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1.1 UPDATE OF THE ORIGINAL GAC SEIA CRITICAL HABITAT ASSESSMENT

This Critical Habitat Assessment (CHA) report is an update of the CHA report developed on behalf of GAC as part of GAC's Bauxite Export Project SEIA Addendum study. This update incorporates recommendations received from the International Finance Corporation´s (IFC) and the African Development Bank´s (AfDB) (together "the Lenders"), as well as their Independent Environmental and Social Consultant (IESC), D'Appolonia, as part of their review of the SEIA documentation, culminating at a workshop meeting held in Paris on the 21st November 2016.

Previous to development of version 02 and 03 of the CHA; and still of relevance to version 04 are the following considerations already discussed with the Lenders and the IESC:

- The DMU concept is difficult to apply to wide-ranging species encountered in the Project area, such as African vulture species, marine turtles, and some fish species. For such species, the CHA thus takes into consideration other factors to define the status of potential biodiversity CH triggers (e.g. identification of a "hotspot").

- A No Net Loss (NNL)[1] approach must be applied for the development of mitigation measures for potential CH species groups. Net Gain[2] will need to be applied to the biodiversity components that trigger CH, unless the Project demonstrates that it will not affect those biodiversity components.

1.2 SOURCES OF INFORMATION

At the onset of the 2014 social and environmental impact assessment addendum study, it was apparent that available biodiversity data, most of which had been collected during initial SEIA studies between 2004 and 2006, was fragmented and outdated. Such gasp were related to three basic features:

- **Presence/Absence** of a species within the area of analysis;
- When present, **distribution and abundance** of the species within the area of analysis; and

[1] No Net Loss (NNL) is defined in the International Finance Corporation's Performance Standard (IFC PS) 6 (paragraph 15) as the point at which project-related impacts on biodiversity are balanced by measures taken to avoid and minimize the project's impacts, to undertake on-site restoration and finally to offset significant residual impacts, if any, on an appropriate geographic scale (e.g., local, landscape-level, national, regional).

[2] Net Gain is defined by in IFC PS6 (paragraph 18) as additional conservation outcomes that can be achieved for the biodiversity values for which the critical habitat was designated. Net gains may be achieved through the development of a biodiversity offset and/or through the implementation of programs that could be implemented in situ (on-the-ground) to enhance habitat, and protect and conserve biodiversity.

- The **ecology** of a species (e.g. habitat/resource use within the area of analysis).

Additional baseline studies were carried out between 2014 and 2016 as part of GAC's SEIA addendum process, with a view to complying with Lenders standards. In order to support a Critical Habitat Assessment in line with IFC Performance Standard 6, these baseline studies have favoured the inclusion of specific biodiversity features within survey design in order to provide additional information in regards to the presence of species, their distribution in the area and habitat associations.

Furthermore, biodiversity baseline data available from surveys conducted by third parties, as part of separate mining Projects adjacent to the GAC concession, were used to support the analysis, and allow for a clearer definition of the main Critical habitat triggers that are found in the area of analysis. This includes information available from CBG's mining expansion project SEIA, as well as results from baseline surveys conducted by BHP Billiton in their Boffa Sentou concession area.

Finally, the results of the biodiversity surveys conducted by ERM in 2016 as part of the ESIA for the CFB rail extension Project are included in this assessment. The records of sensitive species during those surveys were added to the analysis (e.g. 2 specimens of *Hemidactylus kundaensis*). None of these species represent a new finding. As agreed with the IFC, the DMU does not include the entire rail area and the two DMUs initially considered in the previous versions on the CHA were kept (one for the mine, one for the port).

1.3 IFC CRITERIA

The term « critical habitat » is defined in Paragraph 16 of the 2012 version of IFC Performance Standard 6 (PS6) as areas with high biodiversity value. This includes areas that meet one or more of the following criteria (IFC Guidance Note 55)[1]:

[1] As per paragraph GN56 of IFC Guidance Note 6, the determination of critical habitat can include other recognized high biodiversity values, which should be evaluated on a case-by-case basis. Paragraph GN56 provides the following examples:

- areas required for the reintroduction of CR and EN species and refuge sites for these species (habitat used during periods of stress (e.g., flood, drought or fire);
- ecosystems of known special significance to EN or CR species for climate adaptation purposes;
- concentrations of Vulnerable (VU) species in cases where there is uncertainty regarding the listing, and the actual status of the species may be EN or CR;
- areas of primary/old-growth/pristine forests and/or other areas with especially high levels of species diversity;
- landscape and ecological processes (e.g., water catchments, areas critical to erosion control, disturbance regimes (e.g., fire, flood) required for maintaining critical habitat;
- habitat necessary for the survival of keystone species; and
- areas of high scientific value such as those containing concentrations of species new and/or little known to science.

- Criterion 1: Critically Endangered (CR)[1] and/or Endangered (EN) species;
- Criterion 2: Endemic and/or restricted-range species;
- Criterion 3: Migratory and/or congregatory species;
- Criterion 4: Highly threatened and/or unique ecosystems; and
- Criterion 5: Key evolutionary processes.

1.3.1 Critical habitat tiers

IFC Guidance Notes GN71 through GN89 detail « tiers » of critical habitat, based on relative vulnerability (degree of threat) and level of (ir)replaceability (rarity or uniqueness). For Criteria 1 to 3, quantitative thresholds are provided to assign critical habitat into either Tier 1 or Tier 2. *Table 1.1* details the relevant thresholds.

Table 1.1 Quantitative thresholds for Tiers 1 and 2 of critical habitat criteria 1 to 3

Criteria	Tier 1	Tier 2
1. Critically Endangered (CR)/ Endangered (EN) Species	(a) Habitat required to sustain ≥ 10 percent of the global population of a CR or EN species/subspecies where there are known, regular occurrences of the species and where that habitat could be considered a discrete management unit for that species. (b) Habitat with known, regular occurrences of CR or EN species where that habitat is one of 10 or fewer discrete management sites globally for that species.	(c) Habitat that supports the regular occurrence of a single individual of a CR species and/or habitat containing regionally- important concentrations of a Red-listed EN species where that habitat could be considered a discrete management unit for that species/ subspecies. (d) Habitat of significant importance to CR or EN species that are wide-ranging and/or whose population distribution is not well understood and where the loss of such a habitat could potentially impact the long-term survivability of the species. (e) As appropriate, habitat containing nationally/regionally important concentrations of an EN, CR or equivalent national/regional listing.
2. Endemic/ Restricted Range Species	(a) Habitat known to sustain ≥ 95 percent of the global population of an endemic or restricted-range species where that habitat could be considered a discrete management unit for that species (e.g., a single-site endemic).	(b) Habitat known to sustain ≥ 1 percent but < 95 percent of the global population of an endemic or restricted-range species where that habitat could be considered a discrete management unit for that species, where data are available and/or based on expert judgment.
3. Migratory/ Congregatory	(a) Habitat known to sustain, on a cyclical or otherwise	(b) Habitat known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent but

[1] Species conservation status acronyms refer to the definitions of the International Union for the Conservation of Nature and its Resources (IUCN): NT: Near threatened, VU: Vulnerable, EN: Endangered, CR: Critically endangered.

Criteria	Tier 1	Tier 2
Species	regular basis, ≥ 95 percent of the global population of a migratory or congregatory species at any point of the species' lifecycle where that habitat could be considered a discrete management unit for that species.	< 95 percent of the global population of a migratory or congregatory species at any point of the species' lifecycle and where that habitat could be considered a discrete management unit for that species, where adequate data are available and/or based on expert judgment. (c) For birds, habitat that meets Birdlife International's Criterion A4 for congregations and/or Ramsar Criteria 5 or 6 for Identifying Wetlands of International Importance. (d) For species with large but clumped distributions, a provisional threshold is set at ≥5 percent of the global population for both terrestrial and marine species. (e) Source sites that contribute ≥ 1 percent of the global population of recruits.

Source: IFC, 2012

These thresholds rely on the availability of estimates of species global/local population (either from published sources or obtainable by reasonable means through an in-field assessment in the case of the local population). Should this type of information not be available for any of the species under consideration, the client is expected to use expert opinion to determine the significance of the unit of analysis for CH determination with respect to the global population. Surrogates of population size (e.g., extent of occurrence, estimates of total area of known sites, estimates of area of occupied habitat) can aid in this process.

Criteria 1 through 3 are focused on species level, whilst Criteria 4 and 5 focus on ecosystem and landscape levels.

Criterion 4 is triggered by ecosystems that are threatened, house unique assemblages of biome-restricted species, or are recognized for high conservation value, including protected areas. No quantitative thresholds are indicated by the PS6 Guidance notes; nonetheless, quantitative categories and criteria from Rodriguez et al. (2011) may be applied to evaluate ecosystem status if data allows it.

Rodriguez et al. (2011) proposed a categorization of habitats following IUCN Red list species categories in: CR: Critically Endangered; EN: Endangered and VU: Vulnerable; based on a set of four criteria (and sub criteria) over which the analysis is conducted.

Criterion 5 applies to landscape-level features that can influence key evolutionary processes. Key landscape features such as unique topography that creates unique habitats and areas important for climate change adaptations have been identified using literature review and through expert consultation.

Criterion 5 also applies at the species level for "distinct species" which includes those coined as "Evolutionarily Distinct and Globally Endangered" (EDGE) *(GN 95 IFC 2012b).* Species within the unit of analysis identified as EDGE species will be evaluated for critical habitat on a case-by-case basis.

1.3.2 General methodology

Critical habitat was identified during the baseline development of the SEIA following IFC's three-step approach *(Paragraph 66, GN6; IFC 2012b).*

1. **Stakeholder Consultation and Initial Literature Review**. This was supplemented with consultation with relevant authorities, academic/scientific institutions, and other recognized external specialists (including Guinean specialists from Guinee Ecologie as well as International experts specialized in freshwater ecology and herpetology). In-field consultation and desktop research was undertaken to understand the biodiversity values present in the project area, identify existing conservation concerns, and identify gaps in existing knowledge.

2. **Field-survey data collection and verification of existing information**: Field data was collected to describe and map diversity, distribution, abundance and habitat associations of aquatic and terrestrial flora and fauna including species on conservation concern. Field surveys were conducted by fauna specialists over two seasons (i.e. dry and wet seasons).

3. **Critical Habitat determination**: Delineation of a spatial unit of analysis, screening of biodiversity features (i.e., at the species, ecosystem and landscape scales), and evaluation of the distribution of CH.

1.3.2.1 Specific methodology by criterion

Criterion 1: Critically Endangered and/or Endangered Species

Footnote 11 of the IFC Performance Standards 6 defines Critically Endangered and/or Endangered Species as those listed on the IUCN Red List of Threatened Species. With the definition of Critical habitat based on other listings being as follows:

i. If the species is listed nationally / regionally as critically endangered or endangered, in countries that have adhered to IUCN guidance, the critical habitat determination will be made on a project-by-project basis in consultation with competent professionals.

ii. In instances where nationally or regionally listed species' categorizations do not correspond well to those of the IUCN (e.g., some countries more generally list species as "protected" or "restricted"), an assessment is conducted to determine the rationale and purpose of the listing.

Section 6.7 (Terrestrial Biodiversity) of the SEIA Addendum (2015) identifies globally, nationally and regionally Critically Endangered and Endangered species that are likely to be present within the Project's Study Area.

The reported species for CH definition were listed with reference to the IUCN Red List of Threatened Species. On the national level, the corresponding Red Data Book of Guinea (*Monographie nationale sur la diversité biologique de la Guinée, 1997*) was not used in the screening process since it has been found that there is a lack of clarity in regards to what factors have been considered to assign a corresponding protection status (e.g. IUCN Least concern species being listed as « threatened »).

Criterion 2: Endemic and/or restricted-range species

IFC Guidance Notes GN79-80 provide the following definitions for Endemic and restricted-range species:

- An endemic species is defined as one that has ≥ 95% of its global range inside the country or region of analysis.
- Restricted-range species:
- For terrestrial vertebrates, a restricted-range species is defined as those species which have an extent of occurrence of 50,000 km^2 or less.
- For marine systems, restricted-range species are provisionally being considered those with an extent of occurrence of 100,000 km^2 or less.
- For freshwater systems, standardized thresholds have not been set at the global level. However, an IUCN study of African freshwater biodiversity determined thresholds of 20,000 km^2 for crabs, fish, and molluscs and 50,000 km^2 for odonates. These can be taken as approximate guidance values, although the extent to which they are applicable to other taxa and in other regions is not yet known.
- For plants, restricted-range species may be listed as part of national legislation. Plants are more commonly referred to as "endemic" and the definition provided in paragraph GN79 would apply.

Species listed in *Section 6.7* of the SEIA Addendum (2015) report were screened to identify whether they met the definition of either endemic and / or range-restricted species. This was completed with reference to published sources and in liaison with Guinean experts.

Criterion 3: Migratory and Congregatory Species

IFC Guidance Notes GN85-86 define migratory and congregatory species in the following way:

- Migratory species: Any species of which a significant proportion of its members cyclically and predictably move from one geographical area to another (including within the same ecosystem).

- Congregatory species:
    - Species whose individuals gather in large groups on a cyclical or otherwise regular and/or predictable basis.
    - Species that form colonies.
    - Species that form colonies for breeding purposes and/or where large numbers of individuals of a species gather at the same time for non-breeding purposes (e.g., foraging, roosting).
    - Species that move through bottleneck sites where significant numbers of individuals of a species pass over a concentrated period of time (e.g., during migration).
    - Species with large but clumped distributions where a large number of individuals may be concentrated in a single or a few sites while the rest of the species is largely dispersed (e.g., wildebeest distributions).
    - Source populations where certain sites hold populations of species that make an inordinate contribution to recruitment of the species elsewhere (especially important for marine species).

Species listed in *Section 6.7* of the SEIA Addendum (2015) report were screened to identify whether they meet one of the definitions of migratory, congregatory or resident species. This was completed with reference to published sources and in liaison with local experts. For birds, habitat that meets Birdlife International's Criterion A4 for congregations would meet the Tier 2 classification for critical habitat.

Criterion 4: Highly Threatened and/or Unique Ecosystems

IFC Guidance Note GN90 defines highly threatened or unique ecosystems as:

- at risk of significantly decreasing area or quality;
- with a small spatial extent; and/or
- containing unique assemblages of species including assemblages or concentrations of biome-restricted species (i.e. species whose distributions are largely or wholly confined to one biome).

Rodriguez et al. (2011) propose the assignment of levels of threat to ecosystems at local, regional, and global levels (such as those used for species by IUCN) based on four main criteria:

A. short-term decline in distribution or function (over 50 years);
B. long-term decline in distribution or function (over 500 years);
C. small current distribution and decline (in distribution or ecological function) or very few locations; and

D. very small current distribution.

Considering that there is insufficient information with regards to evidences of historical decline, Criterion B has not been assessed. Only criteria A, C and D where used as qualitative aids for the assessment of critical habitat, since criteria and sub criteria require quantitative estimations as a minimum, which are not available. Furthermore, the habitat map produced only covers the southern section of the GAC concession *(Figure 6.54* of the SEIA Addendum, 2015*)*, not the complete DMU *(Figure 6.119* of the SEIA Addendum, 2015*)*, which further limits the analysis.

Criterion 5: Key Evolutionary Processes

Evolutionary processes are often strongly influenced by structural attributes of a region, such as its topography, geology, soil and climate over a period of time. IFC Guidance Note GN95 suggests that this criterion is defined by:

- the physical features of a landscape that might be associated with particular evolutionary processes; and/or

- sub-populations of species that are phylogenetically or morphogenetically distinct and may be of special conservation concern given their distinct evolutionary history (i.e. EDGE species or Evolutionary Significant Units at population level).

Guidance Note GN96 also provides the following examples of spatial features that are associated with evolutionary processes:

- level of isolation (e.g., islands, mountaintops, lakes are associated with populations that are phylogenetically distinct);
- extent of endemism (areas of high endemism often contain flora and/or fauna with unique evolutionary histories);
- spatial heterogeneity;
- presence of environmental gradients (ecotones produce transitional habitat which has been associated with the process of speciation and high species and genetic diversity);
- edaphic interfaces; and
- connectivity between habitats (e.g., biological corridors).

Criterion 5 is usually considered to be heavily reliant on scientific knowledge, and thus would be triggered in areas that have already been investigated or where significant research has been conducted that may have already indicated the potential or existence of unique evolutionary processes. Measurements and methods to identify evolutionary processes exist, but are usually out of the scope of EIA studies; therefore, the presence of such processes has been screened according to available information.

