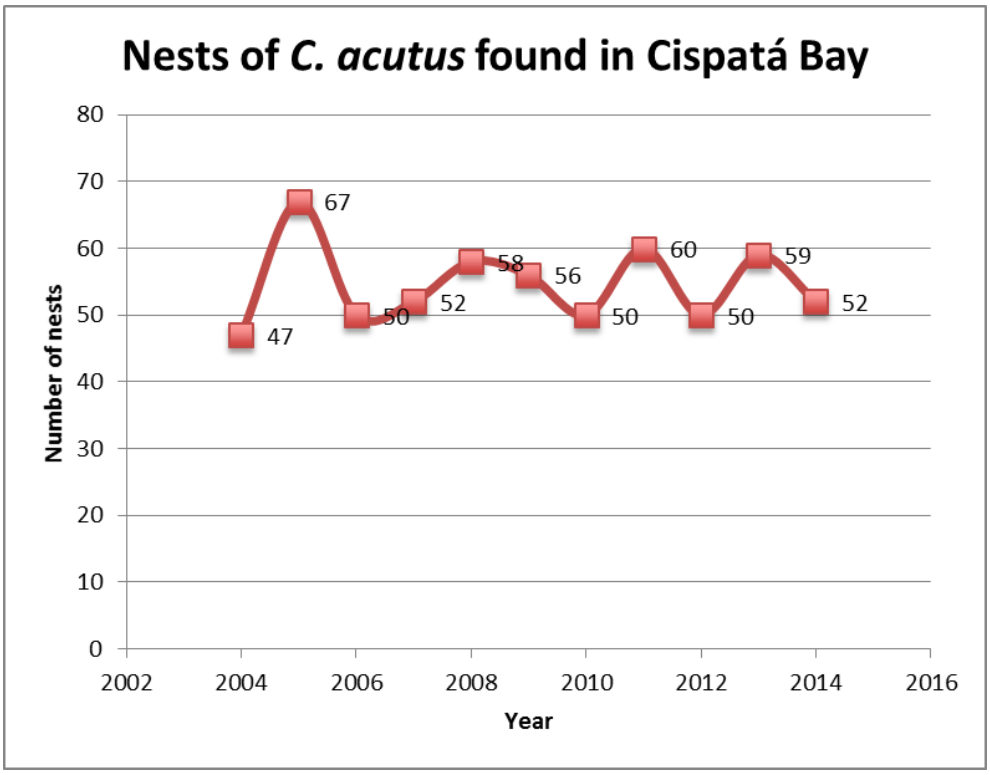


Figure 4. Distribution of the frequency of size classes of individuals of *Crocodylus acutus* observed between 2004 and 2014 during the night census in the Integrated Management District of the Mangroves of Bay of Cispata, Department of Colombia. Colombia. 2015.

a.



b.

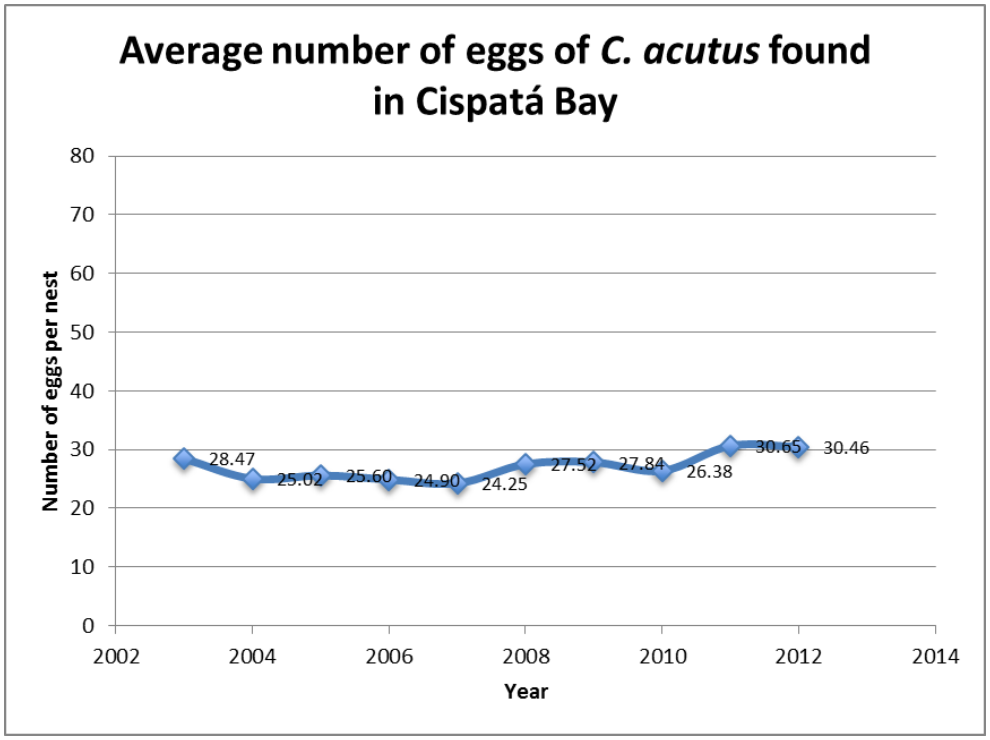


Figure 5. Number of nests found in Bay of Cispata between 2004 and 2014 (a) and the average number of eggs (b). On average, 54.6 nests have been found since 2004, with a standard deviation of 5.9. The average of eggs per nest found has slightly increased. Integrated Management District of the Mangroves of Bay of Cispata, Department of Cordoba. Colombia. 2015.

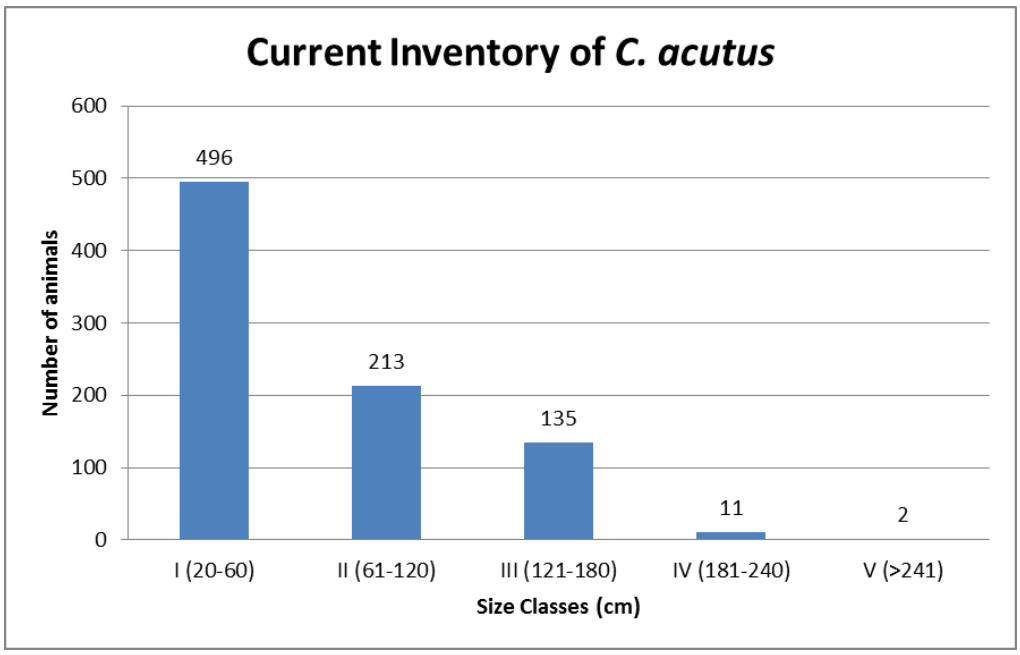


Figure 6. Current inventory (2015) of *Crocodylus acutus* of the conservation and management program of the species in the District of the Mangroves of Bay of Cispata, Tinajones, La Balsa and Surrounding Areas (Ulloa-Delgado, 2015).

b. Tables

Table 1. Relative abundance information, expressed as an encounter rate (Ind/Km), obtained from population studies of *Crocodylus acutus* conducted in Colombia between 1992 and 2012. (*Data to be published; **These abundance values do not include hacthlings; *** the author makes reference to the size of the population between 9 and 10 animals and reports an encounter rate of 19 ind/km without explaining the procedure used to calculate that data)

AUTOR	YEAR OF PUBLICATION	DEPARTMENT	SITE OF STUDY	YEAR OF STUDY	AVERAGE RELATIVE ABUNDANCE (ind/km)
Gómez-Gonzáles	2011	La Guajira	Portete Bay	2011	2.01
Gómez-Gonzáles	2011	La Guajira	Portete Bay	2010	2.71
Gómez-Gonzáles	2011	La Guajira	Portete Bay	2009	0.88
Gómez-Gonzáles	2011	La Guajira	Portete Bay	2008	2.02
Gómez-Gonzáles	2011	La Guajira	Portete Bay	2007	1.73
De la Hoz-Villareal	2008	La Guajira	Portete Bay	2007	1.37
Rodríguez-Melo (ed.)	2000	La Guajira	Portete Bay	1994-1997	0.47
Abadía	1996	La Guajira	Portete Bay	1992	0.09
Patiño *et al.*	2010	La Guajira	Limoncito creek - Dibulla	2009-2010	0
Patiño *et al.*	2010	La Guajira	Limoncito creek - Dibulla	2009-2010	7.58**
Patiño *et al.*	2010	La Guajira	Lagarto creeek - Dibulla	2009-2010	12.12**
Patiño *et al.*	2010	La Guajira	Michiragua creek - Dibulla	2009-2010	7.69**
Rodríguez-Melo (ed.)	2000	La Guajira	Dibulla	1994-1997	3.75
Vargas-Ortega	2014	Magdalena	Tayrona Natural National Park (Los Naranjos, Cañaverales, Arrecifes and Cinto)	2013-2014	1.33
Balaguera-Reina and Gonzáles-Maya	2008	Magdalena	Via Parque Salamanca Island	2006	7.78
Fundación Biodiversa	2011	Bolívar	Puerto Badel - Dique Channel	2011	0.51
Balaguera-Reina	2012	Cesar	Zapatosa swamp and Costilla	2011	0
Ulloa-Delgado	2015	Córdoba	Cispatá Bay	2014	0.95
Ulloa-Delgado	2015	Córdoba	Cispatá Bay	2013	0.8
Ulloa-Delgado	2015	Córdoba	Cispatá Bay	2012	0.74
Ulloa-Delgado	2012	Córdoba	Cispatá Bay	2011	1.44
Ulloa-Delgado	2012	Córdoba	Cispatá Bay	2010	0.64
Ulloa-Delgado	2012	Córdoba	Cispatá Bay	2009	0.42
Ulloa-Delgado	2012	Córdoba	Cispatá Bay	2008	0.31
Ulloa-Delgado	2012	Córdoba	Cispatá Bay	2007	0.23
Ulloa-Delgado and Sierra-Díaz	2006	Córdoba	Cispatá Bay	2006	0.74
Ulloa-Delgado and Sierra-Díaz	2006	Córdoba	Cispatá Bay	2005	0.49
Ulloa-Delgado and Sierra-Díaz	2006	Córdoba	Cispatá Bay	2004	0.3
Ulloa-Delgado and Sierra-Díaz	2006	Córdoba	Cispatá Bay	2003	0.94
Ulloa-Delgado and Sierra-Díaz	2006	Córdoba	Cispatá Bay	2002	1.25
Ulloa-Delgado and Sierra-Díaz	2006	Córdoba	Cispatá Bay	2001	0.5
Rodríguez-Melo (ed.)	2000	Córdoba	Cispatá Bay	1994-1997	19.00***
Ulloa-Delgado and Cavanzo-Ulloa	2009	Sucre	La Caimanera swamp	2008-2009	0.36
Rodríguez-Melo (ed.)	2000	Sucre	La Caimanera swamp	1994-1997	7.29
Barrera	2004	Boyacá and Santander	Ermitaño river	2004	1.07
Ulloa-Delgado	2011	Norte de Santander	San Miguel river, Sardinata, Nuevo Presidente and Tibú	2010	1.32
Barahona *et al.*	1996	Cundinamarca	Bogotá river	1994-1995	1/sin distancia
Promedio					**2.52**
Desviación Estándar					**3.99**

Table 2. Registered captive-breeding operations and in process of being registered before CITES a captive breeding of *Crocodylus acutus* for commercial purposes.

NAME	REGISTRATION CODE	PHASE
Krokodeilos S.A.	A-CO-501	COMMERCIAL
Tropical Fauna LTDA.	A-CO-502	COMMERCIAL
CaicsaS.A.S.	A-CO-503	COMMERCIAL
Cocodrilos de Colombia S.A.	A-CO-504	COMMERCIAL
Zoofarm LTDA.	A-CO-505	COMMERCIAL
Exotika Leather S.A.	A-CO-506	COMMERCIAL
El PrietoLTDA	A-CO-507	COMMERCIAL
Lirica	In process	COMMERCIAL
Reptibol	In process	COMMERCIAL

Table 3. Colombian environmental laws for the use of wild fauna with special emphasis in crocodiles, by chronological order

TYPE	NUMBER	YEAR	PURPOSE
Resolution	573	1969	Pursuant to which a ban on the hunt and capture of the Aguja or Caretabla Crocodile (*Crocodylus acutus*), Caimán Llanero (*Crocodylus intermedius*), Yacaréassu or Caimán Negro (*Melanosuchus niger*) is established in all the territory where INDERENA has jurisdiction.
Resolution	564	1970	Pursuant to which values (monetary costs) are set for the restitution of some species of wild animals originated from faunal territories of INDERENA: Caimán Aguja (*C. acutus*), Caimán Negro (*M. niger*) $ 200 pesos per individual; Babilla (*C. crocodilus*), Cachirre (*P. palpebrosus* and *P. trigonatus*) $ 30 pesos per individual.
Decree-Law	2811	1974	Pursuant to which the Code of Renewable Natural Resources and Protection of the Environment is established.
Decree	1608	1978	Pursuant to which the National Code of Renewable Natural Resources and the Protection of the Environment and Law 23 of 1973 are regulated with respect to wild fauna.
Law	17	1981	Pursuant to which the Convention on International Trade in

TYPE	NUMBER	YEAR	PURPOSE
			Endangered Species of Wild Fauna and Flora –CITES was approved.
Agreement	039	1985	Pursuant to which the list of vertebrae belonging to the species of wild fauna that can be the subject to hunting for the purpose of the promotion of captive breeding is established. The vertebrae species that belong to the wild fauna included cannot be hunted without the corresponding hunting promotion permit obtained according with the provisions of Decree 1608 of 1978
Resolution	17	1987	Pursuant to which Agreement 039 of 1985 is regulated.
Law	84	1989	Pursuant to which the National Statute for the Protection of Animals is adopted and some contraventions are created and its procedure and competence is regulated.
Resolution	242	1990	Authorizes the sale of individuals from the species *Crocodylus acutus*, obtained in the fauna stations of INDERENA, for the assembly and development of nurseries within the National Territory, certified as second generation specimens and marked with a special code.
Law	99	1993	Pursuant to which the Ministry of the Environment is created, the Public Sector is reorganized and is in charge of the management and conservation of the environment and the renewable natural resources, the National Environmental System SINA is organized and other provisions are enacted. *Regulated by Decree 1713 of 2002, Regulated by Decree 4688 of 2005, partially Regulated by Decree 3600 of 2007, Regulated by Decree 2372 of 2010*
Agreement	355	1994	Pursuant to which the exchange and loan of breeding stock of the American Crocodile (*Crocodylus acutus*) species is authorized and its sale is regulated.
Decree	1401	1997	Pursuant to which the Management Authority of Colombia before the Convention on International Trade in Endangered Species of Wild Fauna and Flora –CITES is appointed and its functions are determined.
Decree	1420	1997	Pursuant to which the Scientific Authorities of Colombia before the Convention on International Trade in Endangered Species of Wild Fauna and Flora –CITES are appointed and its functions are determined.
Decree	125	2000	Pursuant to which Decree 1420 of 1997 is modified.
Resolution	1317	2000	Pursuant to which some criteria for the granting of the hunting license for promotion purposes and for the establishment of nurseries are established and other provisions are adopted.
Decree	1909	2000	Pursuant to which the maritime and river ports, airports and other places for the international trade of wild fauna and flora specimens are designated.
Law	611	2000	Pursuant to which laws for the sustainable management of Wild and Aquatic Fauna species are established.
Resolution	438	2001	Pursuant to which a National Single Safeguard for the movement of species of the biological diversity is established.