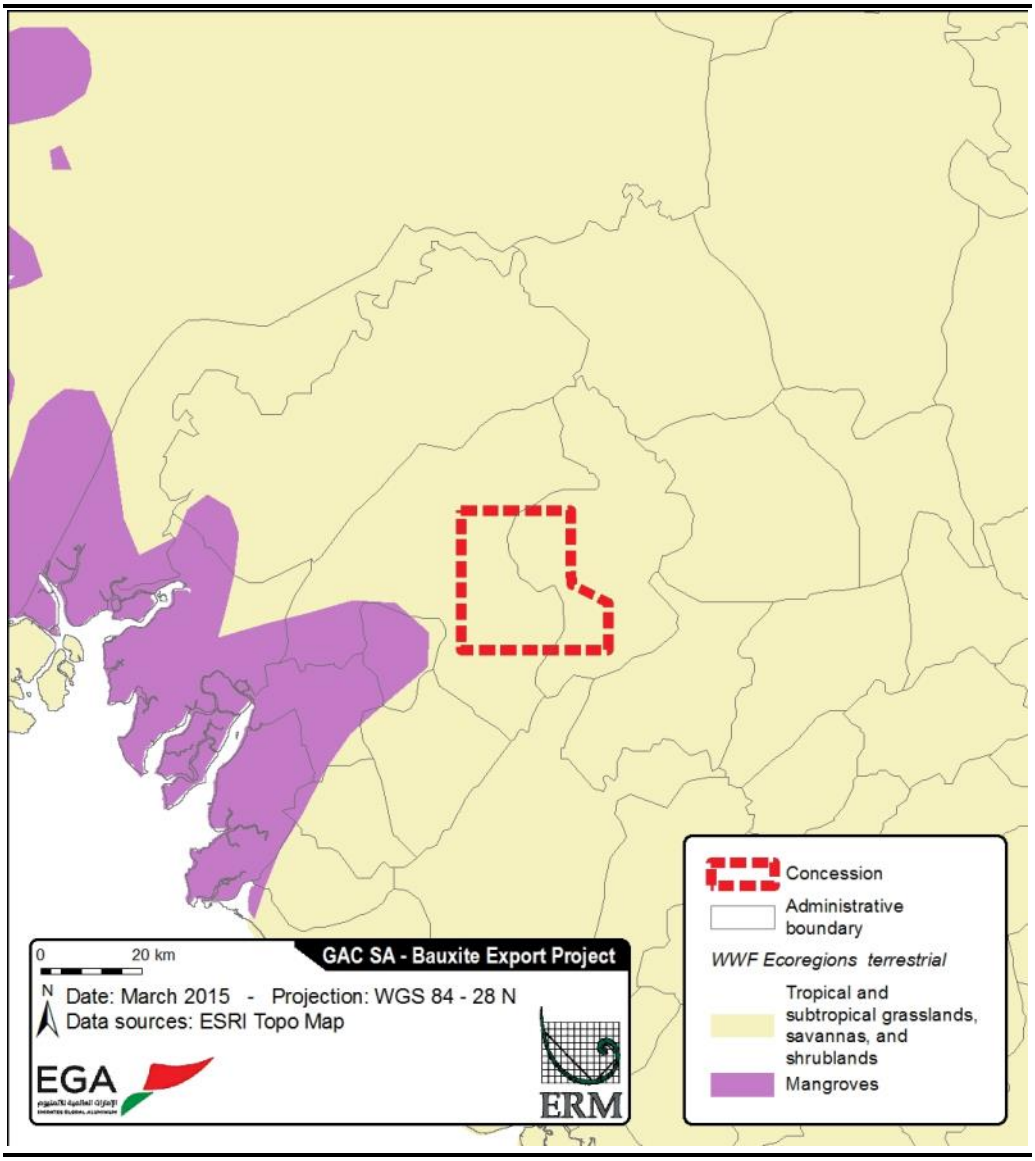
1.4 TERRESTRIAL UNIT OF ANALYSIS FOR CH DETERMINATION

The scale at which a critical habitat determination takes places depends on underlying ecological processes for the habitat in question and is not limited to the footprint of the project. IFC's PS6 Guidance Note GN65 states that for Criteria 1-3, the determination of critical habitat should be based on a « discrete management unit » (DMU) which is an area that has a definable boundary within which the biological communities have more in common with each other than they do with those outside the boundary:

« *A discrete management unit may or may not have an actual management boundary (e.g., legally protected areas, World Heritage sites, KBAs, IBAs, community reserves) but could also be defined by some other sensitive ecologically definable boundary (e.g., watershed, interfluvial zone, intact forest patch within patchy modified habitat, seagrass habitat, coral reef, concentrated upwelling area, etc.). The delineation of the management unit will depend on the species (and, at times, subspecies) of concern* ».

Figure 1.1 shows that the GAC concession lies among the Tanéné and Sangarédi sub-prefectures (within the Boké Préfecture). The whole of the concession is within the Guinean forest-savanna mosaic ecoregion, and the various habitats identified within the concession are also found throughout West Africa (i.e. Bowal, Gallery forest, Wooded/shrub savannah, etc.).

Figure 1.1 ***Location of GAC concession in relation to terrestrial ecoregions and administrative boundaries***



Source: Olsen et al. (2011), adapted by ERM (2015)

Taking into account ecological features of the main species of relevance found within the concession (e.g. home ranges, extent of occurrence and identified areas of occupancy); identified landscapes and other physical/political features such as surface hydrology and administrative boundaries, a DMU was defined to contain the following:

I. An extension of the main ecoregion found within the Projects area of influence (i.e. Guinean forest-savanna mosaic present on GAC concession; see *Section 6.8.2* of the SEIA Addendum, 2015).
II. A mixture of the main Landscape Characteristic Units present within the Projects area of influence (i.e. LCU2 and LCU4; see *Section 6.7* of the SEIA Addendum, 2015).
III. The presence of other mining concessions within the DMU´s limits (e.g. CBG to the east).

IV. An extension of the habitats defined at GAC concession level (see *Section 6.8.2* of the SEIA Addendum, 2015).
V. The presence of relevant species (e.g. within potential CH trigger species range).
VI. The main watersheds identified within the GAC concession.
VII. Be delimited by Administrative boundaries (i.e. Boké Prefecture and its sub-prefectures).
VIII. Within range of direct/indirect project impacts (e.g. consider species displacements).

The definition of the DMU only accounts for the mine area; in regards to the marine port/terminal area, a separate analysis has been undertaken (refer to *Section 1.5* of this report).

The proposed Terrestrial DMU is defined by the boundary limits of the Tanéné and Sangarédi Sub-prefectures (Boké Préfecture). The extension of the DMU is considered appropriate considering these main features:

- Contains an extension of the habitats found within the concession (*note: western section of Tanéné Sub-prefecture containing Guinean Mangroves has not been considered*).
- Overlaps with known species distributions, furthermore survey results enlarge previously known areas of occupancy/range for certain species.
- Most species under review have limited home ranges.
- Impacts over fauna will likely extend beyond the concession, depending on nature of impacts and relevant species.
- The selected administrative boundaries minimally encompass (to varying degrees) all other relevant features.

Figure 1.2 *Relevant screening features for the determination of the terrestrial Discrete Management Unit*

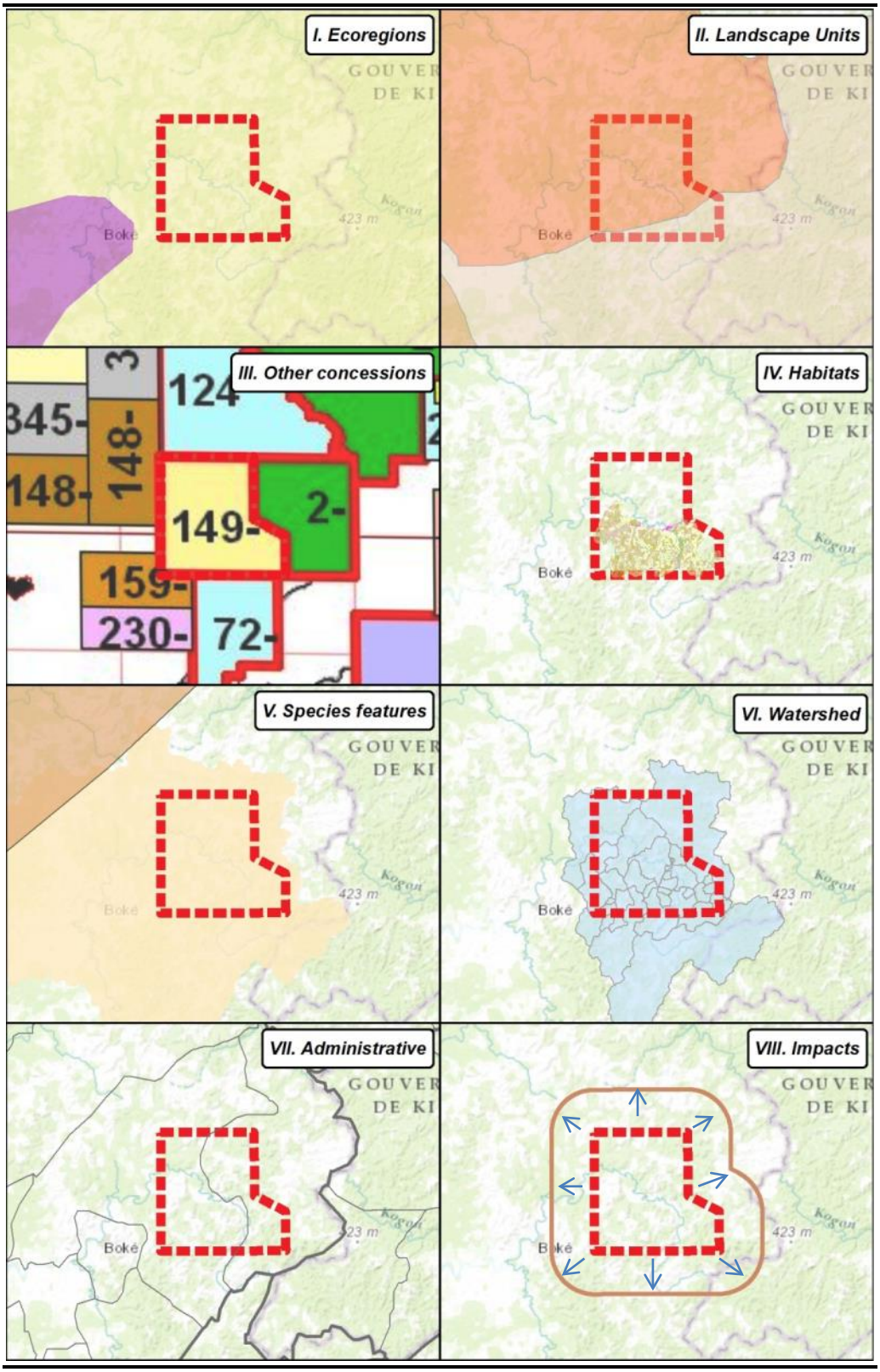
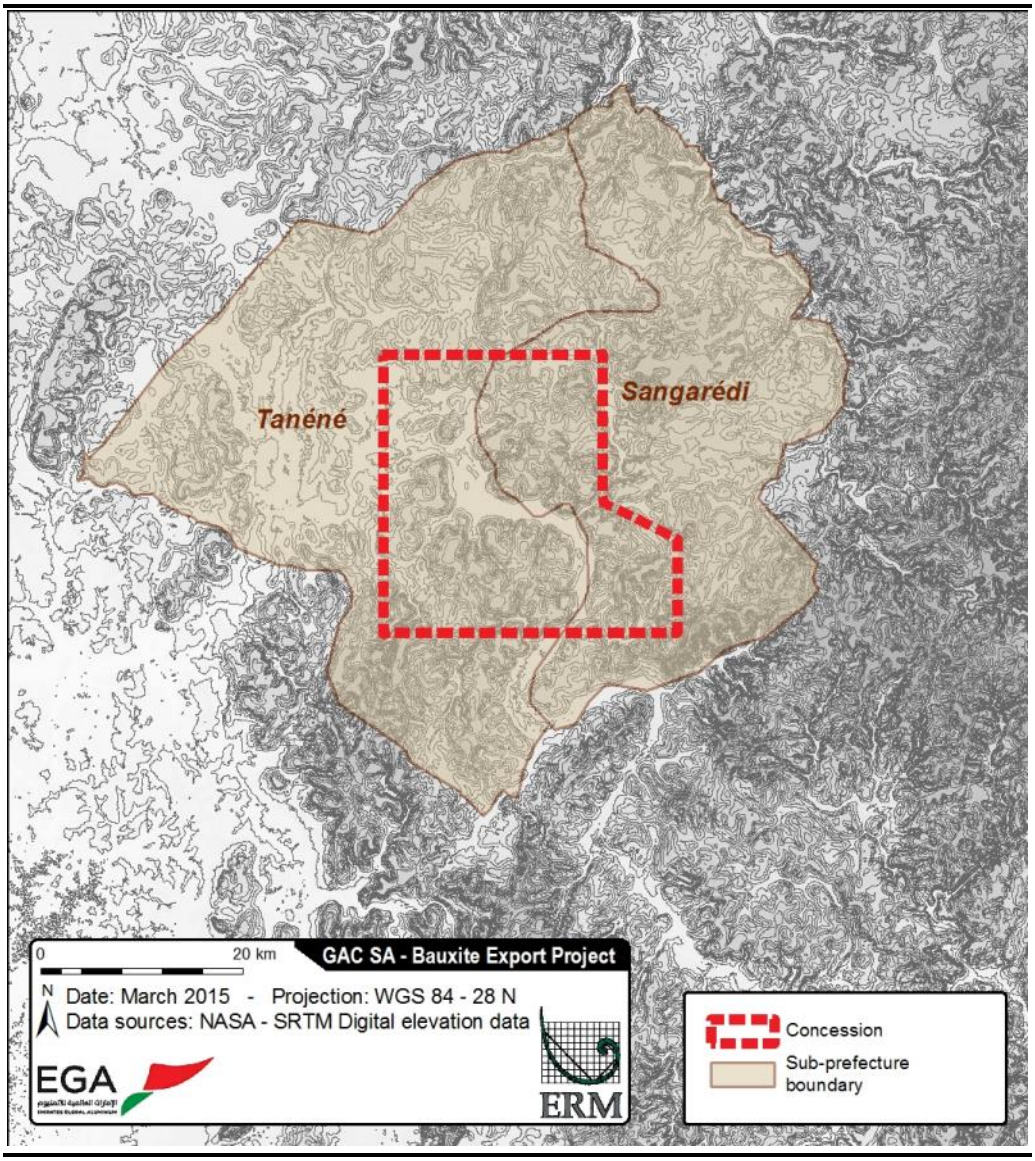


Figure 1.3 Selected DMU for the critical habitat Determination



1.4.1 Terrestrial critical habitat determination

1.4.1.1 Criteria 1 and 2

Species identified in *Section 6.7* (Terrestrial Biodiversity) of the SEIA Addendum (2015) as being likely to be present within the GAC Concession - Terrestrial DMU have been screened in order to identify those that are classified as Critically Endangered or Endangered according to IUCN designations (i.e. globally threatened), as well as their endemicity/range restriction. *Table 1.2* shows the species identified.

Table 1.2 IUCN Red list terrestrial species and status

Class - *species*	Common name	Red List status	Guinean status	Endemic to UGBP (1)	Range restricted (2)
Mammalia					
Pan troglodytes verus	Western Chimpanzee	CR	Menacé (threatened)	Yes	No
Piliocolobus temminckii	Temminck's Red Colobus	EN	Menacé (threatened)	Yes	Probable
Aves					
Necrosyrtes monachus	Hooded vulture	CR	-	No	No
Gyps africanus	White backed vulture	CR	-	No	No
Gyps rueppelli	Rüppel's vulture	CR	-	No	No
Amphibia					
Phrynobatrachus pintoi	Pinto's River frog	EN	-	Yes	Probable
Arthroleptis formosus	Beautiful Squeaker frog	DD	-	Yes	Probable
Reptilia					
Hemidactylus kundaensis	Half-toed Gecko	CR	-	Yes	Probable
Cynisca oligopholis	Cassine River Worm Lizard	EN	-	Yes	Probable
Cynisca leonina	Los Archipelago Worm Lizard	VU	-	Yes	Probable
Crustacea-Malacostraca					
Afrithelphusa monodosa	Purple marsh crab	EN	-	Yes	Probable
Chordata sub class: Actinopterygii)					
Paramphilius teugelsi	Loach Catfish	VU	-	Yes	Probable
Paramphilius trichomycteroides	Loach Catfish	NT	-	Yes	Probable
Malapterurus teugelsi	Electric Catfish	NT	-	Yes	Probable
Petrocephalus levequei	Elephantfish	NT	-	Yes	Probable
Plantae – Tracheophyta - Magnoliopsida					
Fleurydora felicis	n.a.	VU	-	Yes	Probable
Ledermanniella abbayesii	n.a.	DD	-	Yes	Probable

(1): Upper Guinean BioPovince (along the Atlantic coast of Africa approx. from southwestern Gambia to Eastern Ghana – A. Takhtajan classification)
(2): As per GN80, a restricted-range species has an extent occurrence (EOO) of 50,000 km² or less for terrestrial vertebrates, 100,000 km² or less for marine species, 20,000 km² or less for freshwater crabs and fish. Plants are more commonly referred to as "endemic". For many of these species, it is difficult to estimate if they are actually restricted-range because little information are available and few studies have been conducted on them (especially freshwater fish, reptiles, amphibians).