TYPE	NUMBER	YEAR	PURPOSE
Resolution	611	2004	Pursuant to which the procedures to set quotas for the use of nurseries are established.
Resolution	1172	2004	Pursuant to which the National System for Identification and Registration of Wild Fauna Specimens in Ex Situ conditions is established.
Resolution	1173	2004	Pursuant to which the National Registry of Suppliers of Markings defined in the National System for Identification of Specimens of Wild Fauna in Ex Situ conditions is regulated.
Resolution	221	2005	Pursuant to which articles 3 and 6 of resolution 1172 of October 7, 2004 are modified.
Resolution	1660	2005	Pursuant to which the procedure and methodology that the Regional Autonomous and Sustainable Development Corporations are established for the purpose of the annual calculation of the amount of specimens to use in closed nurseries of the *Caiman crocodilus fuscus* species and the subspecies *Caiman crocodilus crocodilus* and other provisions are enacted.
Decree	4688	2005	Pursuant to which the National Code of Renewable Natural Resources and the Protection of the Environment, Law 99 of 1993 and Law 611 of 2000 are regulated in matters of commercial hunting.
Resolution	1263	2006	Pursuant to which the procedure is established and the costs is set to issue the permits referred to in the Convention on International Trade in Endangered Species of Wild Fauna and Flora –CITES and other provisions are enacted.
Resolution	2352	2006	Pursuant to which Resolution 0221 of February 18, 2005 is modified with respect to the definition of deadlines for the marking of parental stock for the captive breeding facilities of the *Caiman crocodilus fuscus* species and other provisions are adopted.
Resolution	923	2007	Pursuant to which Resolution 1172 of October 7, 2004 is modified and other provisions are adopted.
Law	1333	2009	Pursuant to which the environmental punitive procedure is established and other provisions are enacted.
Resolution	1772	2010	Pursuant to which the requirements to proceed with the commercial phase and its registration before the CITES Secretary of the captive breeding that manage species included in Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora – CITES are established and other provisions are adopted.
Resolution	2064	2010	Pursuant to which the subsequent measures for the preventive prehension, restitution or confiscation of specimens of wild ground and aquatic fauna and flora species are regulated and other provisions are enacted.
Decree	3570	2011	Pursuant to which the objectives and the structure of the Ministry of the Environment and Sustainable Development are modified and is integrated with the Administrative Sector for the Environment and Sustainable Development. It also delegates the direction of the Forests, Biodiversity and Ecosystemic Services as an CITES Management

TYPE	NUMBER	YEAR	PURPOSE
			Authority for Colombia.
Resolution	1316	2014	Pursuant to which Resolution number 1772 of 2010 is added and the genotyping of C. *acutus* parentals are conditions until the moment in which the environmental authority publishes the specific molecular markings for the species.
Decree	2041	2014	Pursuant to which Title VIII of Law 99 of 1992 about environmental licenses is regulated
Decree	1076	2015	Pursuant to which Sole Regulatory Decree for the Environment and Sustainable Development Sector is issued.
Resolution	2651	2015	Pursuant to which measures for the control and follow-up of the cutting of skins of *Caiman crocodilus* in duly authorized establishments such as nurseries, tanneries, distribution centers and manufacturers that work with this species are established.
Resolution	2652	2015	Pursuant to which the measures for the control and follow-up of the skins and parts or fractions of skins of the species *Caiman crocodilus,* to be exported are established.
Law	1774	2016	"Pursuant to which the Civil Code, law 84 of 1989 is modified. The Criminal Code. The Criminal Procedure Code and other provisions are enacted.

Additional information

Table 4. Multi-year effectiveness of the *artificial* nesting areas for *Crocodylus acutus* built in mangrove areas. Integrated Management District of the Mangroves of Bay of Cispata, Department of Cordoba. Colombia. 2015.

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NESTING PARAMETERS	NESTING YEARS												
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	TOTAL
Total surface areas	0	10	70	100	100	100	100	100	100	100	100	100	100
Total nests	0	15	47	35	37	40	37	36	40	34	41	32	394
Used areas	0	6	29	19	22	25	27	21	26	23	28	25	24.4
Range of nest per platform	0	0-4	0-5	0-7	0-5	0-6	0-6	0-4	0-4	0-3	0-3	0-3	0-7
Natural nests	15	33	20	15	15	18	19	14	18	16	18	20	221
TOTAL OF NESTS PER YEAR	15	47	67	50	52	58	56	50	60	50	59	52	616

Resolution Conf. 11.16 (Rev. CoP15)

b) in order to be considered by the Conference of the Parties, any proposal to transfer a population to Appendix II in order to conduct a ranching programme satisfy the following general criteria:

i) The programme must be primarily beneficial to the conservation of the local population (i.e., where applicable, contribute to its increase in the wild or promote protection of the species's habitat while maintaining a stable population);

Main aspects of the contribution to the conservation of the local population of C. *acutus*:

- Standardized monitoring processes and adaptive management scheme that can be the methodological basis in other distribution areas of the species in Colombia such as the population found in 2011 in the Catatumbo river basins in the Colombian region.
- The research and conservation processes developed for more than 10 years in Cispata and that have had as a result the increase in its population and the visible fraction, suggest the possibility of migrations of released individuals, which can suggest that released individuals by the program are contributing outside the sampling area in the DMI-BC or even as a center for breeding and recruiting and in which, taking the controlled incubation of eggs as a reference, a portion of individuals of 50% male and 50% female is suggested.
- Prior genetic characterization, individuals of the DMI-BC could be used in reintroduction and repopulation programs in sites that have appropriate habitat and community conditions.
- Conservation and sustainable use processes that provide benefits to the local communities that incorporate other activities such as ecotourism, education and research, can be replicable models in other populations of C. *acutus* in Colombia.

ii) all products (including live specimens) of each operation must be adequately identified and documented to ensure that they can be readily distinguished from products of Appendix-I populations;

Identification of registered captive breeding specimens

Within the framework of Resolution Conf. 12.10 (Rev. CoP15) Registration of facilities that breed captive species of fauna included in Appendix I with commercial purposes, Colombia has requested the registration of 7 Captive Breeding of the species *Crocodylus acutus,* (A-CO-501 to A-CO-507).

For the marking both of breeding stock as production, the following resolutions have been developed:

1. Resolution 1172 of October 7, 2004 “pursuant to which the national system for identification and registration of wild fauna specimens in ex ***situ*** conditions are established:, establishing the microchip as the electronic marking system for the Crocodylia Order, among others.

2. Resolution 1173 of October 7, 2004 “Pursuant to which the National Registry for Suppliers of Markings defined in the National System for Identification of Wild Fauna Specimens in *Ex Situ conditions is regulated*, whose purpose is the Registry of suppliers of marking elements of the National System and Identification and for wild fauna specimens in “*ex situ* conditions" issued by the Ministry of the Environment and Sustainable Development.

3. For the marking of productions from nursery facilities of C. *acutus,* resolution 0923 of May 27 of 2007, establishes that individuals of the productions born as of January 1, 2007, through the system of whorl cutting, the cutting will be made in the same manner as previously mentioned, but whorl number 11 shall be limited by the borders of scale 10 (before) and 12 (after).

4. Resolution 1772 of September 14, 2010, Pursuant to which the conditions to authorize the commercial phase and registration of nurseries for commercial purposes in captive breeding that manage species included in Appendix I of the CITES Convention are established, among other aspect, section 9 of Article 2 Requirements for the commercial phase.

Identification of ranching specimens in the DMI-BC

1. Identification of eggs and individuals

According to the methodology that has been implemented in the project for more than 10 years, harvested eggs will be incubated in a controlled manner and marked with an individual and consecutive numbering, separated in units of incubation by independent nests. Prior to the hatching, they will be individualized and after, marked through the amputation of scales with an individual number that indicates the egg number and the harvest year. Therefore, in each animal or in each skin obtained by ranching the egg number will reflected and together with the scale of the double line, the year of the harvest will be known, which will also allow to know the characteristics of the nests in terms of geographic location and dates of harvest and/or egg-laying **(Figure 1)**.

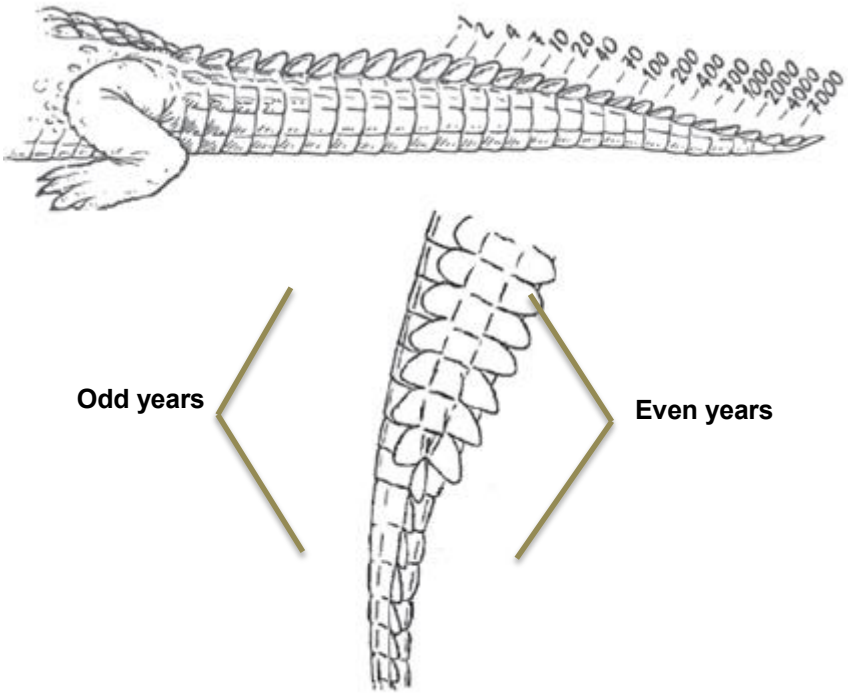


Figure 1. Diagram about the marking system of individuals originated from ranching. 1) amputation of scales in the caudal peduncle that will correspond to the number of the egg and 2) in the double amputation line of one scale that corresponds to the harvest year and will start at the 1st left for 2017. The combination of scales allows to build a numbering system based on unit quartets, tens, hundreds and thousands: for example, the animal or skin No. 99 is built by amputating scales 2-7 and 20-70, while No. 2 simply with the amputation of scale 2. Taken and modified from De la Ossa *et al.*2001in Morales *et al. 2013*.

Identification of skins and products

1. Resolution 1172 of October 7, 2004 "pursuant to which the national system for the identification and registration of wild fauna specimens in *Ex Situ conditions is established".*
2. Resolution 1173 of October 7, 2004 "Pursuant to which the National Registry of Suppliers of Markings defined in the National System for the Identification of Wild Fauna Specimens in *Ex Situ conditions is regulated".*
3. Res.Conf.11.12 (Rev. CoP15) Universal marking system to identify crocodile skins and include a CITES label with the label: ACUTUS CISPATA COLOMBIA (Res. Conf. 11.12, Rev. CoP 15).

iii) the programme must have in place appropriate inventories, harvest-level controls and mechanisms to monitor the wild populations and

The methodology of night census and standardized monitoring that currently applies takes into account national developments (INDERENA 1994) and advise from CSG-UICN experts (John Thorbjarnarson, Wayne King and José Ayarzagüena), as well as documents such as the Ayargüena (1983) "Ecology of the American crocodile in the Apure plains". These methods have been successfully tested in C. *acutus* in other countries such as Mexico (Sánchez -Herrera *et al.* 2011).

Currently, for the monitoring, the total DMI-BC area sampled is about 1436 ha of film of water or 112 km of perimeter. Samplings of the population are conducted by night counts in 9 standardized routes in which the observed individuals are registered and for which the trained members of the community and biologists are a part of the team **(Annex I a, figure 1b)**. In the case of census and collection of nests these are carried out once a year during the egg-laying season that starts in February and of which peak activity is in March in the same routes previously described in which all encountered eggs are collected.

For the case of DMI-BC the estimated size of the population is between 800 and 2356 individuals, calculated based on a formula of basic population estimates, in the case of several repetitions and assuming that one annual monitoring is one repetition (King et al, 1990 and Cerrato, 1991 in Morales-Betancourt et al, 2013). Likewise, the population could be estimated with a visible fraction between 7 to 20% (calculation based on one sample or year); noting that the % can be even lower, underestimating the population; this corresponds to what has been evaluated in other experiences with crocodiles where values of the visible fraction are lower than 1% Larriera *com pers.*

If the proposal for amendment is approved for C. *acutus* and according to the progresses in the ranching program, the possibility of using supplementary methods and adjustments in the monitoring methodology will be used: two annual monitoring, develop a correction factor for tides and maintain consistency and training of the team that is a part of the program.

iv) there must be sufficient safeguards established in the programme to ensure that adequate numbers of animals are returned to the wild if necessary and where appropriate;

For the DMI-BC the eggs from the nests of the sampled area will be collected in accordance to the management plan that will be developed for the sustainable use of C. *acutus*. Collected eggs will be taken to incubation where the proportion of sexes will be analyzed so that they contribute both to the reintroduction of individuals in the wild and to the trade process. The experience of the monitoring program of the DMI-BC considers a initial experimental percentage of 10% (for releases taking as additional reference the discussions of the group of specialists for a value between 5 and 17% (Ulloa com pers.).

This 10% of individuals will be raised to 100 cm for subsequent release into the wild according to the specified management plan. This percentage, which is reserved to contribute to the wild population,

will be reviewed according to the processes for the adjustment of the monitoring and the review about the population trends with appropriate biologic criteria.

The program currently has an inventory of 857 juvenile and subadult individuals at the CVS regional authority facilities (**Annex I a, figure 6**).; Considering that the capacity of the communities should be strengthen in sacrifice activities, it is proposed to start the development with an experimental quota of 200 annual skins until the stock has been exhausted (2019-2020).

d) any proposal for the transfer to Appendix II of a Party's population or a smaller geographically separate population of a species, for the purpose of ranching, not be approved by the Conference unless it contains the following:

i) evidence that the taking from the wild will have no significant detrimental impact on wild populations

As it has been known from other experiences in ranching programs of *crocodiles* (Hutton and Webb, 1992; Ross, 1998; Jenkins *et al*. 2006, Larriera y Webb, com. pers.), the restricted harvest of eggs can be compensated by the increase of the survival of birth of non-harvested eggs. In crocodiles there are different ranching models (*Alligator missipensis*) in Florida (Rice *et al.* 1999), C. *porosus* in Australia (Webb et al, 1992 in Ross, 1998) or *Caiman latirostris* in Argentina (Larriera y Imhof 2006). In the case of the ranching model for the DMI-BC for the harvest of C. *acutus* eggs and taking into consideration the discussions of the group of experts on the ranching of Crocodylia, it is recommended that "in those places where the harvest is considered high, the management programs may require the return to the natural environment of individuals with sizes in which predation is unlikely in a number that represents between 5-17% of the number of harvested eggs. This compensation minimizes the impact of the harvest and has a clear possibility of exercising a positive effect in terms of the wild population (Hutton, J. M. & G. J. W. Webb. 1992).

Table 1. Assessment of the viability or reliability indicator parameters for the development of the conservation and sustainable use project. Sub-population of *Crocodylus acutus* of the Bay of Cispata. Department of Cordoba. Colombian Caribbean region. Agreement No 15-15-0075-107 Office of the Major of San Antero-Instituto Alexander von Humboldt-ASOCAIMAN-CVS. 2015.

PARAMETER		(1) OPTIMAL	(2) NORMAL	(3) UNDER OBSERVATION	(4) UNDER INVESTIGATION
POPULATION	Structure I (20-60) II(61-120) III (121-180) IV (181-240) V (>241)	Representation of the 5 types of sizes and evidence of reproduction and recruiting	Representation of the 5 types of sizes	Absence of types 2 or	Absence of
	Density ani/k^2	7,1	1,8-7,1	<1,8	<0,9
REPRODUCTIVE	No. Nests/year	67	47-67	< 47	< 23
	eggs/nest	30	24-30	< 24	< 20
	% fertility	95	90-95	< 90	< 45
	% hatching	80	60-80	<60	<30

The ranching program will be exclusive and restricted to C. *acutus* eggs of the DMI-BC population. Local community groups such as ASOCAIMAN, will be exclusively responsible for the harvest, and such groups will be approved by the environmental and local and national scientific Authorities. This operation will not be authorized to private persons or any other entity.

In addition, there will be a review of the population and reproductive parameters (Table 1).

ii) an assessment of the likelihood of the biological and economic success of each ranching operation;

The assessment of the natural ecosystems in economic terms and their incorporation to the productive processes is today the most solid tool for the conservation of the habitat, because the sustainability of such productivity results from the general interest (Larriera e Imhof, 2000).

From a technical point of view, the project in the DMI-BC has demonstrated a relative success in the monitoring of the wild population, the collection of nests and the C. *acutus* breeding for the repopulation and suggests having the necessary elements for a long term economic success.

Taking into consideration the ownership by the entities and local communities in the conservation project for more than 10 years; as well as the demonstrated viability in other processes of crocodile use for which the conservation programs that incorporate the sustainable use of the resource allow to internalize costs and be self-sustainable, in addition to not depending on external funding (Larriera 2011).

In parallel to all these actions, the community has developed sustainable use strategies of the population through ecotourism, research and education; which in a certain way is transformed in a real productive alternative that currently generates part of the income for the local community's support. Given that the project has qualified technical personnel for the breeding of species and that skins are highly valuable in international markets, it could be expected that the economic viability will be positive, if it can be taken into account that at a global level the breeding of crocodiles in general is a viable economic activity.

iii) assurance that the operation shall be carried out at all stages in a humane (non-cruel) manner;

Law 84 of 1989 pursuant to which the National Statute for the Protection of Animals was adopted and creates new violations and regulates matters regarding procedures and competence.

Law 1774 of 2016, pursuant to which some conducts are considered punishable related to the mistreatment of animals and a penalty system of police and judicial nature.

iv) documented evidence to demonstrate that the programme is beneficial to the wild population through reintroduction or in other ways; and

In addition to the above information in sections b) iii) and iv). Outlined herein are the main points that show that the program provides a benefit for the wild population in the DMI-BC.

- As part of the innovative strategies for conservation, artificial areas for nesting in the mangrove area were built that are used by adult females for nesting and a harvest program was established, as well as the incubation of eggs and removal of individuals in captivity, which in their totality are for release and repopulation in the area with successful results (Thorbjarnarson, 2010; Ulloa-Delgado and Sierra-Díaz, 2012).
- The community program has increase the availability of nesting areas and 64% of the nests found in the last 13 years has been from these platforms built by the community (about 400 nests).
- The results of the monitoring suggest that the number of individuals of C. *acutus* observed during the regular night counts of the sampled areas of the DMI-BC (see section 8.1.5

monitoring), has increased in a stable manner (**Annex I a., figure 3 and Annex I b., table 2)**, with an average encounter rate during the samplings of 0.6 individuals per kilometer.

- The structure of the C. *acutus* population in the Bay of Cispata according to the data from the night sampling (**Annex I a, figure 4**,), confirms that all size types (different age groups) are represented in which almost always the juvenile are more abundant than adults. What is normally considered in other populations as a population in recovery and equilibrium (Ulloa-Delgado and Peláez-Montes 2011).

- Through community actions, the project has reached two relevant socioeconomic aspects, for the benefit of the wild population of C. *acutus*: 1. educational processes with respect to ecological functions and benefits that have caused changes in local communities for a greater protection of the species and their ecosystem and Conservation works based on the sustainable use with economic benefits for the community that guarantee a greater stability in the long term.

Proposal of amendment to the appendices I and II of the Convention on International Trade in Endangered Species of Wild Flora and Fauna CITES

A. Proposal

To transfer from Appendix I to Appendix II the population of *Crocodylus acutus* (Cuvier, 1807) of the Regional District of Integrate Management of Mangroves of Cispata Bay and nearby sectors of the Estuarine Delta of Sinú River, located in the department of Cordoba, Republic of Colombia, in accordance with the Conf Resolution. 11.16 (Rev. CoP 15) on Ranching and trade in ranched specimens of species transferred from Appendix I to Appendix II

Annotation

1. The population of *C. acutus* by outside the limits of the Regional District of Integrate Management of Mangroves of Cispata Bay and sector area of the Estuarine Delta of the Sinú River (RDIM-BC) will remain in Appendix I.
2. The ranching program of eggs will be exclusive and it will be restricted to the area of the RDIM-BC.
3. The products of the ranching program destined to the international trade will be skins marked according to the Res. 11.12 (Rev. CoP 15) on the system of universal marked to identify crocodile's skins, an exclusive identification of the ranching program, and to the specific regulations of the Republic of Colombia.

B. Author of the proposal

Republic of Colombia.

C. Justification

1. Taxonomy

1.1 **Class:** Reptilia
1.2 **Order:** Crocodylia
1.3 **Family**: Crocodylidae
1.4 **Species:** *Crocodylus acutus* (Cuvier, 1807)
1.5 **Scinetific Synonymy**: *Crocodilus acutus* (Cuvier, 1807) and *Crocodylus americanus*
1.6 **Common Names**:
Spanish: Caimán, Caimán aguja, Caimán del Magdalena, Cocodrilo Americano, Cocodrilo de río, Lagarto, Lagarto amarillo, Caimán de la costa, Caimán caretabla.
English: American Crocodile.
French: Crocodile d'Amérique, Crocodile Americain.

1.7 **Number of code**: A-306.002.001.001

2. General vision

Crocodylus acutus, like most of the crocodiles of the world, mainly underwent great population declines between the 30´s and 70´s, in all its rank of distribution - including Colombia- due to the extensive hunting, motivated by its skin commerce of first quality (Thorbjarnarson, 1992; Ross, 1998; Thorbjarnarson, 2010). The inclusion of the specie in Appendix I of CITES, as a measured to regulate the international trade of their skins, have allowed the recovery of some natural populations in all their rank of distribution, to such point to have healthy populations in countries like the United States, Costa Rica and Cuba, that allow to make a sustainable

use, like Cuba with the amendment proposal presented and approved in CoP 13 in the 2004(Thorbjarnason, 2010).

In Colombia the specie has been protected since 1969, this condition, among other national efforts of conservation, has allowed the recovery of some populations in the last decades (Martín, 2008; Thorbjarnarson *et al*. 2006). This it is the case of the population of *C. acutus* that inhabits the mangroves areas of Cispata Bay, which is under protection in the Regional District of Integrate Management of Mangroves of Cispata Bay and nearby sectors of the Estuarine Delta of Sinú River (RDIM-BC)[1], located in the municipalities of San Antero, San Bernardo del Viento and Santa Cruz de Lorica, in the Department of Cordoba (to see **figure 1** of **Annexed the 1 a.)** (Ulloa - Delgado & Sierra - Díaz, 2012). At this place, a community group of crocodiles of former hunters of illegally use of crocodiles, today organized in association known as -Asocaiman- since 2003 are part of investigation, monitoring, habitat management and environmental education activities, aimed to the recovery and conservation of the specie (Ulloa-Delgado & Sierra-Díaz, 2012).

12 years of conservation processes and monitoring demonstrate that the pressures that threatened the survival of the Cispata's crocodile population in the past (as the hunting) has diminished remarkably, favoring its recovery, which is evident in the increase as much of the rate of encounter (in a 203%), as the population structure heterogeneity (showing more representation of all the different classes of size of the individuals, in agreed proportions with its growth) (Ulloa -Delgado, 2015).

At the moment, the accelerated loss of habitat constitutes the main threat for the survival of *C. acutus* in the country and at all its rank of distribution. This emphasizes the importance of implementing strategies of sustainable use that increase the economic value of the species and its habitat in natural conditions, thus contributing to the conservation of the species, its habitat ecosystems, and the flora and fauna associate (Larriera, 2004).

In this sense, to transfer the population of *C. acutus* of the DRMI-BC of Appendix I to Appendix II allows the implementation of management and conservation species strategies that additionally, promote the conservation of its habitat ecosystem and that simultaneously has a positive effect on local communities' livelihoods due to the sustainable economic alternative for communities (McShane *et.al*. 2010). The transference of Appendix represent the generation of economic benefits for members of the local communities that, at the moment, coexist and protect the population of *C. acutus* of the DRMI-BC, derivatives of the commercialization of its skin, obtained through a ranching program and enables local development.

This program is based on controlled harvesting of eggs (following the national and international guidelines that guarantees the conservation of the species in wild), led by the Competent Regional Environmental Authority - in this case the Autonomous Regional Corporation of the Valley of the Sinú and San Jorge (CVS) -, and implemented with the support of members of the local communities with limited resources like Asocaiman. Additionally, the change of Appendix would encourage the monitoring of other natural populations of the species with a view to the implementation of similar strategies of sustainable use.

3. Characteristics of the species

3.1 Distribution

[1] *A Regional District of Integrate Management*, is an protected area defined like a "geographic space, in which the landscapes and ecosystems maintain their composition and function, although its structure has been modified and whose, associated natural and cultural values are put within reach of the human population to destine them to their sustainable use, preservation, restoration, knowledge and enjoys" (Decree 2372 of the 2010). This category looks for to combine protections and conservation strategies as sustainable use. In agreement with the descriptions of the categories of protected areas of the UICN, the RDIM are homologous to the category IV: Sustainable use of natural resources (UICN 2015).

3.1.1. *Crocodylus acutus* Global Populations

The caiman aguja or American crocodile (*Crocodylus acutus*) is the second most widely distributed crocodylidae in the new world. It occurs naturally from the Tumbes province in Peru until the southern tip of Florida in the United States, passing through Ecuador, Colombia and Venezuela, in South America; Panama, Costa Rica, Nicaragua, El Salvador, Honduras, Belize, Guatemala and Mexico, in Central America. Also is located in some of the islands of Caribbean, such as Jamaica, Haiti, Cuba and Dominican Republic. (Ponce-Campo *et. al.,* 2012) (**to see figure 2 of Annexed I a**.).

3.1.2 *Crocodylus acutus* Colombia´s Populations

The present distribution of *C. acutus* in Colombia includes the Caribbean - in the rivers Atrato, La Piedras, Catatumbo, New President, San Miguel, Sardinata, Tibú and Sinú; in the Magdalena basin, and in mangroves at the deltas of large rivers at Pacific and Caribbean coast (Medem, 1981; Rodriguez, 2000; Ulloa, 2011; Morales-Betancourt *et. al*., 2013). Some recent reports give account of the presence of the species in new areas: at the National Natural Park Tayrona located in the department of the Magdalena (Caribbean coast), and at San Andrés Island (Heraldo, 2012; Balaguera-Reina, 2012; Balaguera-Reina *et. al*. 2013; Morales – Betancourt, 2013; Gomez-González, 2014; Vargas-Ortega, 2014) (**to see figure 3 of Annexed I a**.).

3.2 Habitat

C. acutus use a great variety of terrestrial and aquatic habitats for the provision of its requirements during its life cycle. It is quite adaptable, so that, it is found as much in freshwater, as brackish water swamps and, in the outfall of great rivers, lagoons, swamps, and even in coralline atolls far from the coasts (Thorbjarnarson, 1992; (Thorbjarnarson et. al. 2006; Morales – Betancourt, 2013). Even so, it generally inhabit in coastal wetlands mangroves and estuaries.

3.3. Biological characteristics

C. acutus presents sexual dimorphism. The males reach size between 5 and 6 meters in total length whereas females are smaller (near 4 meters); although it has been reported that individuals that habitat at islands tend to be smaller (Schmidt, 1924; Medem, 1981; Thorbjarnarson, 1992; Ulloa-Delgado & Sierra – Díaz, 2012). The hatchling measures in average 25 cm in total length (Rueda - Almoacid *et.al*. 2007; Meraz et. al., 2008; Morales-Betancourt *et. al*., 2013).

They are multiparous s organisms (Ross, 1999) that reproduce sexually and, according to diverse studies, reach the sexual maturity after exceeding the 2 meters of total length, although this size is not yet well established (Morales-Betancourt *et. al*. 2013). The female lay between 14 to 60 eggs in a nest builds usually in a hole of approximately 40 cm depth or in low mounds build with soil, sand, fallen leaves and grass (Medem, 1981; Rueda - Almoacid *et.al*. 2007; Thorbjarnarson, 2010, Foundation Biodiversa, 2011; Morales – Betancourt, 2013; Ulloa-Delgado, 2015).

The eggs hatch at the beginning of rainy season, usually between April and July and after an incubation period that can takes between 70 and 90 days (Rodríguez-Melo, 2000; Thorbjarnarson, 2010; Foundation Biodiversa, 2011; Gómez-González, 2014). The sexual determination by temperature of incubation has a pattern female-male-female, with a temperature pivot between 31•C and 32,5•C in where females and males are produced (Morales – Betancourt, 2013; Medrano-Bitar and Ulloa-Delgado, com. pers., 2014).