Pan troglodytes verus

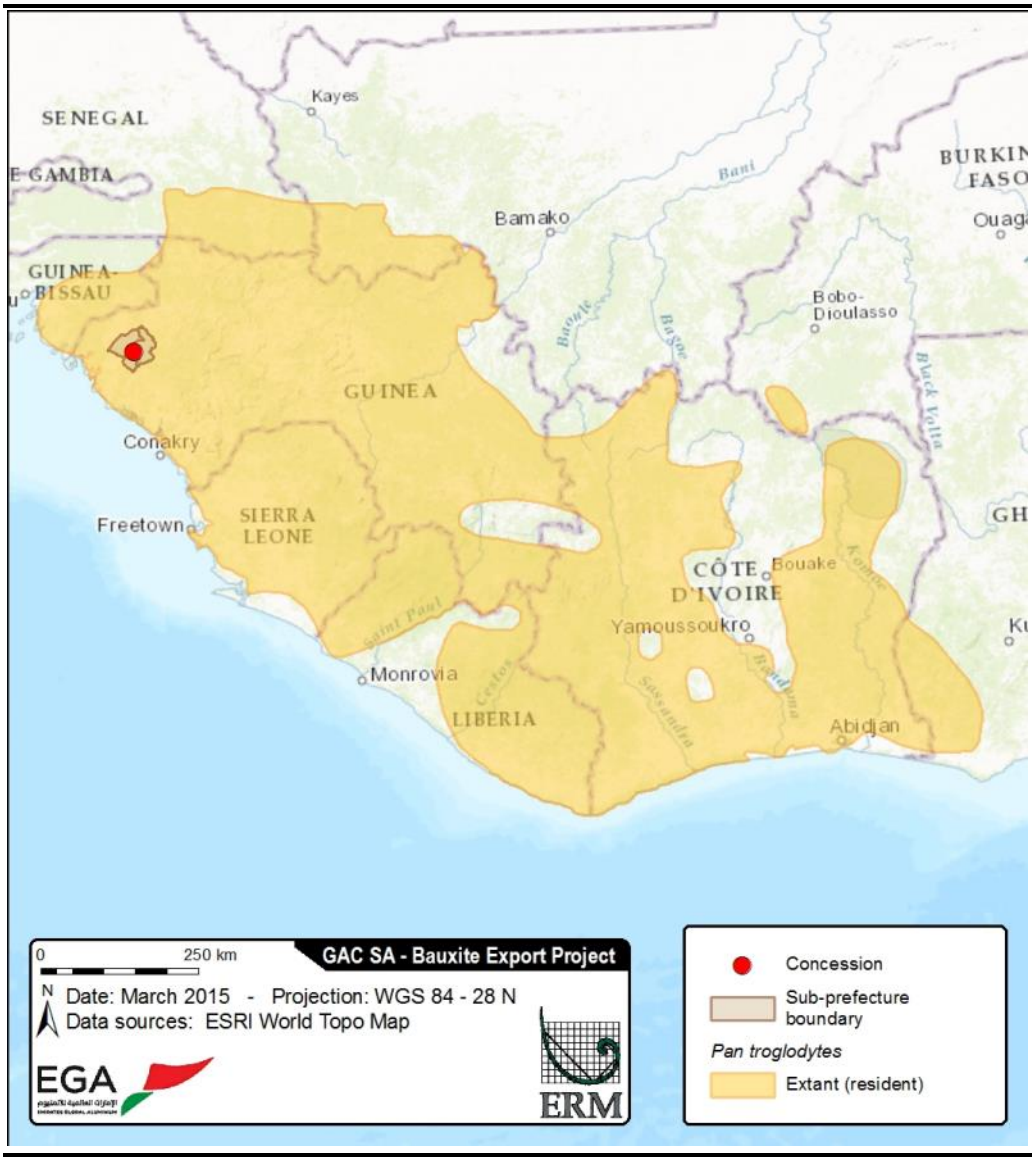
The common Chimpanzee *P. troglodytes* is located throughout West and Central Africa, where the distinct subspecies *P. troglodytes verus* is present in

West Africa and thus within the DMU. WCF has been actively monitoring the GAC concession for almost 4 years, as well as other areas of Guinea; up to 11 areas (that may represent other Chimpanzee DMU's) have been surveyed (see *Figure 6.74* in Terrestrial Biodiversity section).

The *verus* subspecies is patchily distributed in West Africa, with a maximum population estimated at 35,000 individuals in 2015 (Sop *et al*, in prep.). The highest number of individuals is estimated to be found in Guinea (*Kormos et al.*, 2003), which accounts for close to 34% of the total range (*ARCOS, 2013*). Chimpanzees are found predominantly in moist and dry forests, and forest galleries extending into savannah woodlands (*Oates et al., 2008a*). Specific observations from the GAC baseline indicate that they may also be present in fallow lands where slash and burn agriculture has occurred. Chimpanzee home ranges have been found to be larger in woodland forest mosaics than in mixed forests; averaging 10-40 km² (actual values may range between 5 to 400 km²). Considering the situation of habitat distribution in the southern section of the GAC concession, it would be expected that such ranges may be relatively smaller within the DMU (i.e. presence of mixed forest communities).

Utilizing the identified DMU, the habitats contained within it have been shown to be used by Chimpanzee populations inhabiting the concession, being assumed that the same would hold true for adjacent habitats found beyond the GAC concession limits (e.g. gallery forest, wood savannah). Considering that the distribution of *P.t. verus* throughout its range is largely unknown, the relevant critical habitat designation under criteria 1 would be of a Tier 2 CH. Nonetheless, Guidance note GN20 footnote of PS6 states that: "*In terms of the definition of Tier 1 habitat, special consideration might be given to some wide-ranging, large EN and CR mammals that would rarely trigger Tier 1 thresholds given the application of the discrete management unit concept. For example, special consideration should be given to great apes (i.e. Family Hominidae) given their anthropological and evolutionary significance. Where populations of CR and EN great apes exist, a Tier 1 critical habitat designation is probable, regardless of the DMU concept*". Thus, the DMU is qualified as a Tier 1 Critical Habitat, given the regular occurrence of this species within the DMU.

Figure 1.4 Pan troglodytes verus range in relation to DMU



Piliocolobus temminckii

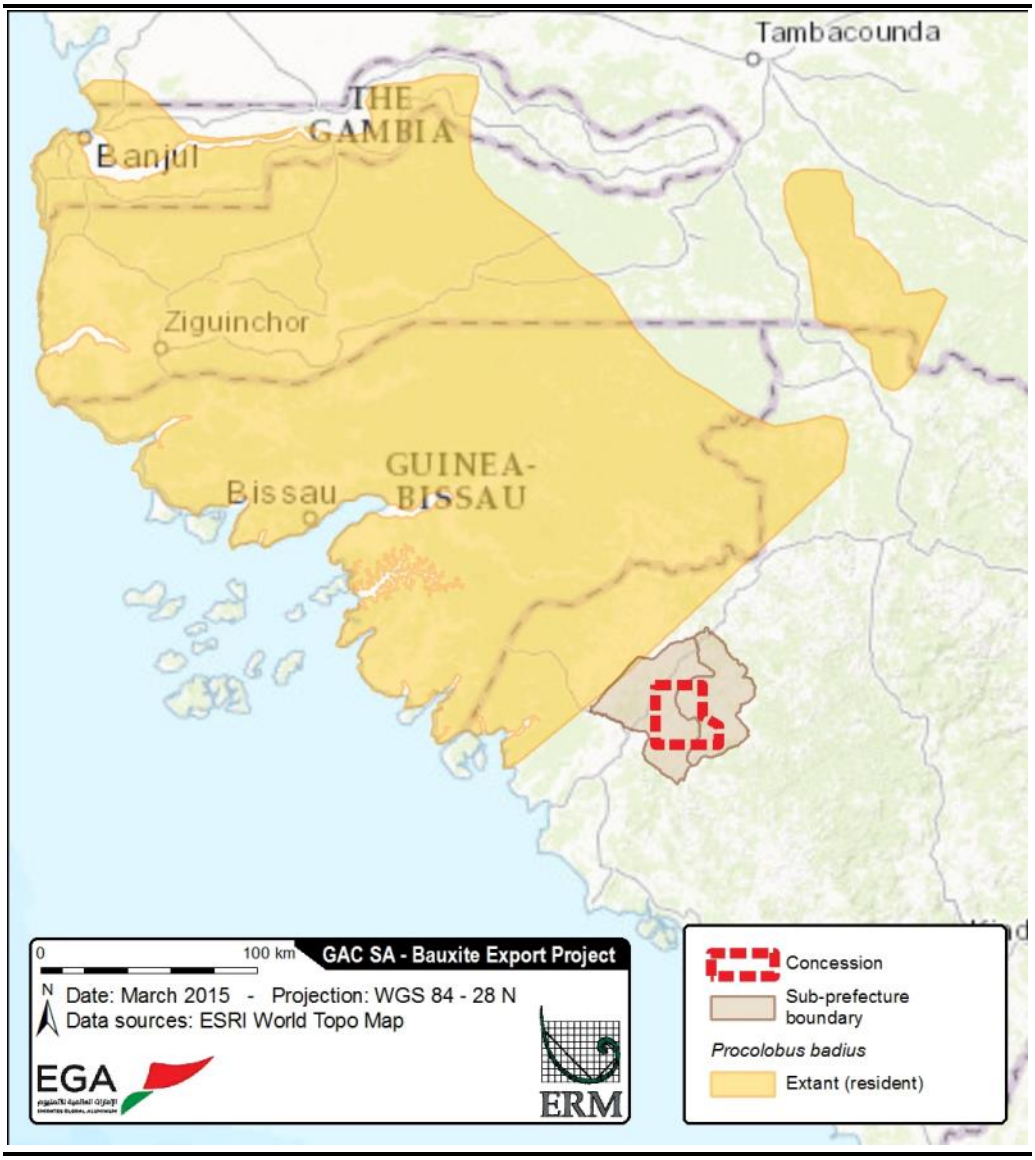
The Temminck's Red Colobus was formerly a subspecies of *Piliocolobus badius* which included *badius*, *temminckii* and *waldronae* as subspecies. The subspecies are now considered as distinct species[1]. The species is known to be occurring from North West Guinea to Gambia. Though it has been recorded in the Fouta-Djallon region in Guinea (*Oates, 2008b*), no recent records have confirmed it. Though actual range maps practically do not overlay with either the DMU or the GAC concession, photographic evidence of one individual in January 2013 in the northern section of the GAC concession and further findings of individuals along the northern edge of the CBG Mine expansion suggest that the proposed southern border of their range may be too restrictive (*Figure 1.5*). The DMU may constitute nevertheless viable habitat for

[1] http://www.iucnredlist.org/details/18247/0

this species given the widespread existence of forest savannah agricultural mosaic to which the Red Colobus has grown accustomed to (*Galat-Luong and Galat, 2005*), even though they have a preference for closed forests (e.g. such as the gallery forest area where it was photographed).

Taking into consideration the confirmed presence of a limited number of individuals within the DMU, there may potentially be higher numbers of this species within and outside the GAC concession and proposed DMU, hence it is considered under a precautionary approach that it triggers critical habitat under Criterion 1, Tier 2.

Figure 1.5 Piliocolobus badius range in relation to DMU



Necrosyrtes monachus, Gyps africanus and Gyps rueppelli

These three vulture species have similar ranges, being considered widespread along sub-Saharan Africa (*Figure 1.6* and *Figure 1.7 and* Figure 1.8).

The Hooded Vulture (*N. monachus*) is considered generally sedentary, with some dispersal of non-breeder/immature birds and movements in response to rainfall in the Sahel West Africa (*Ferguson-Lees and Christie, 2001*). *Rondeau et al. (2008)* reported that healthy vulture populations were present in Guinea, and recent survey results showed that Hooded Vultures were the most commonly occurring vulture; being predominantly found in towns (according to *EEM (2014)* some 30 recurring individuals where found near Sangarédi) and rural areas. *Birdlife (2015)* estimates this species' population to number a maximum of 197,000 individuals. Considering that Hooded Vultures are a wide ranging species, their association with anthropogenic environments, and the difficulty of identifying a sensible DMU for the species; it is not considered a Critical Habitat trigger under this assessment. Nonetheless, mitigation measures will be required to demonstrate No Net Loss (NNL) for this species.

The White-backed Vulture (*G. africanus*) is the most widespread and common vulture in Africa. *Rondeau et al. (2008)* characterized it, like *N. monachus,* as an abundant species in their nationwide road survey (Guinea), being seen mostly in rural areas and towns. *Birdlife (2015)* estimates this species' population to number a maximum of 270,000 individuals. Considering that White-backed Vultures are a wide ranging species, their association with anthropogenic environments, and the difficulty of identifying a sensible DMU for the species, it is not considered a Critical Habitat trigger under this assessment. Nonetheless, mitigation measures will be required to demonstrate NNL for this species.

The Rüppell's Vulture (*G. rueppelli*) occurs throughout the Sahel region of Africa. *Mundy et al. (1992)* estimated a population of the order of 11,000 pairs, with 2,000 for West Africa. Nonetheless, extremely rapid population declines mean that the population may likely be much lower throughout its range. It frequents open areas of Acacia woodland, grassland and montane regions, and it is gregarious, congregating at carrion, soaring together in flocks and breeding mainly in colonies on cliff faces and escarpments (*Birdlife, 2015*). This species has not been identified within the GAC concession. Nonetheless during CBG surveys three individuals were observed near a village (*EEM, 2014*). Considering that Rüppell's Vultures are a wide ranging species, their association with anthropogenic environments, and the difficulty of identifying a sensible DMU for the species, it is not considered a Critical Habitat trigger under this assessment. Nonetheless, mitigation measures will be required to demonstrate NNL for this species.