The early stages of the specie's cycle life are exposed to a relatively high mortality, due to: wildlife nest predation, environmental variables impacts (e.g floods, driest periods and direct solar radiation) on nest, and

hatchlings' mortality due to its low capacity to tolerate environmental fluctuations (e.g. thermal) or to predators, among others (Ross, 1999; Gómez - González, 2014). As a result the nests and hatchlings (first year) survival rate are up to 20% approximately (Moler, 1992 *in* Ross, 1999). However, the fact that a female produces during its reproductive life at least one young that reach adult size, allows the population to maintain stable (Ross, 1999; Abercrombie et.al. 2001).

Despite of this, the longevity, the great size of *C. acutus* and their ectothermic condition turns as characteristics that shows full-size individuals highly tolerant to the environmental fluctuations, which could be catastrophic for neonates (Ross, 1999; Abercrombie *et. al.,* 2001). Among this, the multiparous characteristic provides a high capacity to recover natural populations from the impact generate by extraction, either of the youngest individuals (eggs or juveniles) or large and old ones (male adults) (Ross, 1999).

3.4 Morphologic characteristics

C. acutus is characterized to have an extended and narrow snout. The typical pattern of the cervical osteoderms consists of two rows in where the first row has four great ones and the second only two, although it is worth to clarify that great variation can exists (Morales – Betancourt, 2013). Like most of the crocodiles, *C. acutus* have the fifth mandible tooth more developed (Ulloa-Delgado & Sierra – Díaz, 2012).

3.5 Function of the species in the ecosystem

C. acutus, like other crocodiles, is considering as one of the greatest predators and it is been recognize by its great influence in the food web because to the abundance and composition of its prey (Mazzotti & Brandt, 1994). The early stages (eggs and hatchlings), constitute important prey for other species, suggesting an important role for nutrient cycle and the energy flow within their habitat ecosystem.

Additionally, the crocodiles are considering key, engineer and responsible transformation species; contribute to the maintenance of the structure and function of the ecosystems (Craighead, 1968; King, 1988; Thorbjarnarson, 1992; Ross, 1998; Ripple and Beschta, 2011). And, the specie can become indicator of the ecosystem conservation status, or sentries of environmental changes given its great sensitivity (Sergio *et. al*. 2008).

4. Status and Trends

4.1 Habitat Trends

Although *C. acutus* is adaptable and inhabits a great variety of terrestrial and wetland habitats, the transformation of the land use, derived from the human and economic development at the country has result in the accelerated habitat loss rate for the species. Factors as the overpopulation and climate change aggravate the tendency.

On the other hand, although Medem (1981) at the Pacific coast, registered a discontinuous distribution of the species as a result of the inherent conditions of the habitats e.g rocky coasts, Balaguera-Reina *et. al*. (2013) suggest that the water bodies, within the area of species occurrence estimate in Colombia, provide certain connectivity, which suggests an increase in the viability of the populations (Medem, 1981; Thorbjarnarson *et. al*. 2006).

4.2 Population Trends, Size and Structure

Although, recent studies on *C. acutus* at the country that includes abundance values are few*;* their mainly the DRMI-BC populations and Portete Bay (located in the department of the Guajira, Caribbean coastal area),

since in both places communitarian programs for the conservation of the species have established (Thorbjarnarson, 2010; Balaguera-Reina *et. al.,* 2013). The studies that provide information on the relative abundance of *C. acutus* from 1990 summarizes in **table 1** of **Annexed I b**.

On the other hand, and although in general terms, the crocodiles national census between 1994 and 1997 completed by the Ministry of Environment, found isolated individuals and populations very reduced and fragmented, the results emphasizes the neediness of population management oriented to the conservation of the specie. Rodriguez-Melo (2000) identifies the Bay of Cispatá at the Department of Cordoba, as one of the three areas with ecological and social potential to maintain healthy populations of *C. acutus* in the country. At that moment, it was reported a low relative abundance and an undetermined population structure for this population (Rodriguez-Melo, 2000). In 2002, Ulloa-Delgado & Sierra-Díaz, describe Cispatá Bay structure and dispersion of *C. acutus* as a fragmented and unbalance population, characterized by a relative scarcity of hatchlings and juveniles size class.

Taking into consideration the above account, since 2003, the Autonomous Regional Corporation of Valleys of the Sinú and San Jorge - CVS- has coordinate a program of conservation of *C. acutus* at the Cispatá Bay , which has been implemented including local communities organized as Asocaiman, a local community association formed by a group of 18 crocodile former hunters which illegally took advantage of crocodiles populations in the past, and which are now part of population monitoring through nocturnal counts and tracking the nests, in almost the 80% of the natural habitat within the protected area (Ulloa-Delgado & Sierra-Díaz, 2012). Also and as part of complementary conservation strategies at Cispata Bay, artificially nesting areas in mangroves had been design and adapt, and a program of egg harvest and artificial incubation and grows of juveniles has been established, to become part of the release animals that maintain the recuperation program (Thorbjarnarson, 2010; Ulloa-Delgado & Sierra – Díaz, 2012).

In accordance with Ulloa-Delgado (2015), the program has return to natural habitat near 8.437 individuals between 2004 and 2014, mostly represented, animals of a meter or more of total length (between 2 and 3 years old), and other individuals of 70 cm in total length, as well and some eggs (reintroducing a few days before hatching takes place).

The monitoring activities results, suggest a recovering of *C. acutus* population at the RDIM-BC, because since 2008, the total number of individuals observed during the nocturnal surveys, and therefore the rate of encounter, has increased continuously (special at Caño Salado and at the external mangroves area at the bay) (to see **figure 4** of **Annexed I a**. and **Table 2** of **Annexed I b**.), giving as result a rate of multiannual average encounter of $0{,}60 \pm 0{,}4$ individuals per kilometer.

Ulloa-Delgado and Peláez-Montes (2011), register that a healthy and balance population of *C. acutus* is that shows individuals in all size classes (or ages groups) in where it is observed a greater number of young individuals and less individual adults; a decreasing stair structure. The population structure of *C. acutus* at Cispatá Bay indicates an increase in the representativeness of smaller sizes (class I and II) and in general terms all classes from the nocturnal counts carried out since 2008, reinforcing population heterogeneity size (to see **figure 5** of **Annexed I a**.) (Ulloa - Delgado, 2012). This reinforces the argument that the population is recovering and that the monitoring and investigation efforts has been key evidence of this. It is important also to highlight that Asocaiman members confirm the presence of acutus at some water bodies in which it had not been registered before (Ulloa-Delgado pers. Com).

Based on the data provide by the monitoring activities, the population estimate size could be between 800 and 2.356[2] animals, considering that the visible fraction corresponds to 7% or 20% of the established total population, as it has been suggested by some experts (Ulloa-Delgado, 2013; Morales-Betancourt et. al. 2014). Even so, there are evidence that indicates that this value could be underestimating population size because the individuals of approximately sized of a meter of total length (2.510) is greater to the population size estimated.

On the other hand, the average of nests found from 2004 is 54,6, with a standard deviation of 5,9 nests (to see **figure 6** of **Annexed I a**.) (Ulloa - Delgado, 2015). Ulloa-Delgado & Sierra - Diaz (2012) confirm that this small nest variation, indicates a population stability. Social exclusion phenomena is also possible inhibit adult female's reproduction (Hines and Abercrombie, 1987). Nevertheless, understanding that the nesting availability zones is one of the main causes that limits the size and distribution of the populations of *C. acutus*, the program has increased the nesting available areas, by creating nesting platforms. 65% (400) of the nest found during the monitoring held at the last 13 years, has been found in these platforms.

Nevertheless, it is important to strengthen the information with more accurately number and tendency of nesting female population of *C. acutus* at the DRMI-BC. Smaller clutches records, less than 20 eggs, during the last 3 years, suggest the recruitment of females on the wild parental breeding stock.

4.3 **Geographic Trends**

Available information to date shows that the distribution of the species in the country has changed. There are local extinctions records Medem (1981) since the 70s, including areas such as Isla Fuerte, Tortuguilla, and San Bernardo and a possible disappearance of the Swamp Zapatosa and Costilla reported in 2012 by Balaguera-Reina. Despite of this, recent studies have reported the presence of the species in new areas like Tayrona´s National Park, at the department of Magdalena, and San Andres Island (El Heraldo, 2012; Morales-Betancourt, 2013; Balaguera-Reina et al, 2013; Gómez-González, 2014; Vargas-Ortega, 2014). The species distribution limits for Colombia today are: south (in the interandean valleys) Villavieja at the department of Huila; and northeast Bay Hondita and Castilletes at the department of La Guajira (Medem, 1981; Balaguera-Reina et al, 2014).

5. Threats

The main threat to the species is the degradation and habitat loss (Thorbjarnarson et al, 2006; Morales-Betancourt et al, 2013; Balaguera-Reina et al, 2013). Climate change also constitutes a threat; on one side the sea level rise restricts posture areas affecting the habitat stability, and on the other side the increase in environmental temperature affects the sex ratio (increasing the males proportion) during the incubation period (Ulloa-Delgado y Sierra, 2012). Other threats include incidental fish catch (Fundación Biodiversa, 2011; Ulloa-Delgado, 2012; CORPORGUAJIRA e INVEMAR, 2012).

6. Use and trade

6.1 Use at national level

As other crocodilians, the species is an important source of protein to local communities, and raw material for handcrafts and occasional and local use for traditional medicines (Morales-Betancourt et al, 2013; Gómez -

[2] This value was calculated with base in the population basic estimation formula, when several repetitions exist, assuming that each annual monitoring data is a repetition: Estimate population number = (maximum Value observed x 100)/% Population visible (King *et.al*. 1990 and Cerrato, 1991 in Morales-Betancourt et.al., 2014). The multiannual average of animals seen between the 2004 and the 2014 were 68.

González, 2014). Although its main use focus in pelt industry for international trade purposes, *C. acutus* has also been use as a focal species for community ecotourism initiatives in areas such as DRMI-BC (Thorbjarnarson, 2010; Ulloa-Delgado y Sierra-Díaz, 2012; Morales-Betancourt *et. a*l, 2014).

6.2 Legal trade

After the ban in 1969 and from the 90s, Colombia established captive breeding farms for skin production of *C. acutus*, which in 2001 exported first 100 skins (Ulloa-Delgado y Sierra, 2012; De La Ossa *et al*, 2013). The **figure 7 (Annex I a.)** shows the amount of *C. acutus* skins exported by Colombia between 2001 and 2013, the fluctuations are due to the demand of the international market. Between 1976 and 2011, Colombia has exported approximately 16,191,679 skins of crocodilians, 95.8 % coming from captive breeding farms and only 0.03 % of this belongs to *C. acutus* (De La Ossa *et al*, 2013). From 2012 to July 2015 the Management Authority has granted permission to export 5,502 skins of *C. acutus* from captive-breeding operation (MADS, 2015).

Colombia currently has seven (7) *C. acutus* captive-breeding farms registered to CITES Secretariat and two (2) in process of registration to the Convention (see **Table 3 of Annex I b**.) (MADS, 2015). According to available information, 43.709 specimens of *C. acutus* (including parental) is the estimated stock to date for captive breeding operation (MADS, 2015).

6.3 **Parts and Derivatives in Trade**

According to exporting records of the Management Authority (Ministry of Environment and Sustainable Development of Colombia), *C. acutus* products exported by Colombia are exclusively skins; primarily tanned, raw or salted (MADS, 2015). Skins produce are exported mainly to France, Italy, Japan and Singapore; and are identified in accordance with the registration code of each captive-breeding farm.

6.4 Ilegal trade

Historically the illegal trade of *C. acutus* in the country focused on the sale of females, meat, eggs and neonates for multiple uses. However, this trade is of low magnitude because, among other things, the poor state of wild populations of the species in the country, except for populations such as the DRMI-BC. However, Colombia has measures such as parental genotyping requirement for all captive breeding operation (Resolution No. 1772 of 2010).

6.5 Actual or potential trade impacts

Taking into account the crocodiles biology, sustainable use programs are based on the premise that the use of early stages (eggs and neonates) replace part of the natural mortality that these early stages are exposed to during the life cycle of crocodiles (Ross, 1999; Abercrombie et al, 2001; Larriera et al, 2004). Different programs established for commercial harvesting around the world have shown that crocodilians can tolerate the sustainable use either for ranching eggs or catching some adults, even where the annual removal was 50-80% of the eggs laid or 5-10% of the adult population; which it has had no inhibitory effects on population growth (David, 1994; Webb et al, 1992 and Woodward et al, 1992 in Ross, 1999). In Australia, for example, more than 2000 eggs of *Crocodylus porosus* were removed each year with evidence that did not show a populations decline (Webb et al, 1992 in Ross, 1999)

In this sense, trade products coming from ranching programs based on controlled egg harvest and in accordance to CITES guidelines and Colombia´s regulations, will continue benefit *C. acutus* wild populations conservation, its habitat, and other species of fauna and flora. As part of the positive effects of trade, taking

into account, existing mechanisms and control of traceability globally and within the country ia and in the world, revenue that would positively impact the livelihoods of marginalized local communities and discouraging illegal trade would be generated. Also it is suggested that the implementation of such strategies help to increase the knowledge of other national populations of *C. acutus*

7. Legal instruments

7.1 National

Colombia has a robust legal framework to regulate biodiversity management, including regulations regarding wildlife use and trade, as well as specific rules for use, management and trade for *C. acutus* (see **Table 4 of Annex I b.**). This legal framework is supported by provisions referring mainly to the National Constitution of 1991 that legal bond the state to protect the National natural wealth and demands the state planning for the management and use of natural resources in the pursuit of sustainable development and conservation, among others. (Articles 8 and 80).

In the same sense the Environmental Policy Guidelines for Wildlife Management in Colombia (MMA, 1997) established a Line of Action on Sustainable Use, according to which the use of wildlife must be framed within the Principles of Biological Sustainability and Economic, seeking to reconcile natural resource supply versus demand and the development possibilities for the optimization of its use, in order to incorporate the sustainable use of wildlife in production and economy, carry out actions to identify promising species, evaluate and strengthen community initiatives and effectively integrate resource use in rural production systems.

Moreover, the country also has rules, guidelines and specific national policies aimed to protected habitats, such as wetlands and mangroves, which oblige that those ecosystems should be subject to conservation and sustainable management activities (see **Table 1 of Annex I b**.) (Ulloa-Delgado & Sierra-Diaz, 2012).

With regards to the regulatory framework, the Law 611 of 2000 (for sustainable management of Aquatic and Wild Fauna species rules are establish) and Decree 2372 of 2010, according to which the administration of the Integrated Management Districts is competence of the Regional Environmental Authority and it corresponds to the same environmental authority granting permits, licenses and authorizations, among others, for natural resources use. Other laws, decrees, resolutions and agreements related to conservation, use, management of wild species, and control are summarized in **Table 4** of **Annex I b**.

7.2 International level

C. acutus trade is regulated by CITES, ensuring that both Colombia and other parties have sufficient legal framework to implement the provisions of the Convention. In addition, Colombia is also a party to the Convention on Biological Diversity -CDB-, and the RAMSAR Convention; for those who also have enough legal framework to ensure compliance on the national territory.