Figure 1.6 Necrosyrtes monachus range in relation to DMU

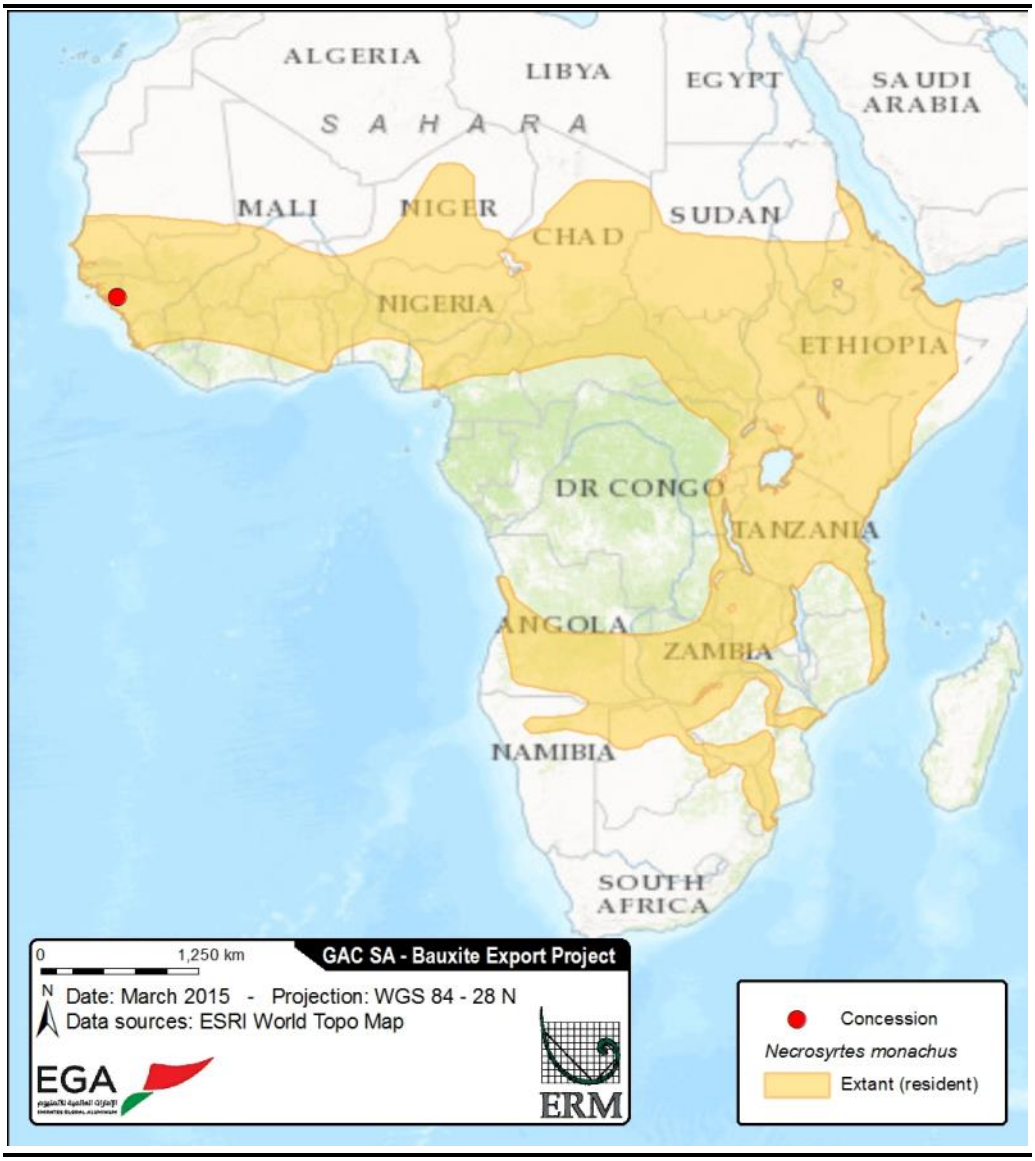


Figure 1.7 Gyps africanus range in relation to DMU

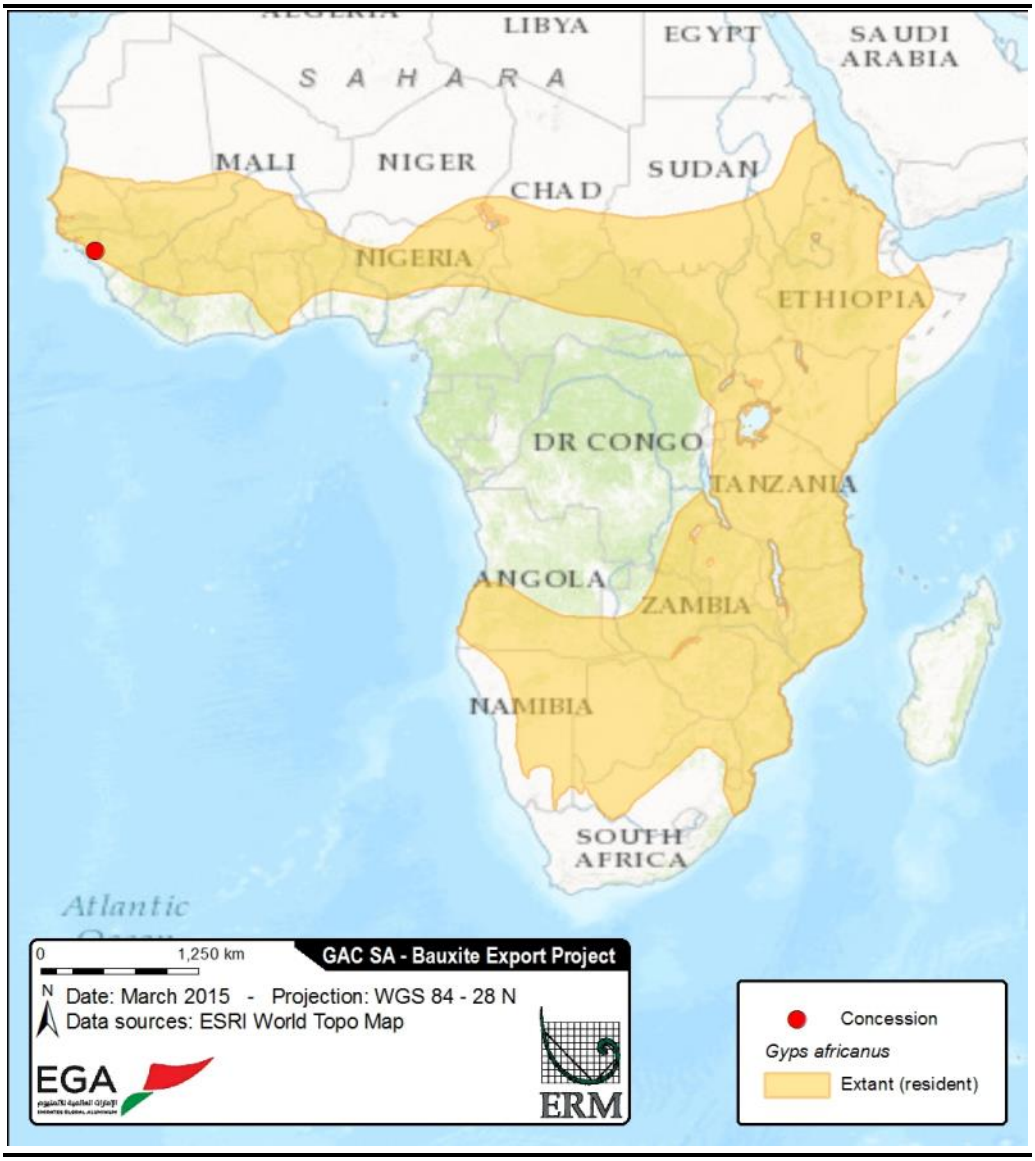
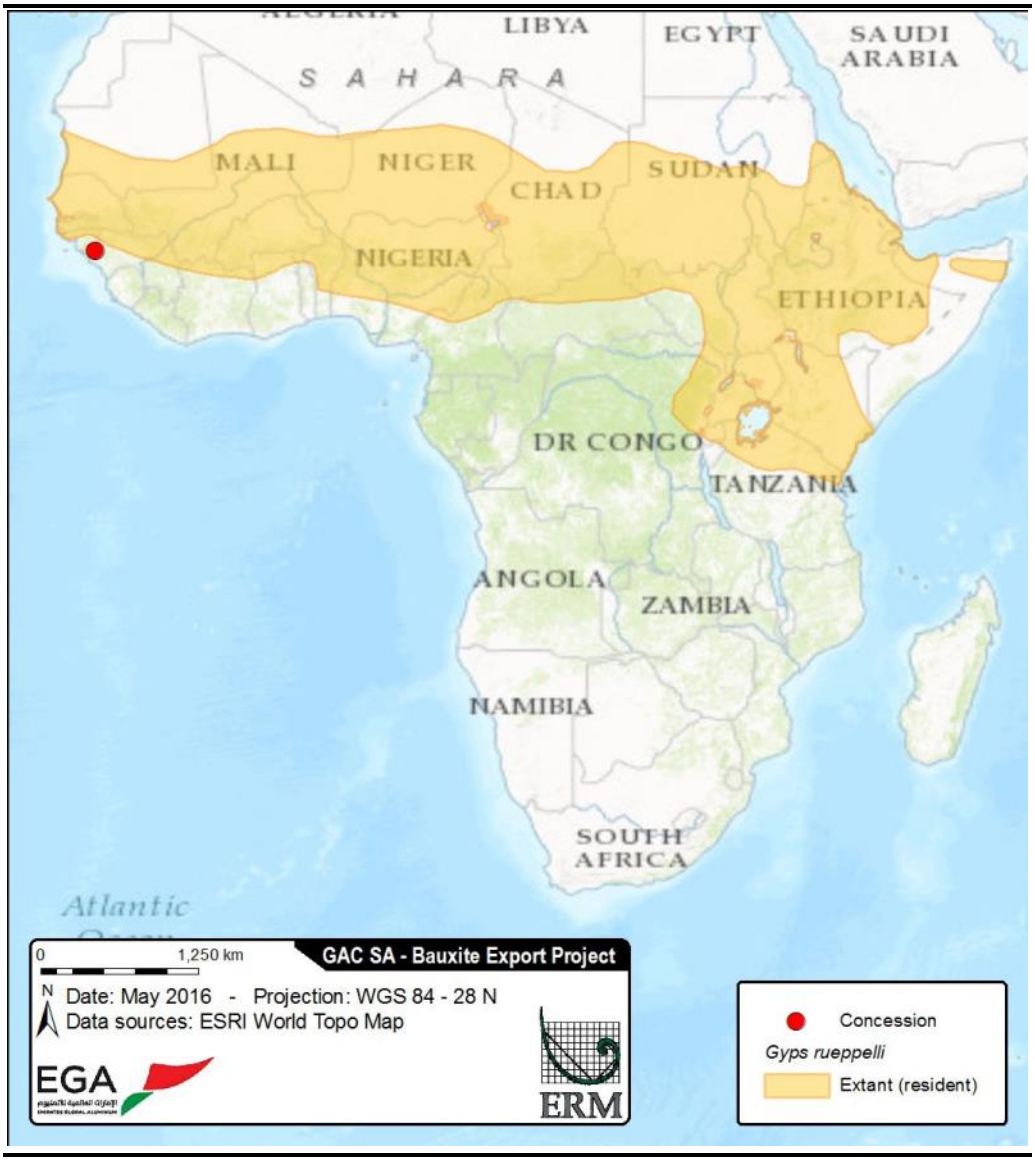


Figure 1.8 Gyps rueppelli range in relation to DMU



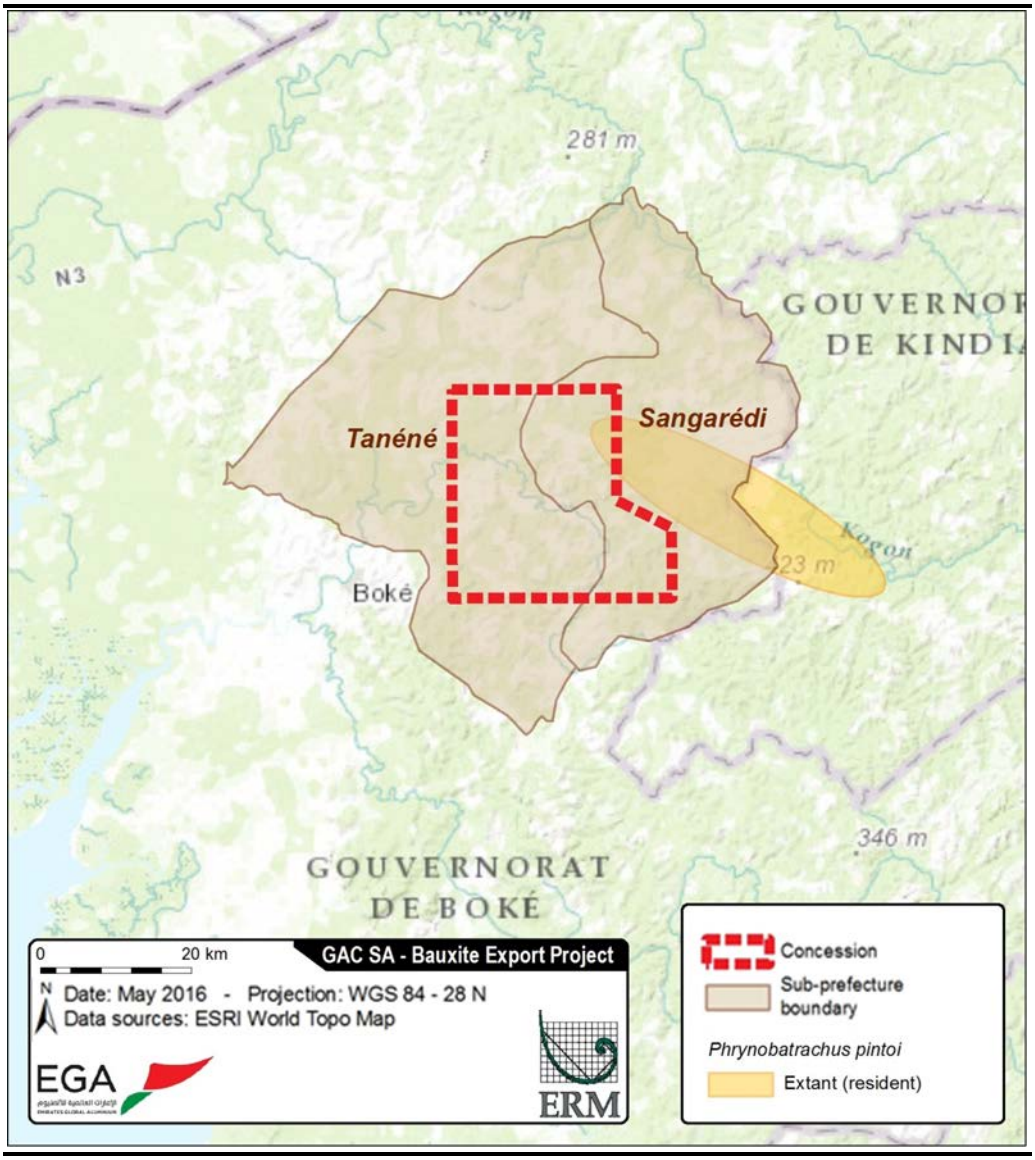
Phrynobatrachus pintoi

This frog species has an estimated 386 km² extent of occurrence (EOO); defined from only one threat-defined location, comprising four sites of small forest patches with savanna, one site located in Sangarédi (Kéwéwol/Boulléré) and three sites located in the Télimélé sub-prefecture. It has been found in areas of dry gallery forest surrounded by grass and tree savanna. It is possible that this species spends the dry season in forest, and the rainy season in savanna (*Rödel et al, 2011a*), presumably breeding in water bodies. *IUCN (2014)* indicates that the population trend is unknown.

The DMU contains suitable habitat for this species and subsequent studies have found additional evidence of the presence of this species (*P. pintoi* was also identified in two areas in the northern section of the BSH Project concession which may further extend its known distribution range, whilst *EEM (2014)* found eight individuals within gallery forests of Kouarewel and

N'Dounssy during the CBG ESIA surveys). The DMU is thus assessed as a Tier 2 Critical Habitat (Criterion 1(d) and 2(b)) for this species.

Figure 1.9 ***Phrynobatrachus pintoi range in relation to DMU***

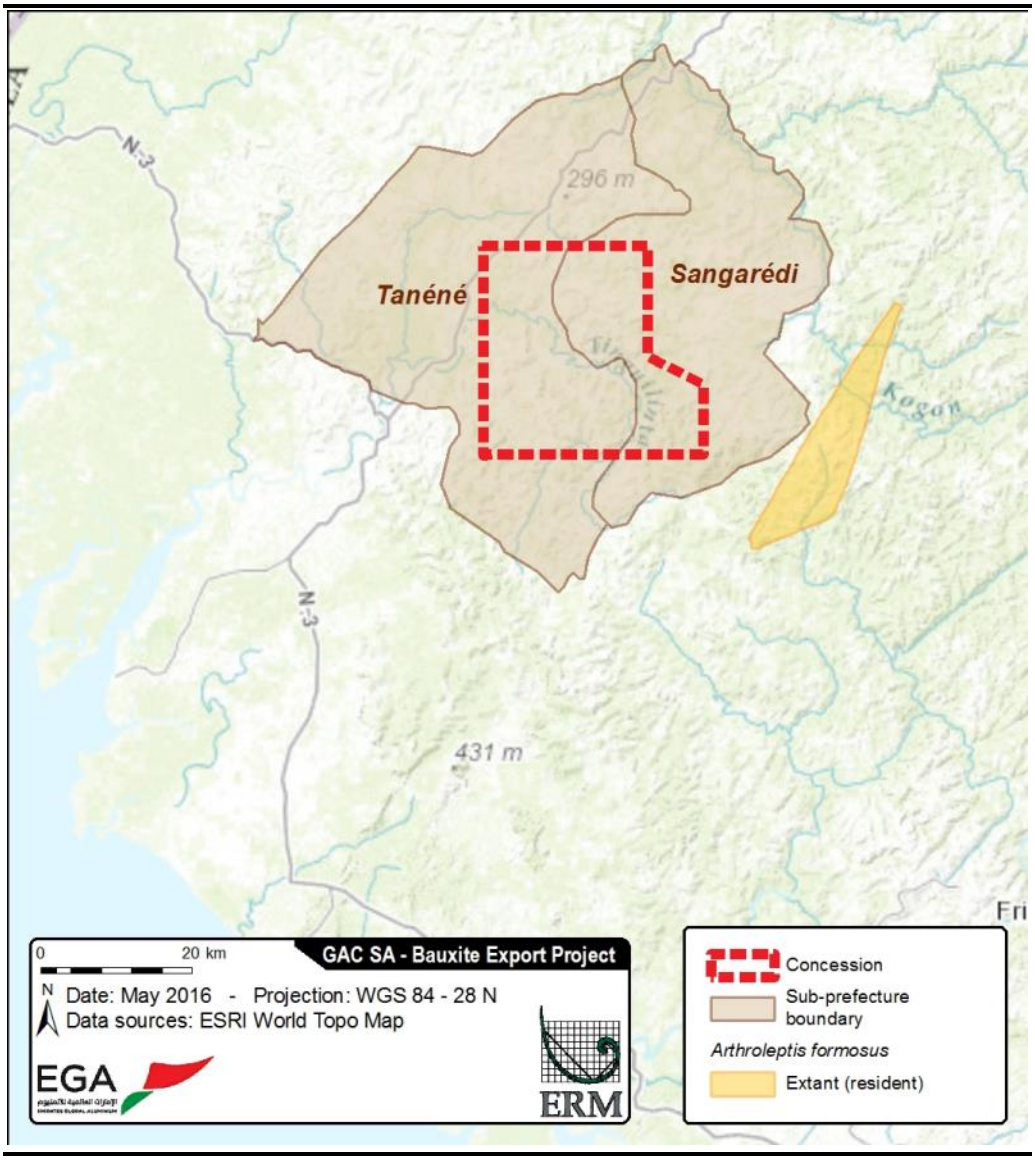


Arthroleptis formosus

This species is known from four sites in the Télimélé region, western Guinea; however, it is thought to occur more widely (*Rödel et al. 2011b; IUCN, 2013)*). It has been found associated to lowland gallery forests with small rivers and humid grass and tree savannas, with individuals having been found in grasses on rocky ground, on rocks and on dead wood. The species is thought to move between these two habitat types (*Rödel et al. 2011b*). The species was further recorded in the 2010 survey for the BHP concession (east of CBG/GAC), and most recently found during the CBG 2015 surveys in a headwater spring near Kagnaka *(EEM, 2016)*. During the latter survey an additional *Arthroleptis* sp. specimen was found, which might be a new species.

The DMU is thus assessed as a Tier 2 Critical Habitat (Criterion 1(d) and 2(b)) for this species under a precautionary approach.

Figure 1.10 Arthroleptis formosus range in relation to DMU



Hemidactylus kundaensis

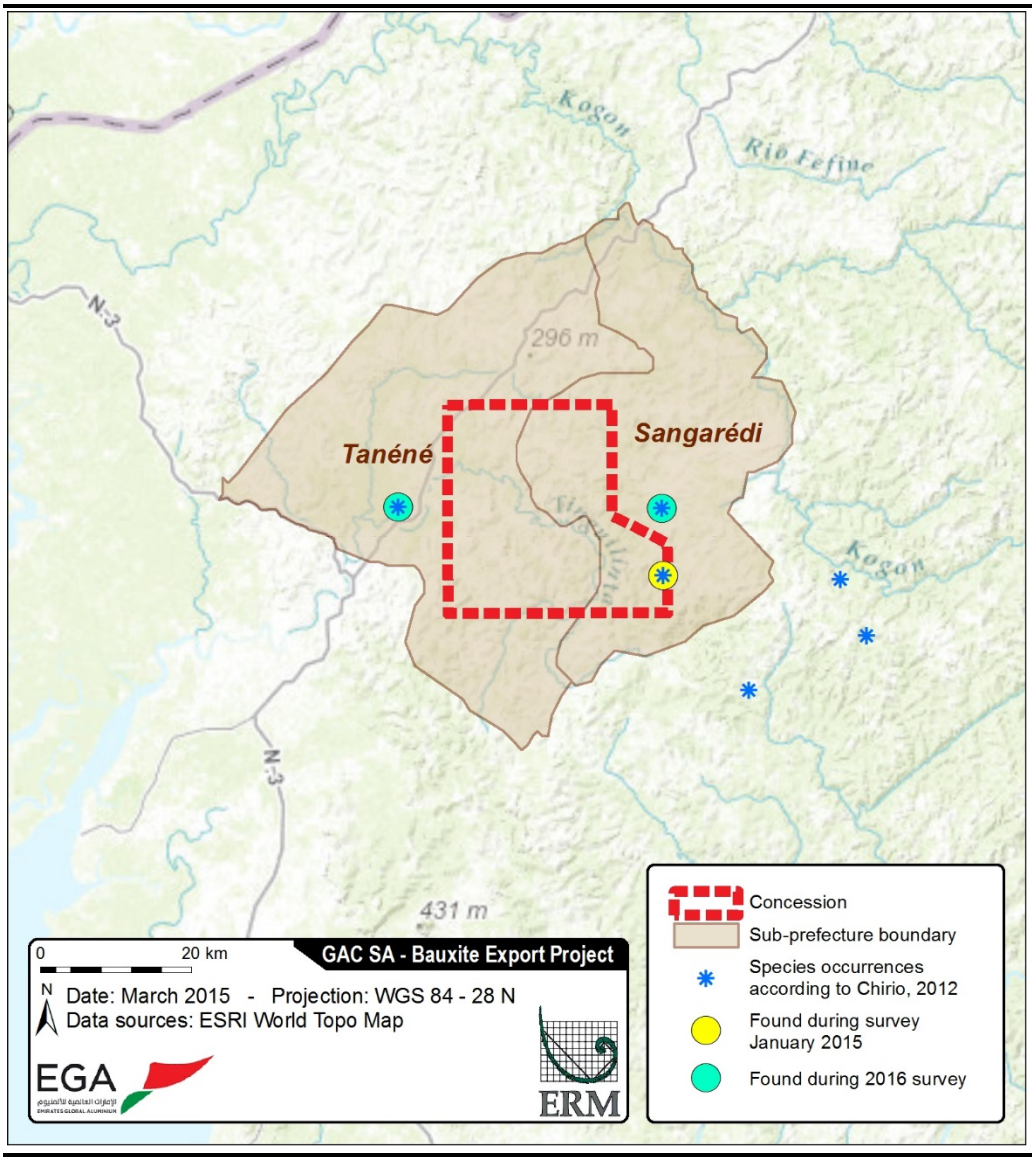
Chirio (2013a) indicates that although this species has been described only recently and is still poorly known, it is listed as Critically Endangered on the basis that it appears to have a restricted distribution range (area of occupancy possibly as low as 10 km² based on the extent of suitable habitat within its range) and highly specific habitat requirements of relic forest that is nowadays highly fragmented, and thus its population may also be fragmented (see *Figure 1.11*).

This gecko species was found at four localities on the forest reliefs of the Fouta Djallon mountains in northwest Guinea in plateau areas with herbaceous vegetation, alternating with wooded savannah (*Trape et al., 2012*). It appears to

be reliant on dry forest (*L. Chirio, pers. comm. 2012*) in areas with small hills, and may consequently be highly localized and reliant on dry forest habitat. The forests where this species occurs are locally considered sacred forest (*Chirio, 2013a*); which may correspond to the forest patches within the savannah identified within the GAC concession. *Chirio (2013a)* indicates that the population trend for this species is unknown. One individual was found during the 2015 field survey in the southern section of the concession (yellow marked), it has also been found in Kourawel in 2013 in dry forests (*EEM, 2014*), and has been found to be tolerant to habitat degradation; thus its extent of occurrence/range is likely larger. The 2016 surveys undertaken as part of the GAC rail study have further found individuals of *H. kundaensis* within the DMU at two separate sites to the east and west of the GAC concession associated to gallery forest/bush savannah environments, which further suggests their likely larger range.

The DMU is assessed under a precautionary approach as a Tier 1 Critical Habitat for Criterion 1(b) and Tier 2 under Criterion 2(b) for this species.

Figure 1.11 Hemidactylus kundaensis occurrences in relation to DMU



Note: Blue marks indicate species occurrences according to *Chirio*, 2012. Note that available IUCN range map is likely to be inaccurate and thus not presented.

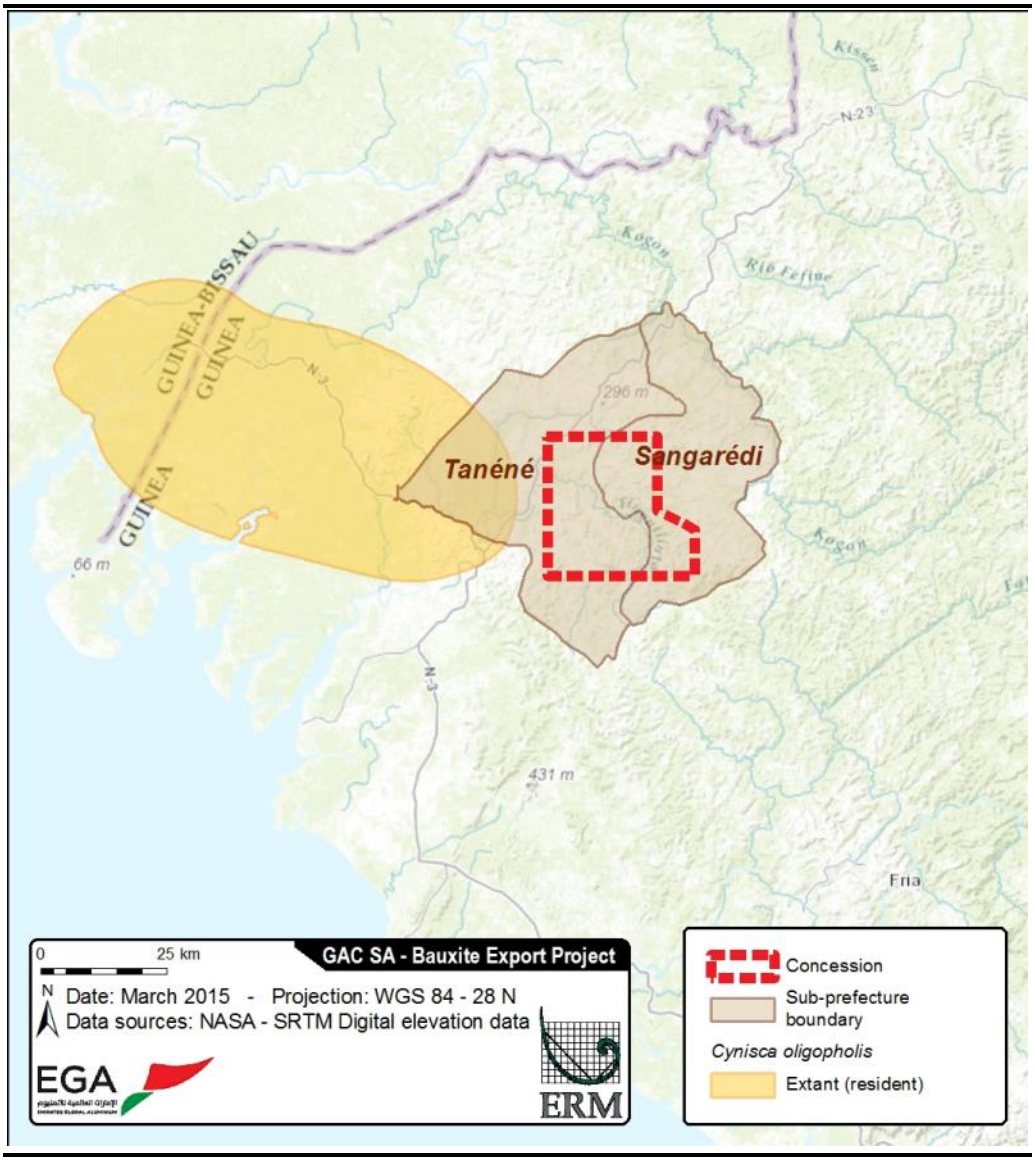
Cynisca cf oligopholis

Cynisca oligopholis is currently known from two separate locations in Guinea and Guinea-Bissau, with an estimated extent of occurrence of less than 4,000 km², a recent survey in 2012 found 29 individuals in the Sangarédi Sub-prefecture (*EEM, 2014*). It is a "fossorial" species (e.g. lives underground in burrows) that has only been found associated with gallery forests in the Guinean savannah; its population trend is unknown (*Chirio, 2013b*). *Cynisca cf oligopholis*[1] may likely be a new species to science and has only been found in the Sangarédi sub-prefecture to date. The ecology and the distribution of the species are not well known. It is believed to be associated to gallery forest (ERM 2015a, Chirio 2015) and has not yet been recorded in the GAC concession, the BSH EIA identified this species at a location east of the DMU within the BSH concession.

Under a precautionary approach, the DMU is assessed as a Tier 2 Critical Habitat (Criterion 1(d) and Criterion 2(b)) for this species.

[1] In biological naming conventions, cf. is commonly placed between the genus name name and the species name to describe a specimen that is difficult to identify because of practical difficulties. Cf. can also be used to express a possible identity, or at least a significant resemblance, such as between a newly observed specimen and a known species or taxon. Such a usage might suggest a specimen's membership of the same genus or possibly of a shared higher taxon

Figure 1.12 Cynisca oligopholis range in relation to DMU

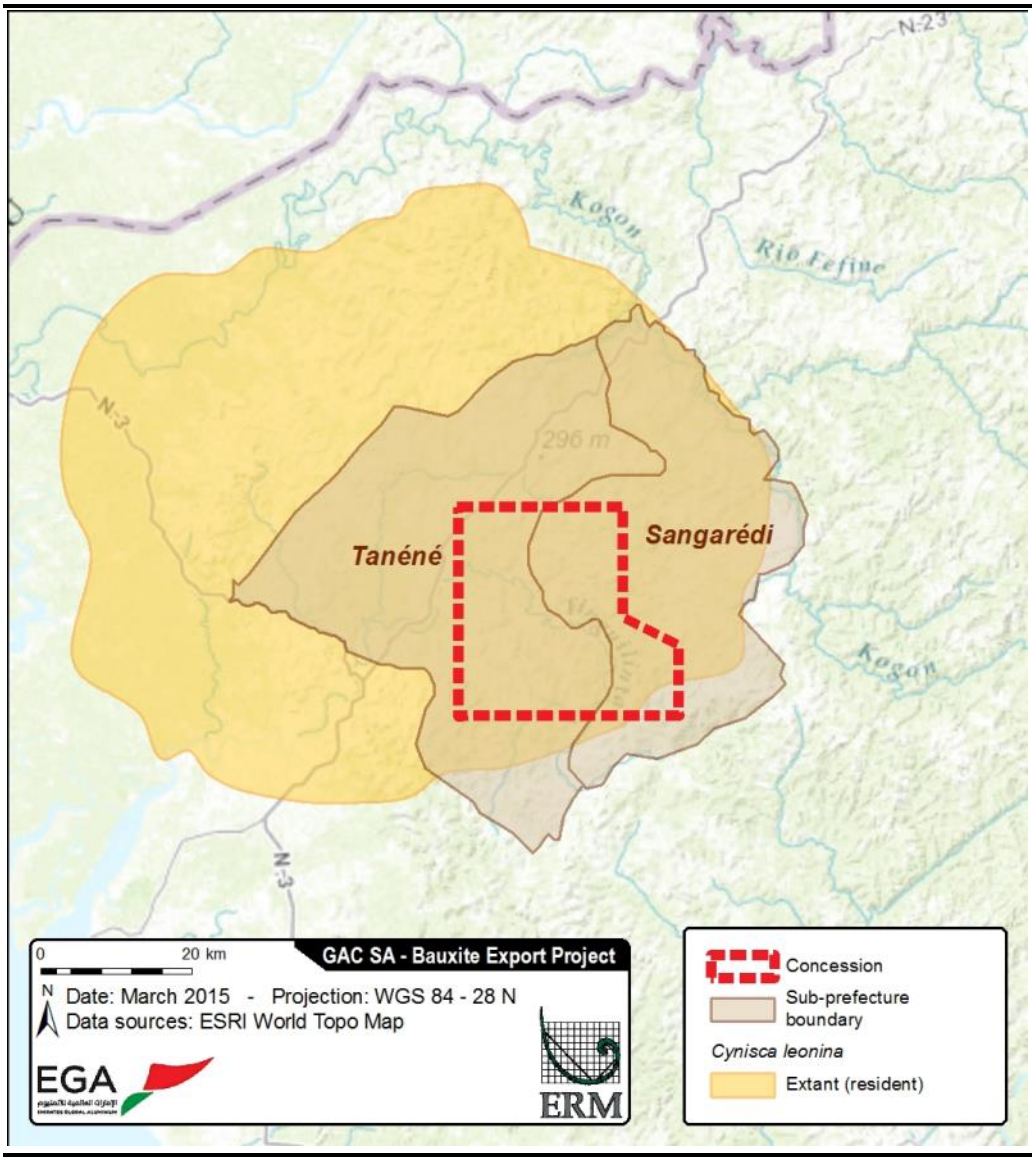


Cynisca leonina

This other lizard species is native of Guinea and only known from some five sites, Los Archipelago, Conakry, Dondé, Doubi and Wondiré; the latter three are recent findings and believed to likely represent the genuine limit of the species range. Its presence has been characterized as common in these three sites, in dry gallery forest of Guinean savannah. *Chirio (2013c)* indicates that the population trend of this species is unknown.

The DMU contains suitable habitat for this species and it significantly overlaps with its known distribution. Subsequent studies may find evidence of its presence (the BSH EIA identified this species at a location south of the DMU within the BSH concession) which may further extend its known distribution range. Hence the DMU is assessed as Tier 2 Critical Habitat (Criterion 2(b)) under a precautionary approach.

Figure 1.13 Cynisca leonina range in relation to DMU



Afrithelphusa monodosa

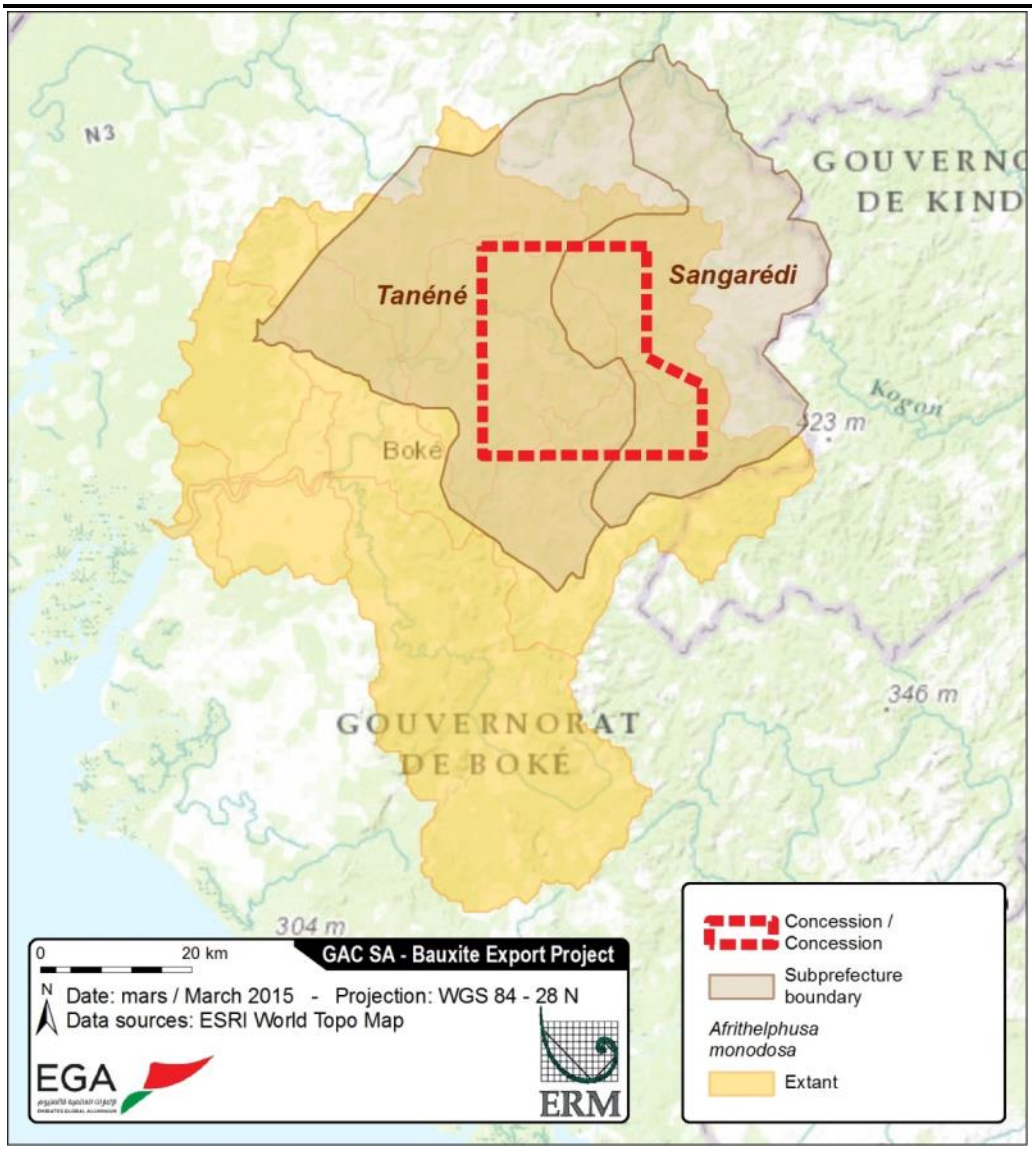
This species is one of the only five species in two genera that belong to a rare group of freshwater crabs endemic to the upper Guinea forest block of West Africa (*Cumberlidge, 1996*). It has been identified in the Boké prefecture by *Wright et al*. (*2006*) during the Conservation International Rapid Assessment (RAP-41) that spanned the whole prefecture, being found in burrows on cultivated land in permanently moist soil, usually containing a pool of shallow water at the bottom. *Cumberlidge and Naskrecki (2011)* report that their original habitat was most surely some type of wetland (semi-deciduous moist forest zone).