8. **Species management**

8.1 **Management measures: Ranching proposal based on controlled collection of eggs harvest.**

Based on the positive results of the management and conservation program of *C. acutus* established since 2003 in Cispatá´s Bay today DRMI-BC, the obtained monitoring data, and understanding ranching as a widely accepted and use strategy taking into account the advantages in conservation processes. Ranching program is propose for commercial purposes based on the controlled eggs harvesting of the population of *C. acutus* from

BC DRMI-producing skins and juveniles, that contributes to rural communities livelihoods as well as conservation of the species (Hutton and Webb, 1992). This program will be coordinated by the Regional Environmental Authority competent CVS and implemented with the support of members of local communities.

8.1.1. Egg Harvesting and Establishment of Quota

Ranching program will be for exclusive for egg ranching of *C. acutus* population at the DRMI-BC. The harvest will be exclusively in charge to local community groups as Asocaiman, which will be approved by local environmental authorities and national Scientific Authorities. Individuals or any other institution shall not be authorized to carry out this operation.

To harvest 100% of the eggs from nests found in the DRMI-BC will be collected at first stage of the program, in agreement to other ranching operations (Hutton y Webb, 1992; Ross, 1999; Larriera y Webb, com. pers.). The egg harvest quota will be recalculated and could be modified according to the data obtained from population surveys in subsequent years.

Taking into consideration that to the date the program has 857 individuals of C. acutus in captivity at the Regional Authority (CVS) station and that capacity building for communities should be take in place for animal sacrifice, obtaining and handling skins activities, the initial quota proposal of 200 annual skins until exhausting stock (2019-2020) according to the existing units in each class (to see **figure 8** of **Annexed I a**.). Subsequent to this, the trade quota definition should be establish according to the populations monitoring data and according the experts committee led by the CITES scientific authorities of the country establish.

8.1.2. Identification and Marking

Eggs harvested from nests will be marked with a specific number associated with the number of nest, and a controlled incubation will be take place at the CVS installations in CIMACI Research Station located at Amaya, Municipally of San Antero within the DRMI-BC.

All animals will be marked at birth with the amputation of caudal peduncle, both single line indicating the number of the egg, and the double line of scales used to refer to the year of production. Each individual is assigned a unique number. All animals will raise at the installations of the Research Station CIMACI in Amaya, Municipally of San Antero, within the DRMI-BC.

All animals in the program will have a unique additional mark.

8.1.3 Produced / Trade Products.

The products for international trade will be skins of *C. acutus.* These will be marked at the time of sacrifice in accordance to universal tagging system for the identification of crocodilian skins in force, and will include a specific mark of origin: ACUTUS CISPATA COLOMBIA (Res Conf 11.12 Rev. CoP15.). Additionally, other innovative methods of traceability CITES approved will be included.

8.1.4 Sacrifice

The sacrifice will be made in appropriate facilities within Research Station CIMACI at Amaya, Municipally of San Antero, within the DRMI-BC., using humane methods to ensure that no cruelty, and complying with the respective national regulations.

8.1.5 Population Monitoring

Monthly records and systematic inventory of each individual, which will be reviewed at sacrifice or release, with permanent access to the CITES Management Authority. Activities of nest tracing and monitoring of the population from census night, including other methodologies that can strengthen the data on population trends will continue.

The program will provide an annual report to the CVS, the CITES Scientific Authority and CITES Management of Colombia, with detailed information on the program including (but not limited to this) population monitoring results (data and trends, including structure), number nests and harvested eggs, number of births and number of animals in breeding stock, sacrifice animals, skins produced (and their identification data) and, in accordance with the safeguards in the event of a population decline due to the ranching program, number of animals released (with the information in its records).

The Ministry of Environment and Sustainable Development, as CITES Management Authority, will submit a summary of the information as well as export as part of the annual report to the CITES Secretariat submitted by the Republic of Colombia in the corresponding year.

8.2 Supervision of population

The direct protection of the species at the national level is in charge of the Ministry of Environment and Sustainable Development, CITES Management Authority, with the support of the CITES Scientific Authorities, and Regional Environmental Authorities (Autonomous Regional Corporations of the country).

In the particular case of the population under ranching program, the Autonomous Corporation CVS will be directly responsible as environmental authority to ensure the resource, to give to Asocaiman and other local community members approved corresponding use permit. And to national environmental authorities the reports and compliance with quotas and measures imposed to ensure that the ranching program has no detrimental impact on the wild population.

8.3 Control Measures

8.3.1 International

Control actions at the international level obey the CITES Convention regulation which provides tools to implement control actions, including the reduction of illegal trafficking (Ulloa-Delgado and Sierra-Diaz, 2012).

In addition to this, all range countries for *C. acutus* are Parties to CITES and its trade is regulated under this convention. The SPAW Protocol also applies *to C. acutus*, so that also contributes to exert stricter control of international trade because some species range countries, including the Republic of Colombia, are also Parties this protocol.

8.3.2 National

Colombia has a legal framework that regulate the use of crocodilians, among other components of biodiversity, at the national level (see **Table 4** of **Annex I b**.). The country also has various public institutions responsible for the management, protection, conservation, use and management of renewable natural resources in charge of implementing various actions of strictly management, control and monitoring, both locally, regionally and nationally. These include the Ministry of Environment and Sustainable Development (CITES Management Authority), CITES Scientific Authorities of the country, the National Environmental Authority Licenses (ANLA),

the Regional Autonomous Corporations (CAR), the Environmental Police, the vial Police and the Control institution (MA, 2002).

Considering the above, other control actions to ensure *C. acutus* sustainable harvesting are:

- The program will have a Management Plan, which includes an analysis of biological and economic viability and will provide guidelines to development and financial management; and also duties, obligations and distribution of benefits.
- Authorized people to carry out the harvest of eggs and breed in farm, besides Asocaiman will be chosen based on criteria defined by the scientific and environmental authorities, and must have an authorization. Individuals or any other entity shall not be authorized to perform this operation.
- All the program products that are intended for international trade will be identified with the numbers and with the special mark.

When considered necessary, the CITES Secretariat is invited to visit and examine the ranching program.

Additionally, due to the importance and size of the industry in crocodilian skins in the country (meaning that it is the largest producer of crocodilian skins in the world), Colombia has measures such as requiring genotyping of parental breeding stock of all the farms (Resolution No. 1772 of 2010), which contribute to strengthening the traceability of products of each establishment, including the DRMI-BC program and the control of trade.

8.4 Captive- breeding

In Colombia there are seven (7) captive-breeding farms with *C. acutus* operations object registered in CITES (Section 6.2).

8.5 Safeguards

Specimens of *C. acutus* not the subject of the ranching program at DRMI-BC, remain in Appendix I and subject to the control regulations established for these. These include wild populations outside the limits of DRMI-BC; neonates and other specimens within the DRMI-BC other than eggs object of ranching; and individuals breeding in captivity and others. These specimens will be easily differentiated from specimens obtained from ranching by the marking system explained above (section 8.1.2).

Additionally and as a precautionary measure in the event that due to the ranching program it is note an obvious decline in the population (according to the monitoring program), an initial figure of 10% of the eggs collected will be used to release to natural environment. In order to keep the gene pool of the population, few individuals from each nest harvested and differentiated brand when they hatch will be chosen. This is expected to offset the impact of harvesting, and contribute to the recovery of the natural population (Hutton and Webb, 1992). Also a series of population parameters to determine the condition of the population according to defined thresholds (e.g. optimal, normal, observation or study) will be defined; this in order to determine the viability of the program, guiding the management of the program and ensure the survival of the population (see **Table 5** of **Annex I b**.).

Moreover, interest due on implementing a conservation program based on the controlled harvest of eggs at other national population, national environmental authorities must ensure that this complies with population monitoring process endorsed by specialists coordinated with the CITES Scientific Authority, complies the requirements of Res. 11.16 CITES and current national legislation and in which the benefit for conservation *C. acutus* populations, its habitat and livelihood of local people are included.

Once Colombia´s CITES Management and Scientific Authorities verify compliance with the above, they will consult the proposal to formalize a program of conservation, management and repopulation that allow

sustainable use based on the controlled harvest of eggs in the new population *C. acutus* with SSC-IUCN Crocodile Specialist Group and will present in the Fauna Committee. Once it is consulted, it will be put in consideration of the Standing Committee of CITES presenting a detailed and justified proposal.

When the results of population surveys indicate a decline in populations is due to ranching program, a percentage of individuals who should be returned to the wild (according to section 8.1.1) will be established.

9. **Information on Similar Species**

Colombia inhabits six of the 23 species of crocodilians in the world of which only two do belong to the genus *Crocodylus*: *C. acutus* and *C. intermedius* (Rodríguez 2000; Martin, 2008). Even so, this proposal would not adversely affect the conservation and / or management of any species of crocodilians in Colombia not included in this proposal. On the other hand and despite of the skin similarity of *C. intermedius* is between 20 and 25 transverse rows of ventral plates, while that of *C. acutus* are between 25 and 35 (Patiño et al, 2013). Additionally, *C. intermedius* is limited almost exclusively to the Orinoco basin in Colombia and Venezuela more restricted distribution. Meanwhile, *C. crocodilus, Melanosuchus niger, Paleosuchus palpebrosus* and *P. trigonatus* have very different morphological characteristics to *C. acutus*, so do not give rise to confusion or impersonation.

10. **Consultations**

This proposal has been consulted to countries of distribution (see consultation formal request attached).

References

Abadía, G. (1996). Population dynamics and conservation strategies for *Crocodylus acutus* in Bahía Portete, Colombia. Proceedings of the 13th Working Meeting of the Crocodile Specialist Group, Santa Fé, Argentina. 176–183 pp.

Balaguera-Reina, S. (2012). Ecology, population status and human interactions of *Crocodylus acutus* at Zapatosa and Costilla swamps, Cesar department, Colombia. Crocodile Specialist Group Newsletter CSG 31: 7–9. http://www.iucncsg.org/ 365_docs/attachments/protarea/31(3-a540a41a.pdf.

Balaguera-Reina, S., Vanegas-Anaya, M., Densmore, L. D. (2014). The Biology and Conservation Status of the American Crocodile in Colombia. *Journal of Herpetology*, 49 (1). In Press.

Balaguera-Reina, S., Farfán-Ardila, N., Vargas-Ortega, D., Medrano-Bitar, S. (2015) Population ecology of American crocodile in Tayrona Natural National Park, Colombian Caribbean. *Trianea*, In Press.

Barrera, L.F. (2004). Current status of a relict population of American crocodile (Crocodylus acutus Cuvier, 1807) in an area of Magdalena Medio. Omacha Foundation study published by ProAves Colombia. 8 pp.

Castaño-Mora, O.V. (Ed.). (2002).Colombia´s reptile red book. Institute of Natural Sciences, from National University of Colombia, Ministry of Environment, Conservation International -Colombia. Bogotá, Colombia. 160 pp.

Cortés-Castillo, D.V. (2010). Flora and vegetation associated with a salinity gradient in the sector Cispatá Bay (Córdoba, Colombia). Postgraduate thesis, National University of Colombia, Science faculty, Biology department, Institute of Natural Sciences. Bogotá, Colombia. 107 pp.

Corporation Autonomous Regional of Valleys of the Sinú and San Jorge – CVS and Institute of Marine and Coastal Research - INVEMAR. (2010). Comprehensive management plan for the Integrated Management District (DMI) Cispatá Bay - La Balsa - Tinajones y Area near the Sinu River Delta Estuary, department of Córdoba. Ed.: Rojas, G. X. y Sierra-Correa, P. Special Publications Series No. 18 de INVEMAR. Santa Marta. 141 pp.

Da Silveira, R., Magnusson, W.E., Campos, Z. (1997). Monitoring the Distribution, Abundance and Breeding Areas of *Caiman crocodilus crocodilus* and *Melanosuchus niger* in the Anavilhanas Archipelago, Central Amazonia, Brazil. *Journal of Herpetology*, 31: 514-520.

De La Hoz-Villareal, D., Patiño-Flores, E., Gómez-González, J., Mejía-López, F., Baez, L. (2008). Population diagnosis and some reproductive aspects of ‘‘Caimán Aguja’’ (*Crocodylus acutus*) in Portete Bay, La Guajira peninsula, Colombia. Proceedings of the 19th Working Meeting of the Crocodile Specialist Group, Gland, Switzerland. 450–466 pp.

El Heraldo, Redacción Regional. (2012). Coralina justified sacrifice of crocodile in San Andrés. Published September 4th of 2012.

Espinosa, M.I., Bertin, A., Gómez, J., Mejía, F., Guerra, M., Baez, L., Gouin, N., Patiño, E. (2012. A three-year mark-recapture study in a remnant population of *Crocodylus acutus* Cuvier un Portete Bay (Guajira, Colombia). *Guayana* 76 (1): 52-58.

Fittkau, E.J. (1970). Role of caimans in the nutrient regime of mouth-lakes of Amazon affuents (An hypothesis). Biotropica 2(2): 138-142.

Fundación Biodiversa. (2011). Study report of Crocodylus acutus in the municipality of Puerto Badel - Under

Canal del Dique, Bolivar. Final report. Regional Autonomous Corporation of Canal del Dique (CARDIQUE). 55 pp.

Garrick, L.D. (1986). The Black River Lower Morass, a threatened wetland in Jamaica. *Oryx* 20: 155–160.

Gómez-González, J. El kayuüshi (*Crocodylus acutus*) in Portete Bay: contributions to the knowledge of the condition. Pp. 300-315. In: Báez, L. y F. Trujillo (Eds.). 2014. Biodiversity of Cerrejón. Carbones de Cerrejón, Omacha Foundation, Fund for Environmental Action and Childhood. Bogotá, Colombia. 352 p.

Hines, T. C. y Abercrombie, C. L. (1987). The management of alligators in Florida, USA. Pp. 43-47 *En:* Wildlife Management: Crocodiles and Alligators ed by G. J. W. Webb, S. C. Manolis and P. J. Whitehead. Surrey Beatty & Sons, Chipping Norton.

IAvH y CVS. (2006). Delimitation and formulation of a integrated management district of natural resources (DMI) of mangrove from Cispatá Bay, Tinajones, La Balsa and surrounding areas. National Institute of Research Alexander von Humboldt, Regional Autonomous Corporation of Valleys of the Sinú and San Jorge. Agreement Nu. 056. 299 pp.

King, F.W. (1988). Crocodiles: Keystone wetland species. *En:* Dalyrymple, G.H., Loftus, W.F., Bernardino, F.S. (Ed). Wildlife in the Everglades and Latin American wetlands. Abstracts of the Proceedings of the First Everglades Nat. Park Symposium. Miami, 1985.

Larriera, A., Webb, G., Velasco, A., Rodríguez, M., Ortíz, B. (2004). Mission to Colombia. Final report, IUCN-SSC Crocodile Specialist Group. 59 pp.

MADS. (2005). National program for conservation of Magdalena's Cayman *Crocodylus acutus* (Cuvier, 1807). Agreement 065 of 2004. Ministry of Environment and Territorial Development and Regional Autonomous Corporation of Valleys of the Sinú and San Jorge. 31 pp.

Mazzotti, F.J. (1999). The American crocodile in Florida Bay. *Estuaries* 22: 552–561.

Mazzotti, F.J., Cherkiss, M.S., Parry, M.W., Rice, K.G. (2007). Recent nesting of the American crocodile (*Crocodylus acutus*) in Everglades National Park, Florida, USA. *Herpetological Review* 38: 285-289.

Medem, F. (1981). The crocodylia of South America, Volume I: The crocodylia of Colombia. Editorial Carrera 7 Ltda. ed., Bogotá, Colombia.

Meffe, G.K., Carroll, C.R., Groom, M.J. (2006). What is conservation biology? In: Groom, M.J., Meffe, G.K., Carrol, C.R. Principles of Conservation Biology. Third Edition. Sinauer Associations, Inc. 779 pp.

McShane, T.O., Hirsch, P.D., Trung, T.C., Songorwa, A.N., Kinzig, A., Monteferri, B., Mutekanga, D., Van Thang, H., Dammert, J.L., Pulgar-Vidal, M., Welch-Devine, M., Brosius, J.P., Coppolillo, P., O'Connor, S. (2011). Hard choices: Making trade-offs between biodiversity conservation and human well-being. *Biological Conservation*, 144: 966–972.

Morales-Betancourt, M.A., Lasso, C.A., De La Ossa, J., y Fajardo-Patiño, A. (Ed). (2013). VIII. Biology and Conservation of Crocodylia from Colombia. Continental Hydrobiological and Fish Resources of Colombia Editorial Series. Institute of Biological Resources Research Alexander von Humboldt (IAvH). Bogotá, Colombia. 336 pp.

Morales-Betancourt, M.A., De La Ossa-Lacayo, A., De La Ossa, J., Lasso, C.A., & Trujillo, F. (2013). Use of

Crocodylia in Colombia. Pp 213-229. *In:* Morales-Betancourt, M.A., Lasso, C.A., De La Ossa, J., y Fajardo-Patiño, A. (Ed). VIII. Biology and Conservation of Crocodylia from Colombia. Continental Hydrobiological and Fish Resources of Colombia Editorial Series. Institute of Biological Resources Research Alexander von Humboldt (IAvH). Bogotá, Colombia.

Platt, S.G., Thorbjarnarson, J.B., Rainwater, T.R., & Martin, D.R. (2013). Diet of the American Crocodile (*Crocodylus acutus*) in Marine Environments of Coastal Belize. *Journal of Herpetology*, 47 (1): 1–10.

Ponce-Campos, P., Thorbjarnarson, J. & Velasco, A. (IUCN SSC Crocodile Specialist Group). (2012). *Crocodylus acutus*. The IUCN Red List of Threatened Species. Versión 2014.3. <www.iucnredlist.org>. Retrieved December 9th of 2014.

Redford, K.H. y Richter, B.D. (1999). Conservation of Biodiversity in a World of Use. *Conservation Biology*, 13 (6): 1246-1256.

Ripple, J., Beschta, R.L. (2012). Trophic cascades in Yellowstone: The first 15 years after wolf reintroduction. *Biological Conservation*, 145: 205–213.

Rodríguez-Melo, M.A. (2000). Status and Distribution of Crocodylia from Colombia. Ministry of Environment, Alexander von Humboldt Institute. Bogotá, Colombia. 71 pp.

Ross, F.D. & Mayer, G.C. (1983). On the dorsal armor of the Crocodylia. In: *Advances in Herpetology and Evolutionary Biology*, Rhodin, A.G.J. & Miyata, A. (ed): 305-331. Museum of Comparative Zoology, Cambridge, Massachusetts.

Ross, J.P. (Ed) (1998). Crocodiles. Status Survey and Conservation Action Plan. 2nd Edition. IUCN/SSC Crocodile Specialist Group. IUCN. Gland, Switzerland, and Cambridge, UK. 96 pp.

Rueda-Almonacid, J.V., Carr, J.L., Mittermeier, R.A., Rodríguez-Mahecha, J.V., Mast, R.B., Vogt, R.C., Rhodin, A.G., De La Ossa, J., Rueda J.N., & Goettsch-Mittermeier, C. (2007). The turtles and crocodiles of the Andean countries of the tropics. Conservation International. Bogotá, Colombia. 536 pp.

Sánchez-Pérez, H., Ulloa-Delgado, G.A. & Álvarez, R. (2000To recovery of mangroves in the Caribbean Colombia. Ministry of Environment, ACOFORE, OIMT. Bogotá, Colombia. 290 pp.

Sánchez-Pérez, H., Ulloa-Delgado, G.A., Tavera-Escovar, H. & Gil, W. (2005). Integral management plan of mangroves of the sustainable uses zone of estuarine sector Cispatá Bay. Department of Córdoba, Colombia. Regional Autonomous Corporation of Valleys of the Sinú and San Jorge, National Corporation for Forestry Research and Development. OIMT. Bogotá, Colombia.

Schmidt, K. (1924). Notes on Central American Crocodiles. *Field Museum Natural History, Zoological Series*, 12 (6): 79-92.

Seijas, A.E. (2002). Scale patterns of American crocodiles (*Crocodylus acutus*) from several Venezuelan localities. *Revista UNELLEZ de Ciencia y Tecnología*, 20: 118-134.

Sergio, F., Caro, T., Brown, D., Clucas, B., Hunter, J., Ketchum, J., McHugh, K. & Hiraldo, F. (2008). Top Predators as Conservation Tools: Ecological Rationale, Assumptions, and Efficacy. *Annual Review of Ecology, Evolution & Systematics*, 39: 1-19.

Thorbjarnarson, J.B. (1988). The status and ecology of the American Crocodile in Haiti. Bulletin of the Florida State Museum, Biological Sciences, 33 (1): 1-86.

Thorbjarnarson, J.B. (1992). Crocodiles: An action plan for their conservation. IUCN/SCC Crocodile Specialist Group. IUCN, Gland, Switzerland. 136 pp.

Thorbjarnarson, J.B., Mazzotti, F., Sanderson, E., Buitrago, F., Lazcano, M., Minkowski, K., Muñiz, M., Ponce, P., Sigler, L., Soberón, R. et al. (2006). Regional habitat conservation priorities for the American Crocodile. *Biological Conservation*, 128: 25–36.

Thorbjarnarson, J.B. (2010). American Crocodile *Crocodylus acutus*. Pp. 46-53 *In:* Crocodiles. Status Survey and Conservation Action Plan. Third Edition. (Ed) S.C. Manolis y C. Stevenson. Crocodile Specialist Group: Darwin.

International Union for Conservation of Nature –IUCN. (2015). Management Categories of IUCN protected areas. Web page: https://www.iucn.org/es/sobre/union/secretaria/oficinas/sudamerica/sur_trabajo/sur_aprotegidas/ap_categorias.cfm. Retrieved September of 2015 .

Ulloa-Delgado, G. (2014). Synthesis of information activities in the Bay of Cispatá –Estación Amaya- for 2014. Conservation project for Crocodylus acutus of the Cispatá Bay with the participation of local communities in the municipality of San Antero –Department of Córdoba, Colombian Caribbean. Regional Autonomous Corporation of Valleys of the Sinú and San Jorge CVS. Colombia. 35 pp.

Ulloa-Delgado, G. (2015). Final report under the agreement for scientific and technological cooperation ASOCAIMÁN-OMACHA-CVS-003 de 2015; in order to develop the activities of community strengthening in the project of structure Cayman populations projections towards achieving ecological, social and economic benefits belonging to the District Management Plan Integrated Management Cispatá, La Balsa and Tinajones., Departamento de Córdoba. 54 pp.

Ulloa-Delgado, G.A. & Cavanzo-Ulloa, D.L. (2009). Characterization Study and diagnosis of "Cayman" populations *Crocodylus acutus* (Cuvier, 1807) and their natural habitat in the Cienaga La Caimanera.. CARSUCRE-FUNDACIÓN SABANAS. PDF, 24 pp.

Ulloa-Delgado, G.A. & Peláez-Montes, J.M. (2011). Preliminary management plan for the conservation of American crocodile populations, *Crocodylus acutus*, (Cuvier, 1807) in the rivers Sardinata, San Miguel, Nuevo Presidente y Tibú in Department of Norte de Santander, Catatumbo basin of Colombia. Consulting final report. CORPONOR-ECOPETROL-VQ-INGENIERIA. PDF, 235 pp.

Ulloa-Delgado, G y Sierra-Díaz, C. (2012). Conservation project for Crocodylus acutus of the Cispatá Bay with the participation of local communities in the municipality of San Antero –Department of Córdoba, Colombian Caribbean. Regional Autonomous Corporation of Valleys of the Sinú and San Jorge CVS. Colombia. 108 pp.

Ulloa-Delgado, G y Sierra-Díaz, C. (2015). Technical summary. Workshop on "assessment and mitigation of the implications of the inclusion in the appendices of CITES livelihoods" conservation project Crocodylus acutus Bay Cispatá with the participation of local communities. Municipality of San Antero- Department of Córdoba, Colombian Caribbean. 21 pp.

Ulloa-Delgado, G.A., Tavera-Escovar, H., Ponce de León, E., & Sierra-Díaz, C.L. (2011). Delimitation and

formulation of a district integrated management of natural resources (DMI) of mangrove from Cispatá Bay, Tinajones, La Balsa and surrounding. National Institute of Research Alexander von Humboldt, Regional Autonomous Corporation of Valleys of the Sinú and San Jorge (CVS). PDF, 299 pp.

Vargas-Ortega, D. (2014). Population structure, spatial distribution and habitat study of *Crocodylus acutus* (Cuvier, 1807) in the Tayrona National Park, Colombian Caribbean. Degree work for the degree of Biologist of Pedagogical and Technological University of Colombia, Faculty of Basic Sciences. Tunja, Boyacá, Colombia.

Velasco, A. (2008). Crocodile management, conservation and sustainable use in Latin America.

Von Prahl, H. (1990). Mangroves. Villegas Editores, Second Edition. Bogotá, Colombia. 203 pp.

ANNEX I

a. Figures

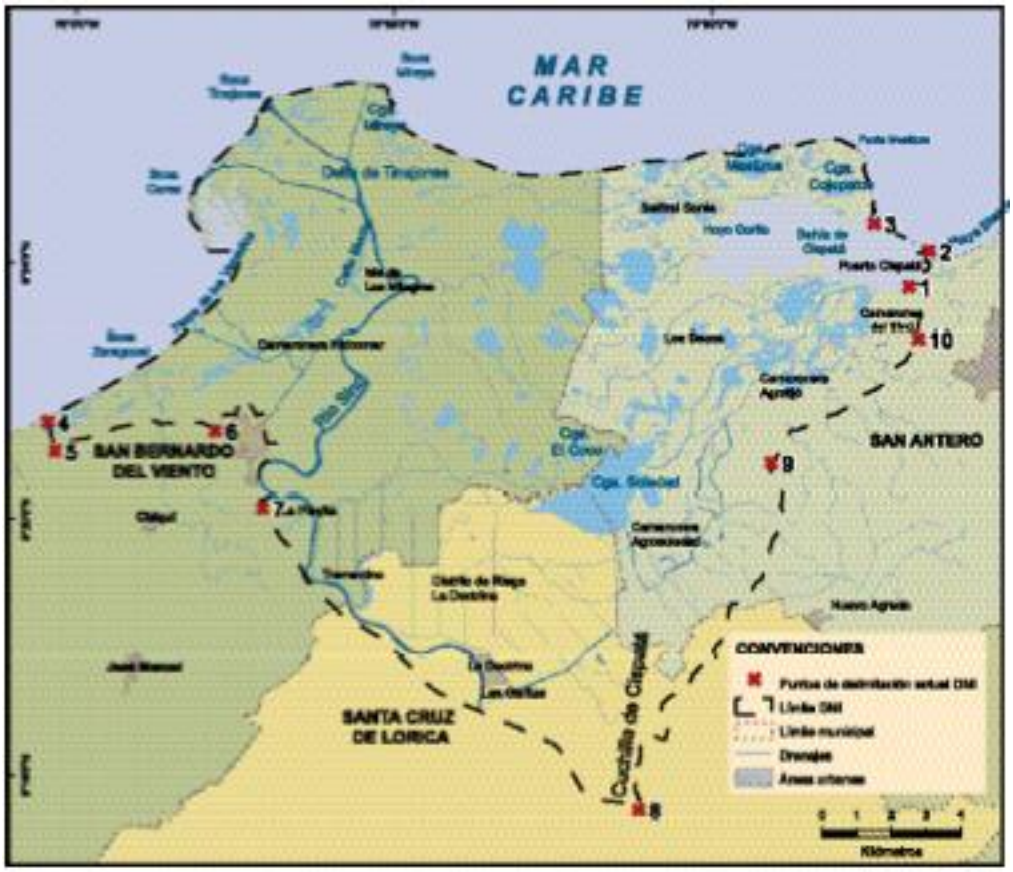


Figure 1. Map of the limits of the Regional District of Integrate Management of Mangroves of Cispata Bay and nearby sectors of the Estuarine Delta of Sinú River, located in the department of Cordoba, Republic of Colombia. A protected area accredits to category IV of the UICN. (Taken from CVS and INVEMAR, 2010).

Figure2. Map of distribution of Crocodylus acutus at world-wide level (Taken from Thorbjarnarson, 2010).