This species has an estimated area of occupancy of less than 500 km² given its restriction to year-round wetland areas in savannah and altered rainforest. Considering that there have been subsequent discoveries of more populations its conservation status was downgraded from CR to EN in 2008.

There is not enough available information to estimate population size, but the scarcity of specimens implies a small population size (estimated to be fewer than 2,500 mature individuals) with no subpopulation estimated to contain more than 250 individuals; population trend is thought to be decreasing *(Cumberlidge, 1996)*.

Considering the limited amount of information available on the presence of this species within the DMU, it is not possible to assess whether it triggers Critical Habitat. Nonetheless, mitigation measures will be implemented to ensure NNL for this species.

Figure 1.14 Afrithelphusa monodosa range in relation to DMU



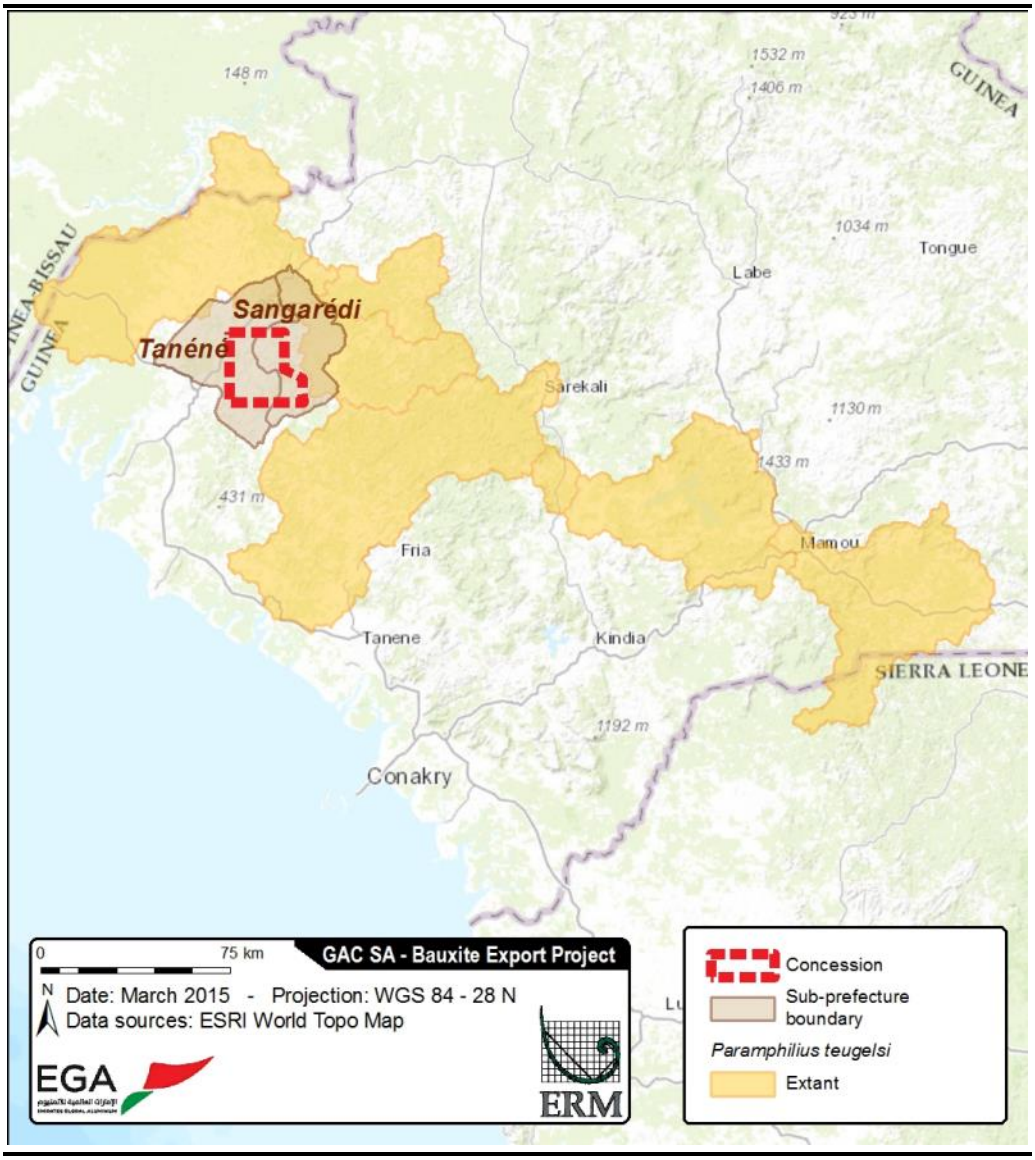
Paramphilius teugelsi

Limited information is available on this fish species; it is restricted to tributaries of the Mamou (Little Scarcies basin), Konkouré, and Fatala Kogon

rivers in Guinea. The latest freshwater survey identified one individual at station ST20 (*Section 6.9.6.4* of the SEIA Addendum (2015) report), located in a rapids/cascade section within a gallery forest. The sampling site is practically on the border of its known range, hence it is considered present within the Tinguilinta catchment. There is no available data on population and population trend is unknown (*Lalèyè, 2010a*).

Considering the limited amount of information available it is not possible to assess whether this species triggers Critical Habitat. Nonetheless, mitigation measures will be implemented to ensure NNL for this species.

Figure 1.15 Paramphilius teugelsi range in relation to DMU



Paramphilius trichomycteroides

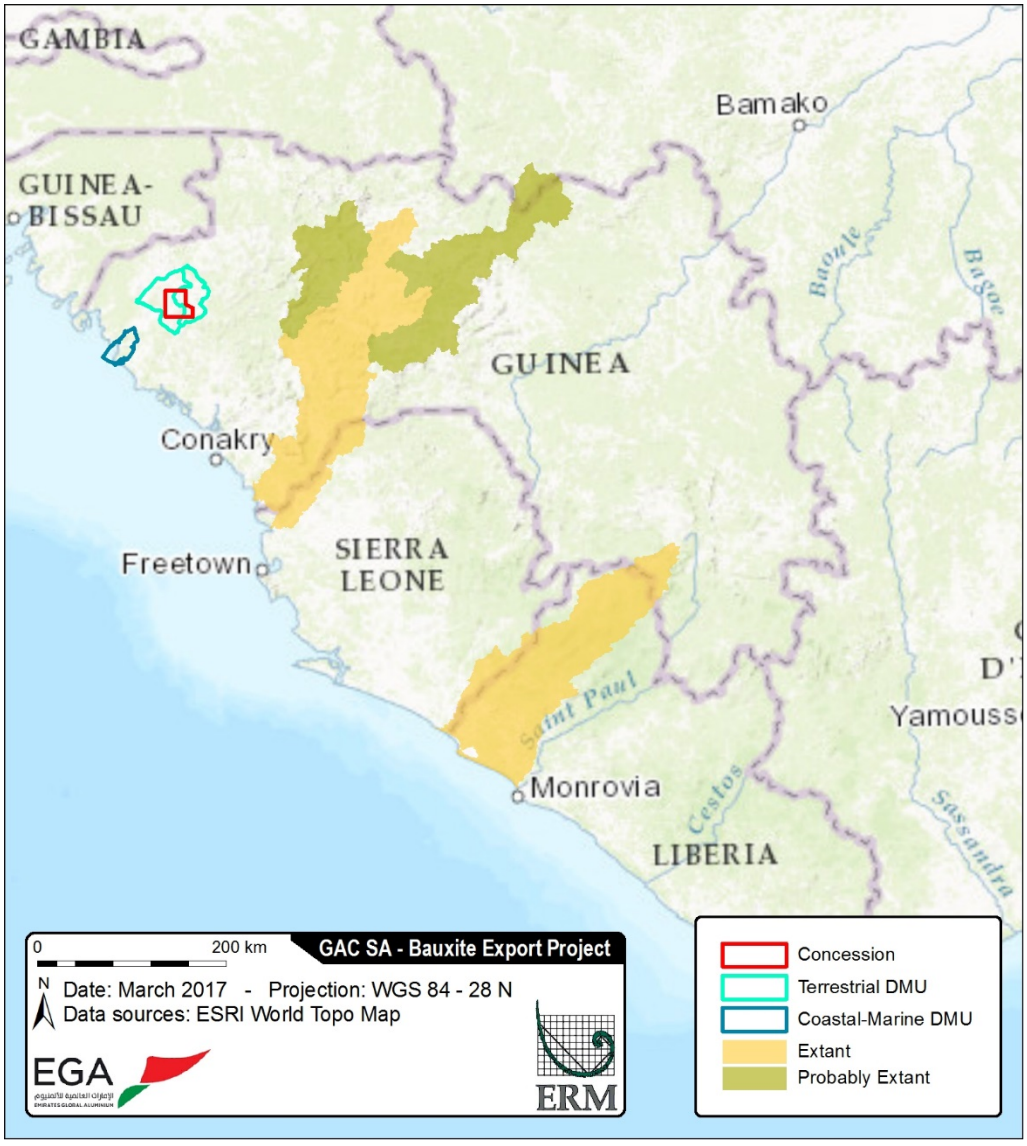
Paramphilius trichomycteroides is a demersal freshwater fish found in the headwater tributaries of Senegal River, near Ditinn and Mamou in Guinea, the upper course of the Bafing River (Senegal basin) and the basins of the

Konkouré, Corubal, Little Scarcies in the Fouta Djalon region in Guinea. The extent of occurrence and area occupancy thresholds are estimated at just over 20,000 km² and 2,000 km², respectively (*Bousso & Lalèyè, 2010*).

The 2016 Dam SEIA update found 15 individuals along 3 sampling sites in the upper and middle Tiouladiwol, mainly in ponds and streams of the quarry area.

Considering the limited amount of information available it is not possible to assess whether this species triggers Critical Habitat. Nonetheless, mitigation measures will be implemented to ensure NNL for this species.

Figure 1.16 Paramphilius trichomycteroides range in relation to DMU



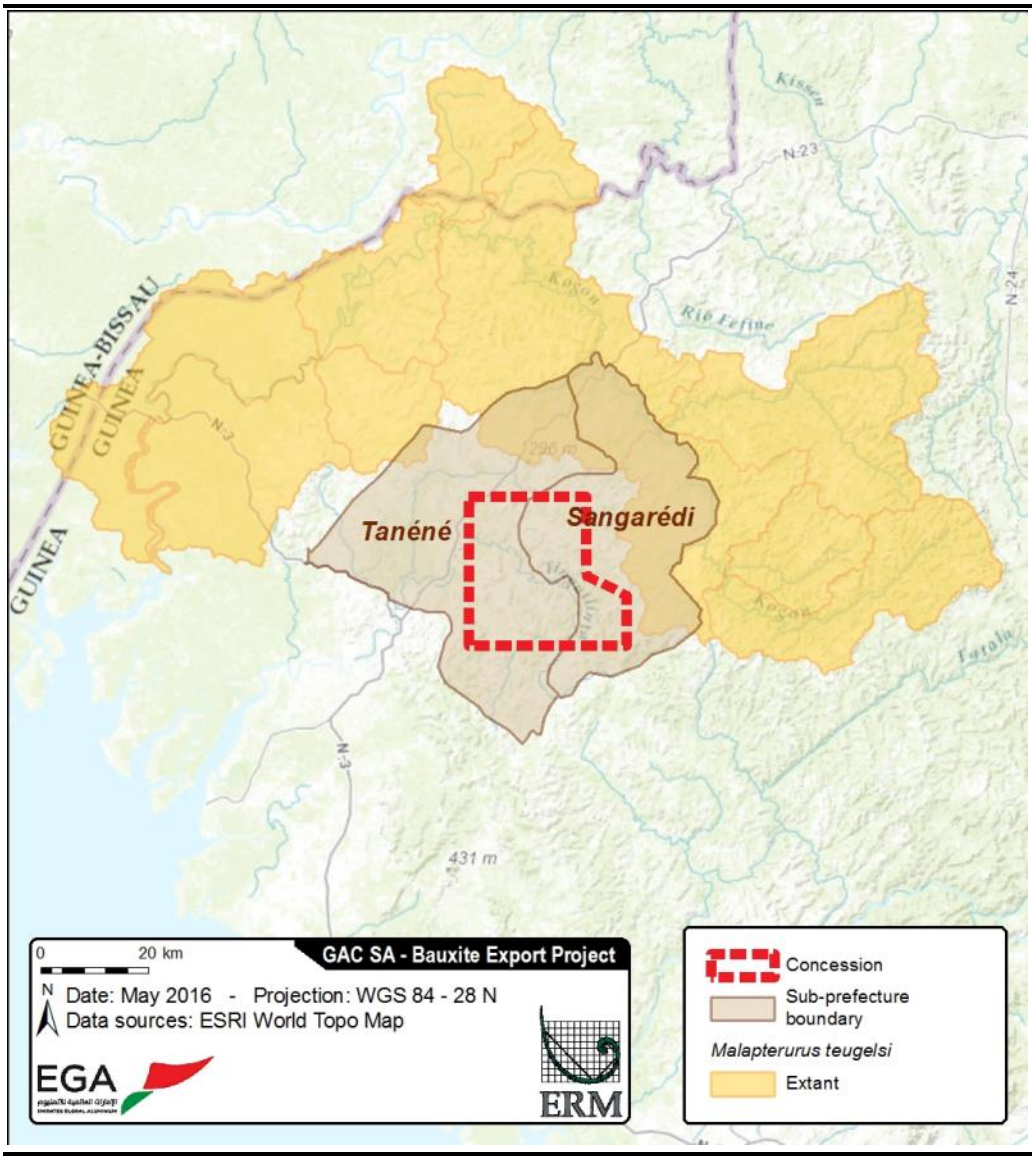
Malapterurus teugelsi

This species has a very restricted range, being limited to the Kogon river system in Guinea (*Lalèyè, 2010b*). Recent surveys performed in 2016 for the

GAC Dam ESIA found a single specimen within the Tinguilinta river catchment. The species had already been recorded in the Tinguilinta river system during a survey for BHP Billiton (*SNC-Lavalin, 2011*). These findings would mean a range extension for the species. However, it should be noted that some species of the genus *Malapterurus* that are found in freshwater systems of this part of Africa are known to be difficult to identify without a certain degree of uncertainty, therefore these records must be taken with caution.

Considering the limited amount of information available it is not possible to assess whether this species triggers Critical Habitat. Nonetheless, mitigation measures will be implemented to ensure NNL for this species.

Figure 1.17 Malapterurus teugelsi range in relation to DMU



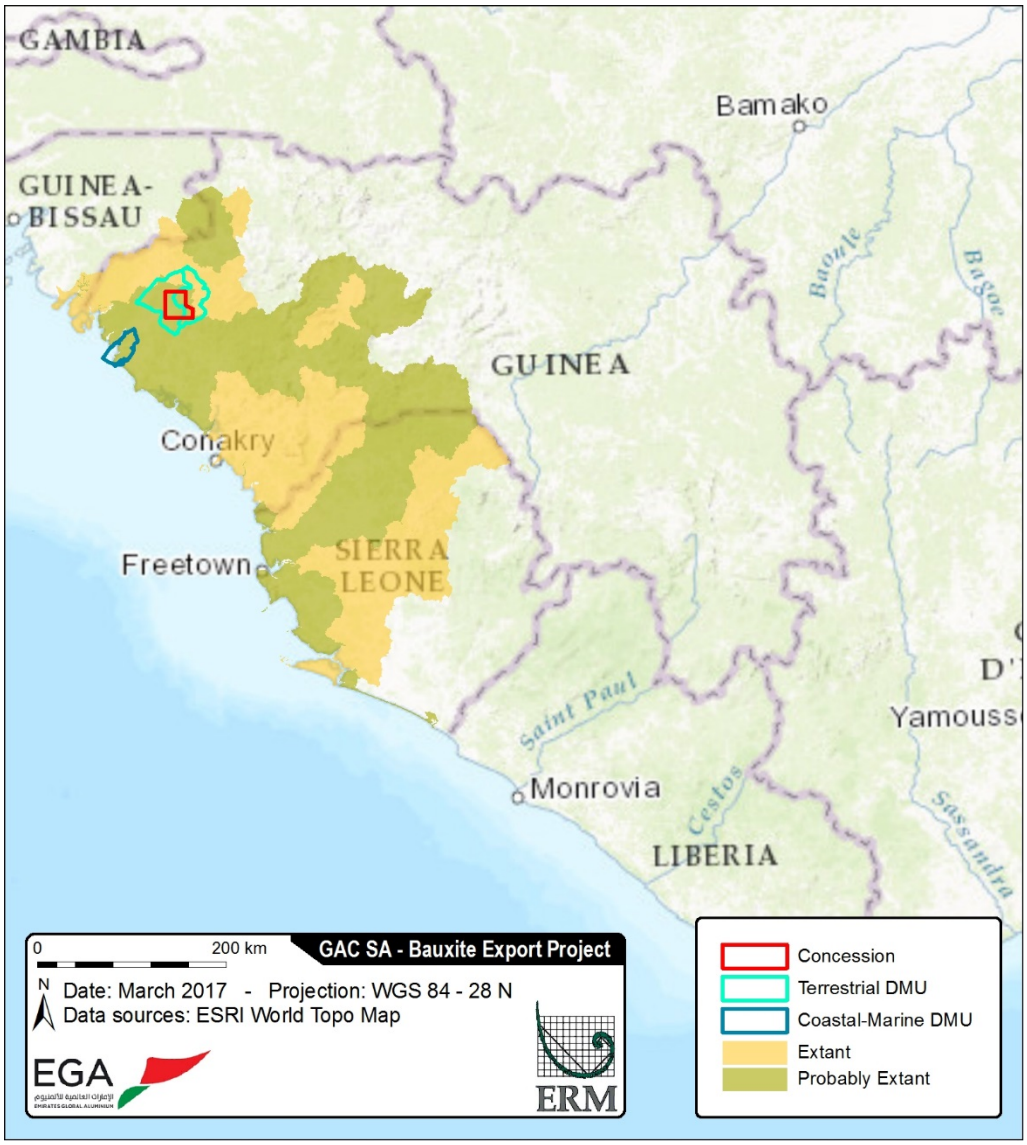
Petrocephalus levequei

This species is known from the Guinean Atlantic area and Sierra Leone, its extent of occurrence and area of occupancy are close to meeting the thresholds for Vulnerable (at less than 20,000 km² and 2,000 km² respectively), being endemic to the Upper Guinea ichthyological province and is found in fewer than 10 locations (Entsua-Mensah, 2010). They are small bottom feeders occurring in tributaries bordered by gallery forests.