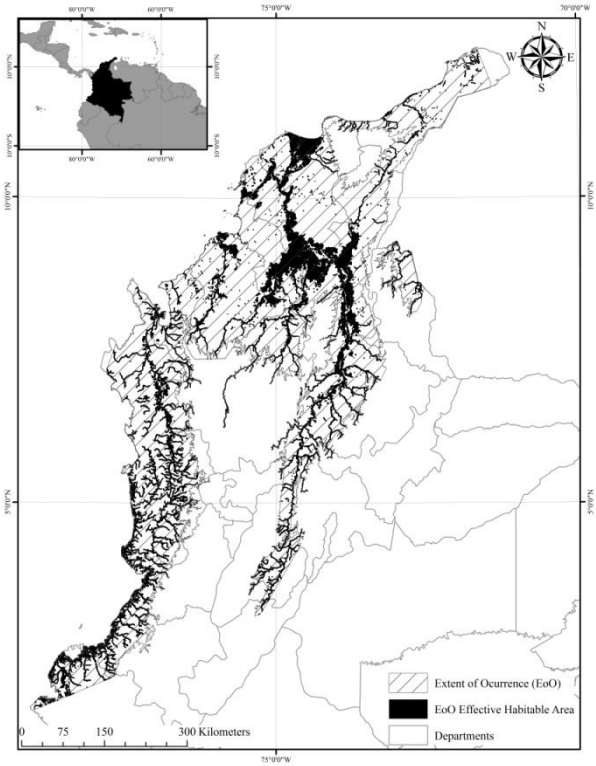
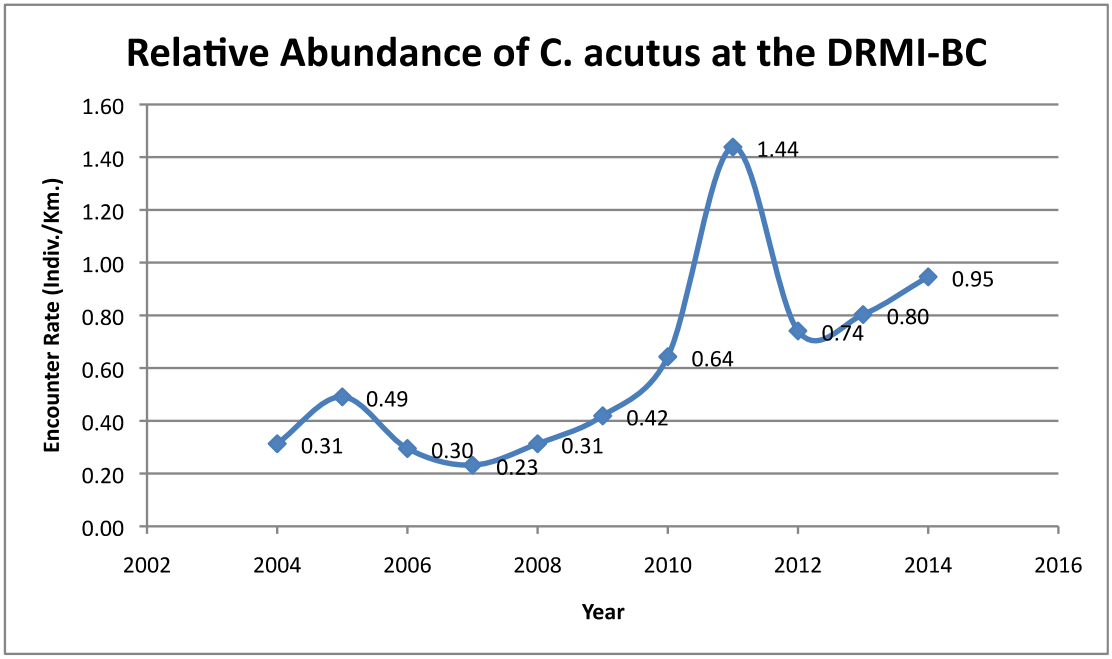


Figure 3. Inhabitable effective area (with a zone buffer of 1 km) with base in the *Extent of Ocurrence* (EoO) estimated that reflects the optimal habitat and the connectivity between these habitats due to the presence of water bodies. The authors maintain that this figure way sample needs the area inhabited by *Crocodylus acutus* in Colombia (Balaguera-Reina *et.al*. 2013).



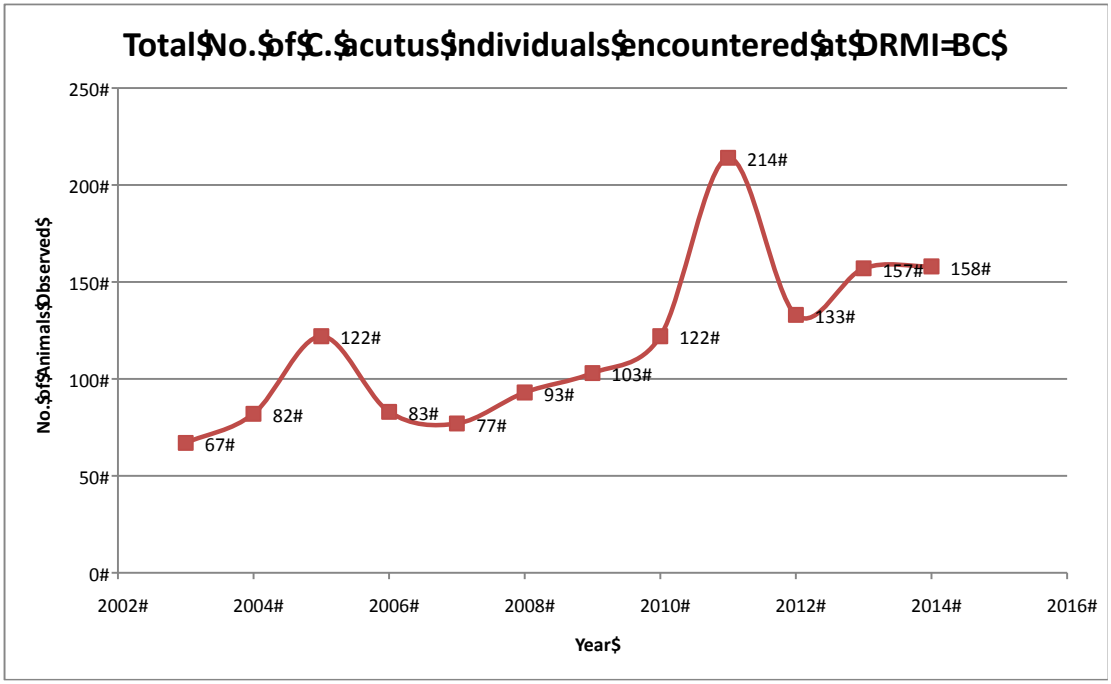


Figure 4. Rate of encounter average (relative abundance) of *Crocodylu acutus* obtained in the nocturnal monitoring between 2004 and 2014 (a), and total number of observed individuals (b). In both graphs the rate of encounter is observed as much that as the total number of observed individuals is increasing from the 2007. Regional District of Integrate Management of Mangroves of Cispata Bay of and nearby sectors of the Estuarine Delta of Sinú River, located in the department of Cordoba, Republic of Colombia. 2015

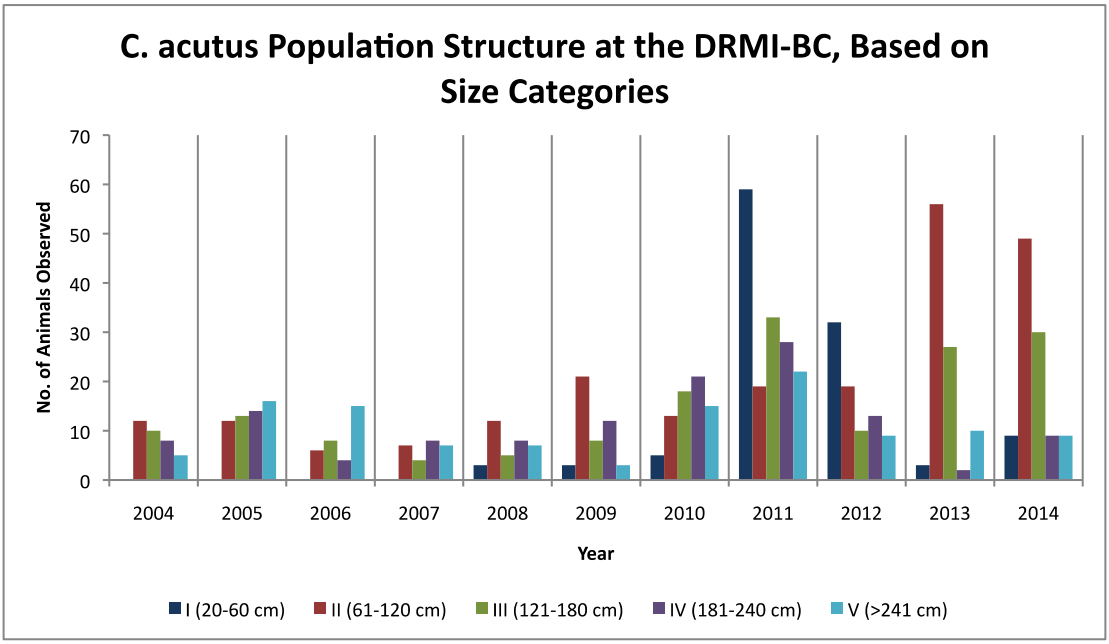


Figure 5. Frequency allocation of classes of sizes of individuals of *Crocodylus acutus* observed between the 2004 and the 2014 during nocturnal censuses at the Regional District of Integrate Management of Mangroves of Cispatá Bay and nearby sectors of the Estuarine Delta of Sinú River, located in the department of Cordoba, Republic of Colombia. 2015

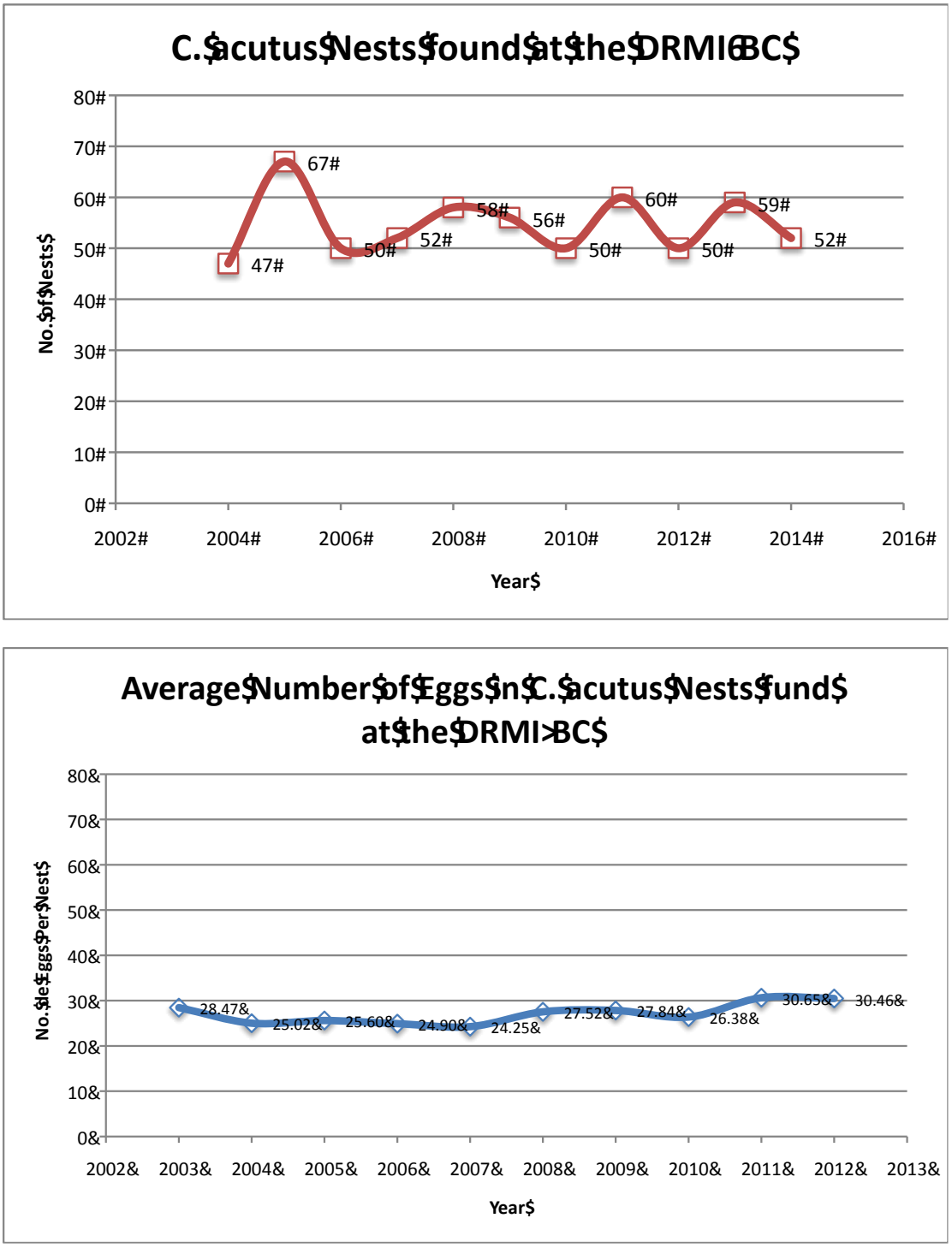


Figure 6. Number of nests found in Cispatá Bay between 2004 and 2014 (a) Average of eggs (b). In average 54,6 nests have been from the 2004, with a standard deviation of 5.9. The average of eggs by nest found has increased slightly. Regional District of Integrate Management of Mangroves of Cispata Bay and nearby sectors of the Estuarine Delta of Sinú River, located in the department of Cordoba, Republic of Colombia. 2015

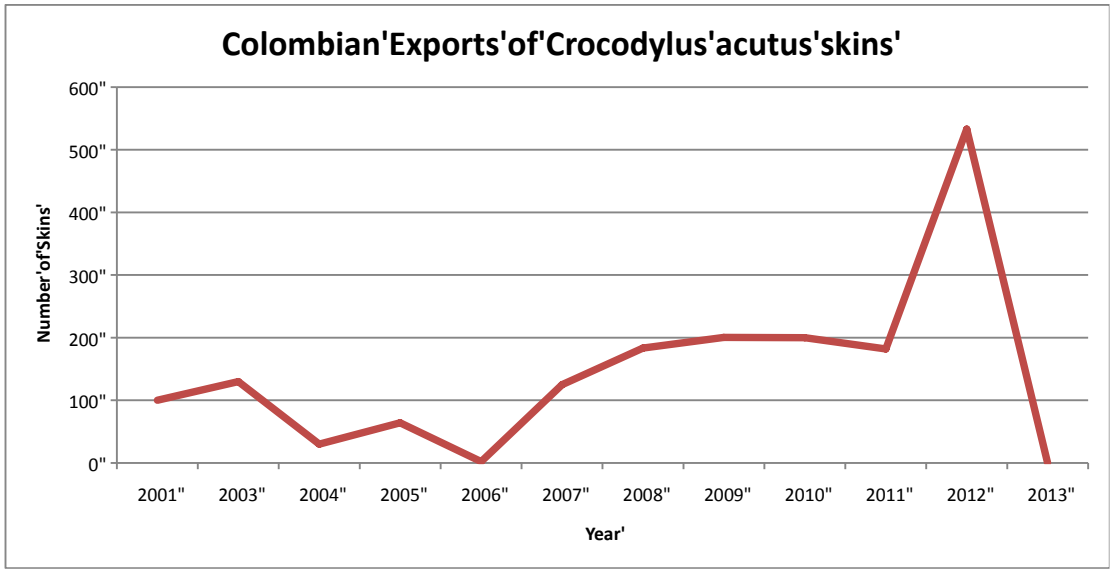


Figure 7. Annual average of the exports of skins of *Crocodylus acutus* registered in CITES trade database for Colombia between the 2001 and the 2013 (http://trade.cites.org/#).