The 2016 Dam SEIA identified 4 individuals in the middle Tiouladiwol which is a is typical West-African low order headwater stream.

Considering the limited amount of information available it is not possible to assess whether this species triggers critical habitat. Nonetheless, mitigation measures will be implemented to ensure NNL for this species.

Figure 1.18 Petrocephalus levequei range in relation to DMU



Other freshwater species

Surveys developed for the CBG concession in 2014 found the presence of endangered/range restricted freshwater fish species, specifically:

Species	Red List status	Endemic to UGBP	Range Restricted	Known locations
Epiplatys hildegardae	VU	Yes	Yes	Known only from a restricted area around N'Zérékoré in south-eastern Guinea in the upper drainage systems of the Saint John/Mani and Saint Paul/Oulé rivers (*Lalèyè, 2010c*)
Epiplatys njalaensis	EN	Yes	Yes	Known from a few localities in in the tropical rainforest of south-eastern Sierra Leone; Mano Geleben, Serabu and Baham (*Lalèyè, 2010d*)
Nimbapanchax jeanpoli	EN	Yes	Yes	Known from upper Mano river drainage, northern Liberia and eastern Guinea *(Entsua-Mensah, 2010)*

Note: Upper Guinean BioPovince (approx. from Gambia to Ghana) – following A. Takhtajan classification

According to *EEM (2014)*, these species where caught in both the Tinguilinta and Kogon watersheds, particularly small stretches of rivers and streams. In consultation with international specialists, identification of these species is very difficult, and judging from their current distribution (which is quite far from the GAC concession area) it is suspected that there may have been a misidentification of these.

Considering the limited amount of information available it is not possible to assess whether these species are effectively present in the area and thus trigger critical habitat. Nonetheless, mitigation measures implemented for other endemic freshwater fishes described in this CHA (e.g. *P. teugelsi; P. trichomycteroides; P. levequei* and *M. teugelsi)* will ensure NNL for this species.

Fleurydora felicis

This species is endemic to upland forest in Guinea *(WCMC, 1998)*. According to *TBC (2015)*, the species was identified within the CBG proposed DMU being found in gallery forests and river banks. No distribution map is available for this species.

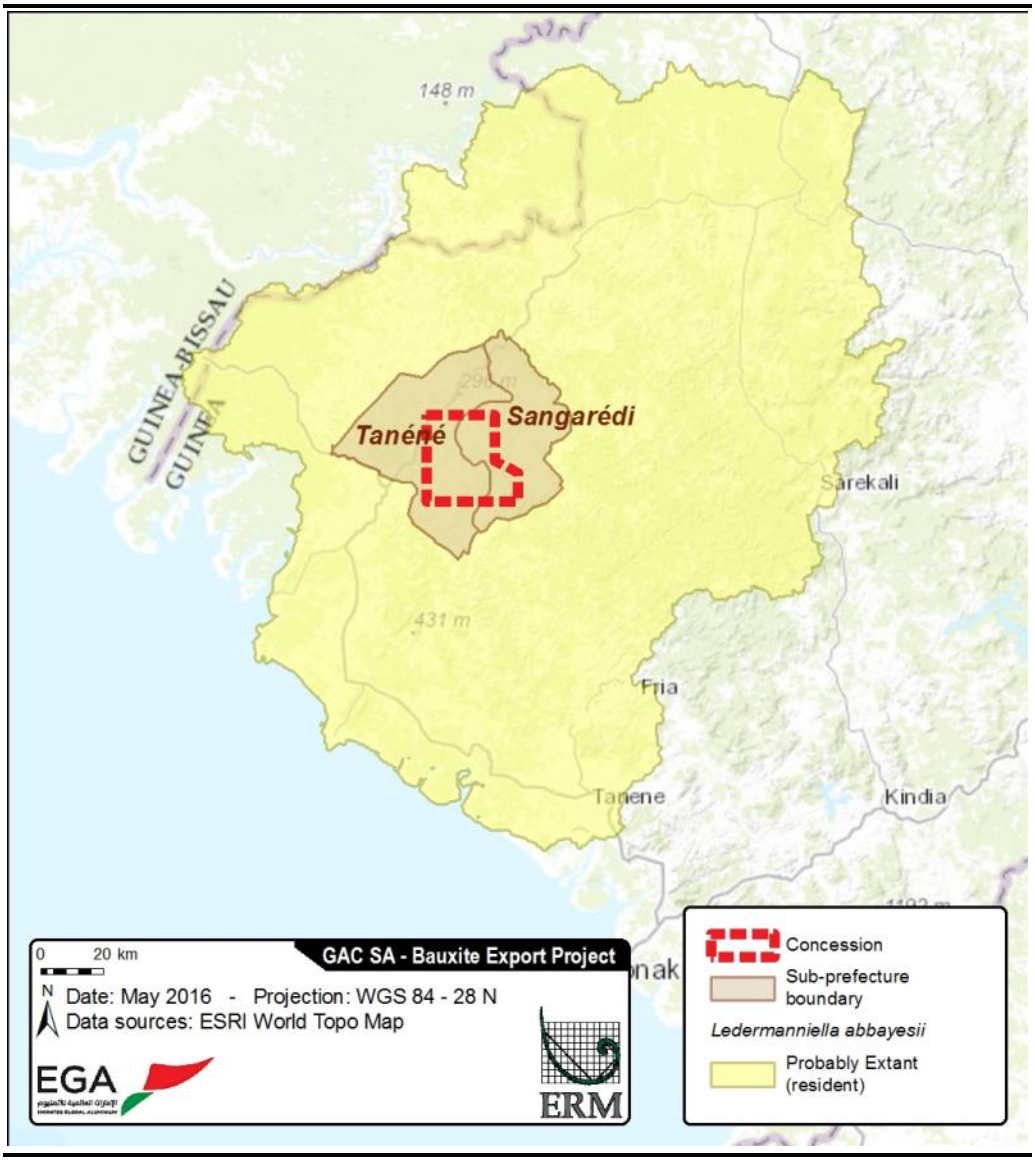
Considering the limited amount of information available it is not possible to assess whether this species triggers critical habitat. Nonetheless, mitigation measures implemented for gallery forest conservation will favour NNL for this species.

Ledermanniella abbayesii

L. abbayesii is an endemic species to Guinea and possibly Côte d'Ivoire *(Diop, 2010)*. According to *TBC (2015)*, the species was identified within the CBG proposed DMU being found in rocky rivers and streams.

Considering the limited amount of information available it is not possible to assess whether this species triggers critical habitat. Nonetheless, mitigation measures implemented for gallery forest / river conservation will favour NNL for this species.

Figure 1.19 Ledermanniella abbayesii range in relation to DMU



1.4.1.2 Criterion 3

Migratory birds identified in the terrestrial DMU

Section 6.8.4 of the SEIA Addendum (2015) provides a list of all bird species recorded within the GAC concession during the field surveys, which have broader distribution ranges so are appropriate for analysis at the DMU scale. Of these, some 67 species are characterized as migratory (whether intra-African or Palearctic migrants, see *Table 1.3*). All species are listed as Least Concern (LC) by the IUCN with the exception of Denham's bustard *Neotis denhami* which is listed as Near Threatened (NT).

Table 1.3 IUCN Red list of migratory birds identified in the GAC concession

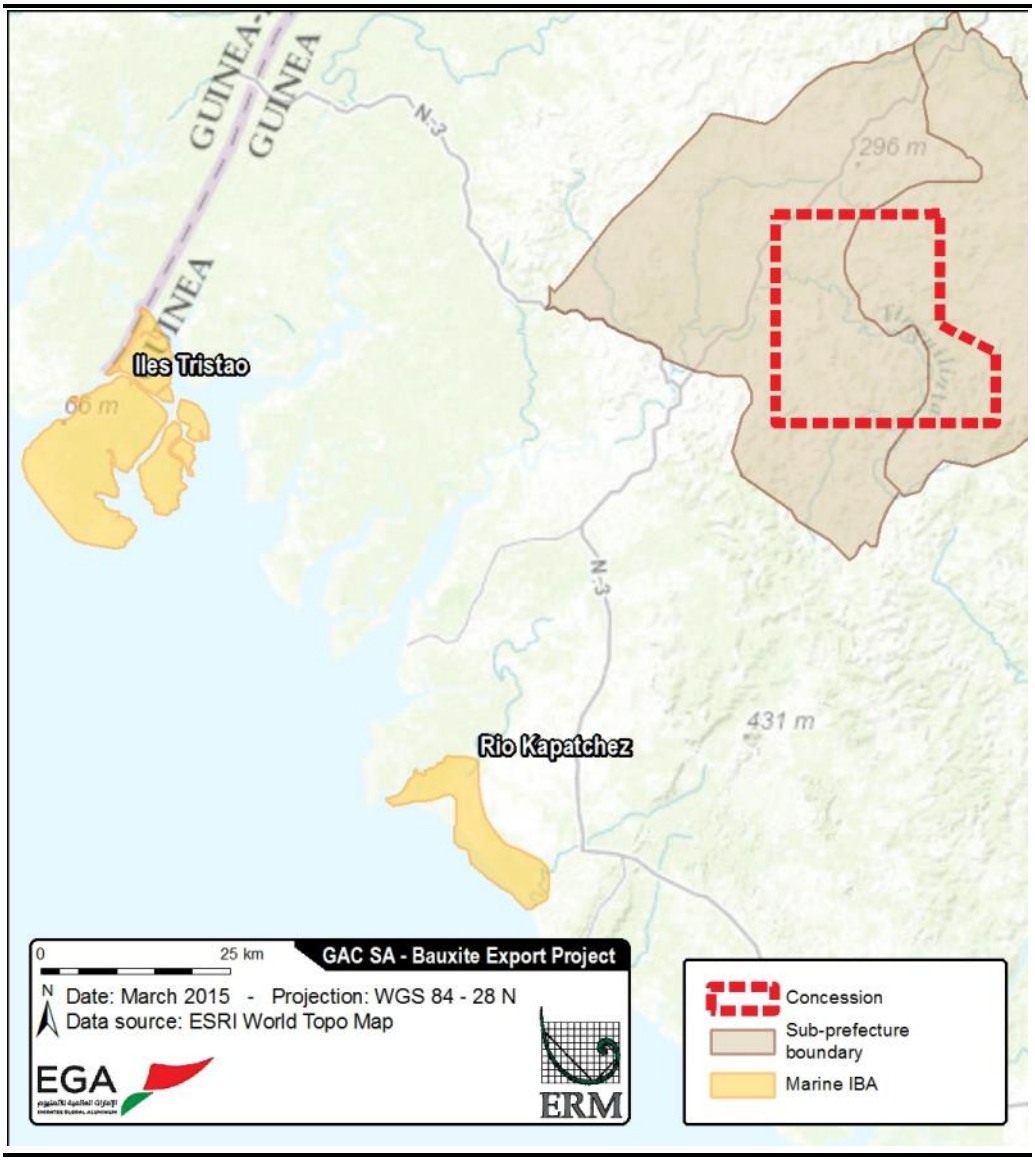
Class Aves- *species*	Common name	Red list status	Guinean status
Ardea melanocephala	Black headed heron	LC	-
Ardea cinerea	Grey heron	LC	-
Ardea purpurea	Purple Heron	LC	-
Nycticorax nycticorax	Black-Crowned night heron	LC	-
Loxobychus sturmii	Dwarf Bittern	LC	-
Ardeola ralloides	Squacco heron	LC	-
Egretta intermedia	Intermediate Egret	LC	-
Bubulcus ibis	Cattle Egret	LC	-
Dendrocygna viduata	White-faced Whistling Duck	LC	-
Milvus migrans	Black kite	LC	Annex II
Circus aeruginosus	Eurasian Marsh Harrier	LC	-
Accipiter badius	Shikra	LC	-
Buteo auguralis	Red-necked Buzzard	LC	-
Falco tinnunculus	Common Kestrel	LC	-
Neotis denhami	Denham's Bustard	NT	-
Eupodotis melanogaster	Black-bellied Bustard	LC	-
Charadrius forbesi	Forbes's plover	LC	-
Vanellus senegallus	African Wattled Lapwing	LC	-
Actitis hypoleucos	Common Sandpiper	LC	-
Tringa ochropus	Green Sandpiper	LC	-
Tringa nebularia	Common Greenshank	LC	-
Streptopelia vinacea	Red-eyed Dove	LC	-
Oxylophus levaillantii	Levaillant's Cuckoo	LC	-
Cuculus solitarius	Red-chested Cuckoo	LC	-
Chrysococcyx caprius	Didric cuckoo	LC	-
Chrysococcyx cupreus	African Emerald Cuckoo	LC	-
Chrysococcyx klaas	Klaas's Cuckoo	LC	-
Caprimulgus climacurus	Long-tailed Nightjar	LC	-
Macrodipteryx longipennis	Standard-winged Nightjar	LC	-
Apus pallidus	Pallid Swift	LC	-
Apus apus	European Swift	LC	-
Ceyx pictus	African Pygmy Kingfisher	LC	-
Halcyon senegalensis	Woodland Kingfisher	LC	-
Alcedo cristata	Martin pêcheur huppé	LC	-
Merops hirundineus	Swallow-tailed Bee-eater	LC	-
Merops apiaster	European Bee-eater	LC	-
Merops persicus	B lue-cheeked Bee-eater	LC	-
Merops albicollis	White-throated Bee-eater	LC	-
Eurystomus glaucurus	Broad-billed Roller	LC	-
Coracias cyanogaster	Blue-Bellied Roller	LC	-
Coracias naevius	Rufous-crowned Roller	LC	-
Coracias abyssinicus	Abyssinian Roller	LC	-
Tockus nasutus	African Grey Hornbill	LC	-

Class Aves- *species*	Common name	Red list status	Guinean status
Psalidoprocne obscura	Fanti Saw-wing	LC	-
Hirundo daurica	Red-rumped Swallow	LC	-
Hirundo lucida	Red-chested Swallow	LC	-
Riparia riparia	Common Sand Martin	LC	-
Delichon urbicum	Common House Martin	LC	-
Anthus trivialis	Tree Pipit	LC	-
Motacilla flava	Yellow Wagtail	LC	-
Campephaga phoenicea	Red-shouldered Cuckoo-shrike	LC	-
Saxicola rubetra	Whinchat	LC	-
Cossypha niveicapilla	Snowy-crowned Robin Chat	LC	-
Acrocephalus schoenobaenus	Sedge Warbler	LC	-
Hippolais polyglotta	Melodious Warbler	LC	-
Phylloscopus trochilus	Willow Warbler	LC	-
Ficedula hypoleuca	Pied Flycatcher	LC	-
Muscicapa striata	Spotted Flycatcher	LC	-
Terpsiphone viridis	African Paradise Flycatcher	LC	-
Chalcomitra senegalensis	Scarlet-chested Sunbird	LC	-
Cinnyris pulchellus	Beautiful Sunbird	LC	-
Chalcomitra senegalensis	Scarlet-chested Sunbird	LC	-
Oriolus auratus	African Golden Oriole	LC	-
Oriolus oriolus	Eurasian Golden Oriole	LC	-
Lamprotornis splendidus	Splendid glossy starling	LC	-
Cinnyricinclus leucogaster	Violet-backed Starling	LC	-
Petronia dentata	Bush Petronia	LC	-

There is currently no information available that may characterize the Mine DMU as representing a major flyway where migratory birds would congregate on a cyclical/regular basis in a number in excess of 1% of its global population. *Figure 1.20* shows the location of identified Important Birds Areas (IBA's) in relation to the Terrestrial DMU, where the two most notables IBA's defined by Birdlife Criterion A4 (Congregations) are located to the east and southeast of the Mine DMU, being Îles Tristao (>40 km) and Kapatchez (>50 km) respectively.

No migratory or congregatory bird species have been found to trigger Critical Habitat under Criterion 3.

Figure 1.20 Location of Important Bird Areas (IBA's) in relation to DMU



1.4.1.3 Criterion 4

The current habitat classification used in this report is explained in *Section 6.8.2* of the SEIA Addendum (2015) report. These habitats are an integral part of a Forest-Savannah mosaic, where years of human occupation have further transformed the landscape into a Forest-savanna-agricultural mosaic.

The Guinean forest-savannah mosaic of West Africa runs through Guinea, Côte d'Ivoire, Ghana, Togo, Benin and Nigeria, where the interlacing of forest, savannah and grassland habitats (and in the last century agriculture) are highly dynamic, with the proportion of forest in relation to the other habitats having varied substantially over time (*Shorrocks and Bates, 2015*). WWF categorizes this ecoregion as Critical/Endangered.