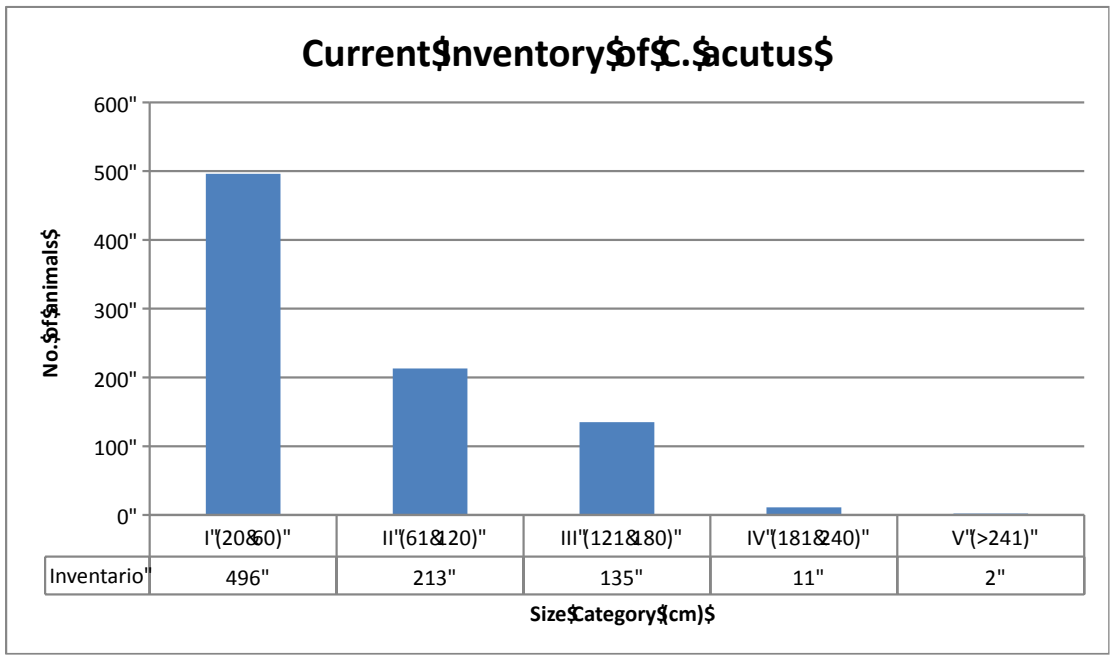


Figure 8. Present inventory (2015) of *Crocodylus acutus* at the conservation program, handling at the Regional District of Integrate Management of Mangroves of Cispata Bay and nearby sectors of the Estuarine Delta of Sinú River, located in the department of Cordoba, Republic of Colombia. (Ulloa-Delgado, 2015).

ANNEX I

b. Tables

Table 1. Relative abundance information expressed as rate of encounter (Ind/Km), obtained of the population studies of *Crocodylus acutus* in Colombia between 1992 and 2012. (*Unpublished data; ** These values of abundance do not include hatchlings)

AUTHOR	PUBLICATION YEAR	COLOMBIAN DEPARTMENT	STUDY SITE	YEAR OF STUDY	AVERAGE RELATIVE ABUNDANCE (ind/ km)
Gómez-González	2011	La Guajira	Bahía Portete	2011	2.01
Gómez-González	2011	La Guajira	Bahía Portete	2010	2.71
Gómez-González	2011	La Guajira	Bahía Portete	2009	0.88
Gómez-González	2011	La Guajira	Bahía Portete	2008	2.02
Gómez-González	2011	La Guajira	Bahía Portete	2007	1.73
De la Hoz-Villareal	2008	La Guajira	Bahía Portete	2007	1.37
Rodríguez-Melo (ed)	2000	La Guajira	Bahía Portete	1994-1997	0.47
Abadía	1996	La Guajira	Bahía Portete	1992	0.09
Patiño *et al.*	2010	La Guajira	Caño Limoncito -Dibulla	2009-2010	0.00
Patiño *et al.*	2010	La Guajira	Caño Limoncito -Dibulla	2009-2010	7.58**
Patiño *et al.*	2010	La Guajira	Caño Lagarto -Dibulla	2009-2010	12.12**
Patiño *et al.*	2010	La Guajira	Caño Michiragua -Dibulla	2009-2010	7.69**
Rodríguez-Melo (ed)	2000	La Guajira	Dibulla	1994-1997	3.75
Vargas-Ortega	2014	Magdalena	Parque Nacional Natural Tayrona (Los Naranjos, Cañaverales, Arrecifes y Cinto)	2013-2014	1.33
Balaguera-Reina y González-Maya	2008	Magdalena	Vía Parque Isla de Salamanca	2006	7.78
Fundación Biodiversa	2011	Bolívar	Puerto Badel - Canal del Dique	2011	0.51
Balaguera-Reina	2012	Cesar	Ciénaga de Zapatosa y Costilla	2011	0.00
Ulloa-Delgado	2015	Córdoba	Bahía de Cispatá (DMIBC)	2014	0.95
Ulloa-Delgado	2015	Córdoba	Bahía de Cispatá (DMIBC)	2013	0.80
Ulloa-Delgado	2015	Córdoba	Bahía de Cispatá (DMIBC)	2012	0.74
Ulloa-Delgado	2012	Córdoba	Bahía de Cispatá (DMIBC)	2011	1.44
Ulloa-Delgado	2012	Córdoba	Bahía de Cispatá (DMIBC)	2010	0.64
Ulloa-Delgado	2012	Córdoba	Bahía de Cispatá (DMIBC)	2009	0.42
Ulloa-Delgado	2012	Córdoba	Bahía de Cispatá (DMIBC)	2008	0.31
Ulloa-Delgado	2012	Córdoba	Bahía de Cispatá (DMIBC)	2007	0.23
Ulloa-Delgado y Sierra-Díaz	2006	Córdoba	Bahía de Cispatá (DMIBC)	2006	0.74
Ulloa-Delgado y Sierra-Díaz	2006	Córdoba	Bahía de Cispatá (DMIBC)	2005	0.49
Ulloa-Delgado y Sierra-Díaz	2006	Córdoba	Bahía de Cispatá (DMIBC)	2004	0.30
Ulloa-Delgado y Sierra-Díaz	2006	Córdoba	Bahía de Cispatá (DMIBC)	2003	0.94
Ulloa-Delgado y Sierra-Díaz	2006	Córdoba	Bahía de Cispatá (DMIBC)	2002	1.25
Ulloa-Delgado y Sierra-Díaz	2002	Córdoba	Bahía de Cispatá (DMIBC)	2001	0.50
Ulloa-Delgado y Cavanzo-Ulloa	2009	Sucre	Ciénaga de la Caimanera	2008-2009	0.36
Rodríguez-Melo (ed)	2000	Sucre	Ciénaga de la Caimanera	1994-1997	7.29
Barrera	2004	Boyacá y Santander	Río Ermitaño	2004	1.07
Ulloa-Delgado	2011	Norte de Santander	Río San Miguel, Sardinata, Nuevo Presidente y Tibú	2010	1.32
Barahona *et al.*	1996	Cundinamarca	Río Bogotá	1994-1995	1/sin distancia
Average					**2.05**
Estándar Deviation					**2.86**

Table 2. Relative abundance expressed as rate of encounter of *Crocodylus acutus* (Individual observed by crossed kilometer) observed in the nocturnal counts in the DRMI-BC between the 2004 and the 2014, and the changes positive that suggest a population increasing. Regional District of Integrate Management of Mangroves of Cispata Bay and nearby sectors of the Estuarine Delta of Sinú River, located in the department of Cordoba, Republic of Colombia. (Ulloa-Delgado, 2015).

YEAR	ENCOUNTER RATE (Indv/Km)	TOTAL NUMBER OF OBSERVED INDIVIDUALS	CHANGE WITH RESPECT TO INMEDIATELY PREVIOS YEAR	
			ENCOUNTER RATE	TOTAL NUMBER OF OBSERVED INDIVIDUAL
2004	0.31	35	-0,19	15,00
2005	0.49	55	0,40	40,00
2006	0.30	33	-0,34	-39,00
2007	0.23	26	-0,10	-6,00
2008	0.31	35	**0,17**	**16,00**
2009	0.42	47	**0,08**	**10,00**
2010	0.64	72	**0,20**	**19,00**
2011	1.44	161	**0,89**	**89,00**
2012	0.74	83	**-0,70**	**-78,00**
2013	0.80	98	**0,06**	**15,00**
2014	0.95	106	**0,14**	**8,00**
	0.60	**Average**		
	0.36	**Estándar desviation**		

Table 3. Captive-breeding farms registered to CITES Secretariat and in process to register of *Crocodylus acutus* in Colombia.

NAME	REGISTER CODE	FASE
Krokodeilos S.A.	A-CO-501	COMERCIAL
Tropical Fauna LTDA.	A-CO-502	COMERCIAL
Caicsa S.A.S.	A-CO-503	COMERCIAL
Cocodrilos de Colombia S.A.	A-CO-504	COMERCIAL
Zoofarm LTDA.	A-CO-505	COMERCIAL
Exotika Leather S.A.	A-CO-506	COMERCIAL
El Prieto LTDA	A-CO-507	COMERCIAL
Lirica	In process	COMERCIAL
Reptibol	In process	COMERCIAL

Table 4. Colombian environmental legislation related to management, and trade of wildlife species, with special emphasis on *Crocodylus acutus*.

Type	Number	Year	OBJETIVE
Resolution	573	1969	By which the ban on the hunting and capture of Needle Cayman or Caretabla (*Crocodylus acutus*), Caiman Llanero (*Crocodylus intermedius*), Jacare assu or Black Caiman (*Melanosuchus niger*) throughout the country where the INDERENA exercising its jurisdiction is established.
Decree-Law	2811	1974	By which the Code of Renewable Natural Resources and Environmental Protection is enacted.
Decree	1608	1978	By which the National Code of Renewable Natural Resources and Environmental Protection and the Law 23 of 1973 is regulated wildlife. (Refers to permit hunting promotion: For the purposes of this Agreement, understood as promoting hunting activity, this act led to the arrest of individuals or animals of wild fauna for the establishment and development of commercial and farms building, authorized by the INDERENA.)
Law	17	1981	By which approves the Convention on International Trade in Endangered Species of Wild Fauna and Flora -CITES.
Law	99	1993	By which the Ministry of Environment is created, the public sector responsible for the management and conservation of the environment and renewable natural resources is rearranged, the National Environmental System, SINA, organized and other dispositions are dictated. Regulated by the National Decree 1713 of 2002, regulated by National Decree 4688 of 2005, partially regulated by the National Decree 3600 of 2007, regulated by National Decree 2372 of 2010.
Law	165	1994	By which the Convention on Biological Diversity, done at Rio de Janeiro on June 5, 1992 is approved.
Resolution	1602	1995	Through which actions to ensure the sustainability of mangroves in Colombia are issued.
Resolution	020	1996	Through which Resolution No. 1602 of December 21, 1995 clarified and other provisions related to forest harvesting are held and specifically the Mangrove.
Decree	1401	1997	For which the Management Authority of Colombia is designated to the Convention on International Trade in Endangered Species of Wild Fauna and Flora -CITES-, and their

			functions are determined.
Decree	1420	1997	By which scientific authorities of Colombia to the Convention on International Trade in Endangered Species of Wild Fauna and Flora -CITES- are designated, and their functions are determined.
Resolution	233	1999	Through which Resolution 924 of October 16, 1997 amending and the period specified in Article 4 of Resolution 1602 of December 21, 1995 is extended.
Decree	125	2000	By which the Decree 1420 of 1997 is modified.
Decree	1909	2000	By which sea and river ports, airports and other places for international trade in specimens of wild fauna and flora are designated.
Resolution	438	2001	By which the Single National Safe Conduct for the mobilization of specimens of biological diversity is established.
Resolution	721	2002	By which is emitted a pronouncement about studies and zoning proposals in mangrove areas presented by the Autonomous Regional Corporations and Sustainable Development and other determinations are made.
Resolution	1172	2004	By which the National System of Identification and Registration of Wildlife Specimens in Ex situ conditions is established.
Resolution	1173	2004	By which the National Register of Providers markings defined in the National Identification System Wildlife Specimens ex situ is regulated.
Resolution	1263	2006	By which it establishes the procedure and the value is set to issue permits under the Convention on International Trade in Endangered Species of Wild Fauna and Flora -CITES- to, and other dispositions are dictated.
Agreement	056	2006	By which reserves, declares and defines as District Integrated Management the Mangrove Area of Cispatá Bay and Adjacent Sector Delta Estuary of Sinú River by the Regional Autonomous Corporation of Valleys of Sinú and San Jorge - CVS -
Resolution	923	2007	By which the Resolution 1172 of October 7, 2004 is modified and be adopt other regulations.
Law	1333	2009	By which the environmental sanction procedure is established and other dispositions are dictated.

Resolution	1772	2010	By which requirements for advance on the level of trade and registration before the CITES Secretariat of the farms in closed cycle that handle species included in Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora - CITES and other provisions are adopted.
Resolution	2064	2010	By which subsequent actions to preventive arrest, restitution or forfeiture of specimens of wild fauna and terrestrial and aquatic flora are regulated and other dispositions are dictated.
Decree	2372	2010	By which the Decree Law 2811 of 1974, Law 99 of 1993, Decree 165 of 1994 and Decree 216 of 2003 and Decree concerning to the National System of Protected Areas, management categories that comprise it are regulates and dictate other provisions.
Agreement	138	2010	By which Integral Management Plan for the District of Integrated Management -DMI- Cispatá Bay -La Blasa -Tinajones and Area near Delta Estuary Rio Sinú, declared by Agreement 056 of 2006, approving its area expands and other determinations are made.
Decree	3570	2011	By which the objectives and structure of the Ministry of Environment and Sustainable Development are modified and Administrative Sector of Environment and Sustainable Development is integrated. Also delegates to the direction of forests, biodiversity and ecosystem services as CITES Management Authority of Colombia.
Agreement	173	2011	By which the homologation of the District Integrated Management the Mangrove Area of Cispatá Bay and Adjacent Sector Delta Estuary according to the categorization of Decree 2372 of 2010 management is performed.
Resolution	1316	2014	By which is added to the resolution 1772 of 2010, and parental genotyping of *C. acutus* is conditioned to the time when the environmental authority publish specific molecular markers for the species.
Resolution	0192	2014	By which the list of endangered wild species of Colombian biodiversity found in the country is established, and other dispositions are dictated.
Decree	1076	2015	By which the Single Regulatory Decree of the Environment and Sustainable Development Sector is issued.

Table 5. Viability population parameters taking in account at the conservation program of *Crocodylus acutus* at Regional District of Integrate Management of Mangroves of Cispata Bay and nearby sectors of the Estuarine Delta of Sinú River, located in the department of Cordoba, Republic of Colombia. (Ulloa - Delgado, 2015).

	Viability parameters
Populations	Population structure
	Relative abundance (Indiv/km cross)
Reproductive	No. Nest/year
	No. de Eggs/nest
	Fertility percentage
	Hatching percentage

Additional information

Table 6. Multiannual effectiveness of the nesting platforms areas, for *Crocodylus acutus,* constructed in mangroves areas. Regional District of Integrate Management of Mangroves of Cispata Bay and nearby sectors of the Estuarine Delta of Sinú River, located in the department of Cordoba, Republic of Colombia. (Ulloa - Delgado, 2015).

	Nesting years												
NESTING PARAMETERS	**2003**	**2004**	**2005**	**2006**	**207**	**208**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**TOTAL**
Superficial total areas	0	10	70	100	100	100	100	100	100	100	100	100	100
Tota Nest	0	15	47	35	37	40	37	36	40	34	41	32	394
Areas used	0	6	29	19	22	25	27	21	26	23	28	25	24,4
Rank of nests by platform	0	0-4	0-5	0-7	0-5	0-6	0-6	0-4	0-4	0-3	0-3	0-3	0-7
Natural nest	15	33	20	15	15	18	19	14	18	16	18	20	221
Total nest per year	15	47	67	50	58	58	56	50	60	50	59	52	616