- Bowal: this grassland habitat is primarily found within the plateaus of undulating landscapes (though it may be found in valleys too). Parts of

it are seasonally flooded, with limited drainage and a very thin or absent topsoil layer over a hard substrate such as ironstone or rock; which limits the development of woody plants. This type of habitat may support unique species assemblages if associated to rock outcrops; it is usually burnt in order to produce grasses where cattle can graze. It may be considered a **mix of modified/natural habitat**, since the type of flora community that grows here usually reaches climax before it is burned again. Considering the presence of numerous bauxite concessions in West Africa, the relevant Ecosystem Red List criteria for this type of habitat would be related to the estimated decline in this type of habitat during the last century in excess of 30%, which would list this particular habitat as Vulnerable (VU).

- Wooded savannah: this habitat can vary according to the density of tress present from a "woodland" savannah to a "shrub" savannah, the former usually contains larger/higher trees than the latter (shrub savannah furthermore was considered "rare" by the 2008 SEIA). In practical terms distinguishing them can be difficult and subjective, thus they are considered as one here. According to *FAO Global Forest Resources Assessment (2015)*, forest habitats comprised close to 6.3 million hectares in Guinea, while other wooded lands comprised close to 5.8 million hectares (approx. 26 and 24% of total land area respectively). Most of the agricultural conversion has occurred on this type of habitat, through slash and burn practices, which today are to a great extent part of the hillside landscape. Agriculture plus unsustainable uses such as firewood and hunting have further degraded and fragmented this habitat; thus, whilst it is **considered largely still a natural habitat** where significant biodiversity still exists (though it is recognized that savanna landscapes that have evolved through the use of human-induced fires), it has been modified to varying degrees throughout its distribution. The relevant Ecosystem Red List criteria for this type of habitat would be related to the estimated decline in this type of habitat during the last century in excess of 30%, which would list this particular habitat as Vulnerable (VU).

- Gallery Forest: this forest grows along rivers and watercourses that run through the hill valleys; it is in fact a relic forest from an original and much more extensive forest habitat. Though these may in part have been modified (e.g. evidence of palm trees along some banks), cultural factors have halted their transformation, since they are acknowledged as sacred sites and important in conserving river headwaters. These strips of forest usually run in parallel and directly adjacent to watercourses with variable widths between 100 to 500 m. This type of habitat is **considered natural habitat** since it is largely untouched by historical human activities and is home to fauna species of interest;

particularly primates, swine and some species of herpetofauna, the latter which have only been identified in this type of habitat.

Considering the relative width of gallery forest strips, it is assumed that these may have been substantially reduced, thus triggering a rating of Endangered (EN), in terms of short-term decline (over 50%).

- Agricultural lands (active and fallow): Agricultural lands whether active or inactive are found mostly on hillside slopes. Cyclical clearing and burning further contribute to the habitat mosaic that characterizes modern day Guinean landscapes and is one of the most dominant habitat types. This habitat is **considered to be modified habitat**, since there is no recovery of the original woodland habitat, but certain agricultural practices sometimes leave either solitary or groups of trees, evidenced by the presence of small "woodland island" habitats. Many fauna species have been able to exploit these secondary habitats (e.g. some species of bovids as well as primates), furthermore, one species of endangered invertebrate (Purple Marsh Crab) has been found to be associated with agricultural lands, presumably those that were once wetlands or have a high water table and thus provide a minimum level of water in their burrows. Considering the nature of this habitat, Ecosystem Red List criteria are not triggered.

Based on the defined habitats, a first screening was performed based on prior/actual project documentation on the current habitats features (e.g. from EIAs, biodiversity reports, scientific literature, etc.), after which engaged experts made a further evaluation with regard to the suitability of the CH definition.

Table 1.4 Critical habitat identification of Highly Threatened or Unique ecosystems

Identified habitat within the DMU*	Similar designations and/or habitats	Critical habitat criteria			Critical habitat trigger
		At risk of significantly decreasing in area or quality	Small spatial extent	Presence of unique assemblages of species	
Bowal	Grassland savannah	Yes	No	Probable	No
Wooded savannah	Tree savannah	No	No	No	No
Gallery forest	Riparian forest	Yes	Yes	Yes	Yes
Agricultural mosaic	Plantation (active); Fallow land – Thicket (inactive)	No	No	No	No

*: Current habitat map only covers the southern section of the concession, thus for the purpose of this screening it is assumed that these habitats are further represented within the DMU, and that percentage cover of each calculated within the concession is similar throughout the DMU.

1.4.1.4 *Criterion 5*

The terrestrial DMU is situated in the westernmost section of the Guinean forest-savanna mosaic ecoregion, within the tropical/subtropical grasslands, savannas and shrublands biomes. Topographically, the DMU is located mostly over a landscape unit that ranges from 10 to 320 m (e.g. LCU4) over a homogenous mosaic of habitat types which have limited "intra-variation" attributes. These factors are expected to have a minor contribution towards evolution and speciation processes.

The terrestrial DMU area is not considered to be within any Global 200 (WWF) site nor any Hotspot sites (CEPF). Actual sites within Guinea are related to Guinean Forests (i.e. Eastern Guinean Forests, Guinean Montane Forests and Western Guinean Lowland Forests). No EDGE species have been identified in the area neither, though there have been accounts of sightings of the Pygmy Hippopotamus (*Choeropsis liberiensis*) but surveys have not been able to determine if it is present or not in the area. According to *Lewison and Oliver (2008)* fragmented populations are located in Guinea in the *Reserve de Ziama* and to the southeast of it (Diécké Forest Reserve), with last reports (in 1994) on population estimating some 32–96 and 18–54 individuals in Ziama and Diécké forests respectively.

This criterion may overlap with Criterion 2 for Endemic species. Recent surveys in the last 10 years have been able to describe new species, mainly herpetozoos, which require continuous efforts in taxonomical definition; but information is not sufficient to determine whether or not critical habitat is triggered for the DMU under Criterion 5.

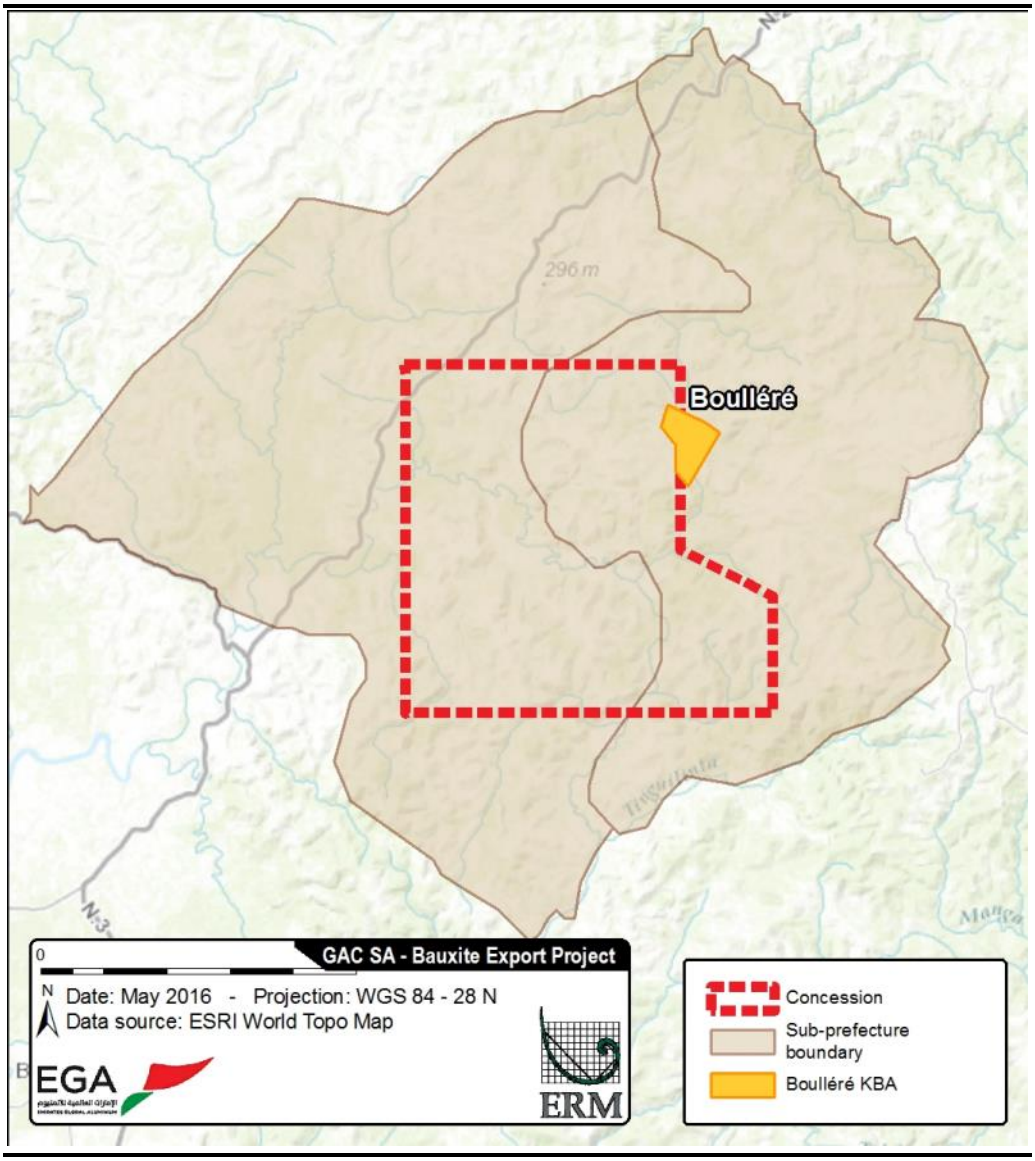
1.4.1.5 *Protected areas and/or Internationally recognized areas*

Boulléré Key Biodiversity Area

The Boulléré KBA is located partially within the northeast limits of the GAC concession. It is set within a vegetation mosaic that comprises gallery forests, open grassland and rocky bauxite outcrops. Eight primate species have been recorded in this area in the past (*Wright et al., 2006*): *Galagoides* sp., Campbell's monkey *Cercopithecus campbelli*, Calithrix monkey *Cercopithecus sabaeus*, Sooty mangabey *Cercocebus atys*, Patas monkey *Cercopithecus patas*, Western red colobus *Piliocolobus temminckii*, Guinea baboon *Papio papio* and Western Chimpanzee *Pan troglodytes verus*; the presence of the latter species being the reason for its designation.

EEM (2014) states the Boulléré KBA has been degraded since the *Wright et al. (2006)* study due to extensive agricultural practices occurring in the area, though it still supports a chimpanzee population. Following a precautionary approach, the Boulleré KBA is considered as a Critical Habitat.

Figure 1.21 Location of Boulléré KBA in relation to Concession/DMU



1.4.2 *Conclusions of critical habitat assessment for the Mine Area*

One species inhabiting the DMU clearly triggers Critical Habitat criteria being the Western Chimpanzee (*verus* subspecies). Six other species (one primate, an amphibian, three reptiles and an invertebrate) are also assessed to be triggering CH status (*Table 1.5*), though further information on their occurrence and distribution within the mining concession is warranted to further inform any conservation measures for NNL/NG purposes. One habitat (gallery forest) has been assessed as CH based on its relative scarcity and for its ability to host specific biodiversity values. The Boulleré KBA is also a critical habitat, being an internationally recognised area (as per IFC PS6 #20).

Most species share the importance of the gallery forest for their existence, whether because they inhabit exclusively this type of habitat (e.g. herpetozoos associated with watercourses) or because they depend on it for water and associated flora resources (as is the case of the Chimpanzee).

The protection of the Western Chimpanzee and other identified biodiversity features, through the definition of priority conservation areas where no mining activities should occur, will allow that expanses of habitat comprising gallery forests along with associated wooded savannah be protected from direct/indirect impacts that may result from the Project (see *WCF report 6.4B*).

It should be noted that all the species identified in this section (*Section1.4.1*), whether triggers (regardless of Tier designation) or not, will be considered in subsequent monitoring surveys as part of GAC's Environmental Monitoring Program and Biodiversity Management Plan, with directed actions (e.g. surveys in all types of habitats) to confirm their presence/abundance in the concession and application of NNL/NG measures.

Table 1.5 Summary table of Critical Habitat designations for the Mine DMU.

Trigger	Criteria	Tier	Assoc. Habitat
Pan troglodytes verus	1	1	Gallery forest, Wooded savannah, Agricultural mosaic
Piliocolobus temminckii	1	2	Gallery forest
Phrynobatrachus pintoi	1 and 2	1d and 2b	Gallery forest
Arthroleptis formosus	1 and 2 (P)	1d and 2b	Gallery forest/Tree savannah
Hemidactylus kundaensis	1 and 2 (P)	1b and 2b	Gallery forest, Headwater spring, Wooded savannah
Cynisca oligopholis	1 and 2	1d and 2b	Gallery forest
Cynisca leonina	2 (P)	2b	Gallery forest
Gallery forest (habitat)	4	n.a.	n.a.
Boulleré KBA	LPIRA	n.a.	Gallery forest, bowal, Wooded savanna.

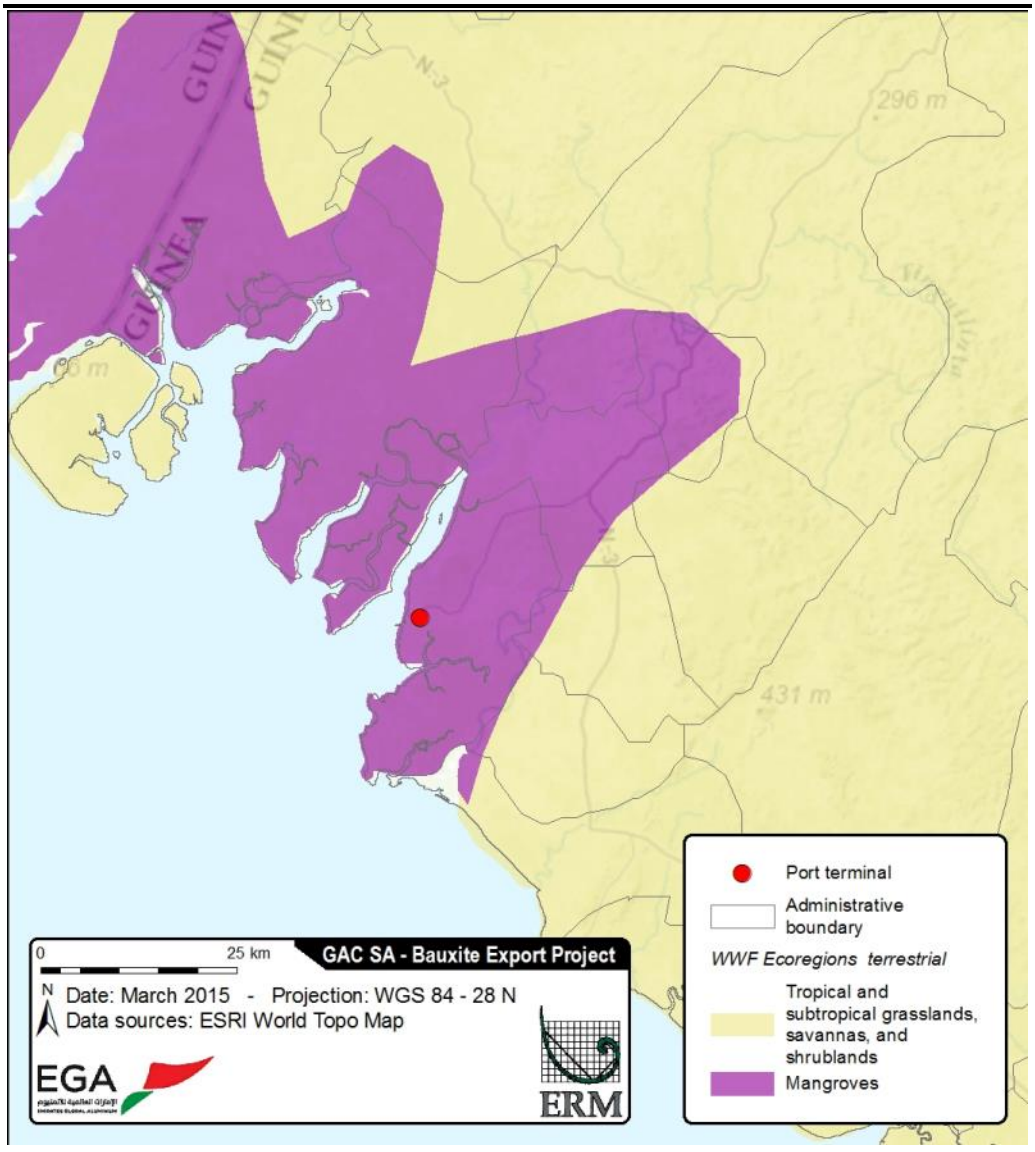
(P): indicates that the assessment of CH has been made on a precautionary basis.
LPIRA=Legally protected and internationally recognized area

Table 1.6 Summary table for species requiring as minimum NNL measures for the Mine DMU.

Species	Assoc. Habitat
Necrosyrtes monachus	Wooded savannah, Agricultural mosaic
Gyps africanus	Wooded savannah, Agricultural mosaic
Gyps rueppelli	Wooded savannah, Agricultural mosaic
Afrithelphusa monodosa	Agricultural mosaic
Paramphilius teugelsi	Freshwater, Gallery forest
Paramphilius trichomycteroides	Freshwater, Gallery forest
Malapterurus teugelsi	Freshwater, Gallery forest
Petrocephalus levequei	Freshwater, Gallery forest
Felurydora felicis	Gallery forest
Ledermaniella abbayesii	Gallery forest

Figure 1.22 shows that the GAC Port Terminal and associated facilities are located within the Kamsar Sub-prefecture (Boké Prefecture). The whole of the sub-prefecture is within the Guinean Mangroves ecoregion; where identified habitat largely corresponds to Mangrove habitat that is found throughout West Africa.

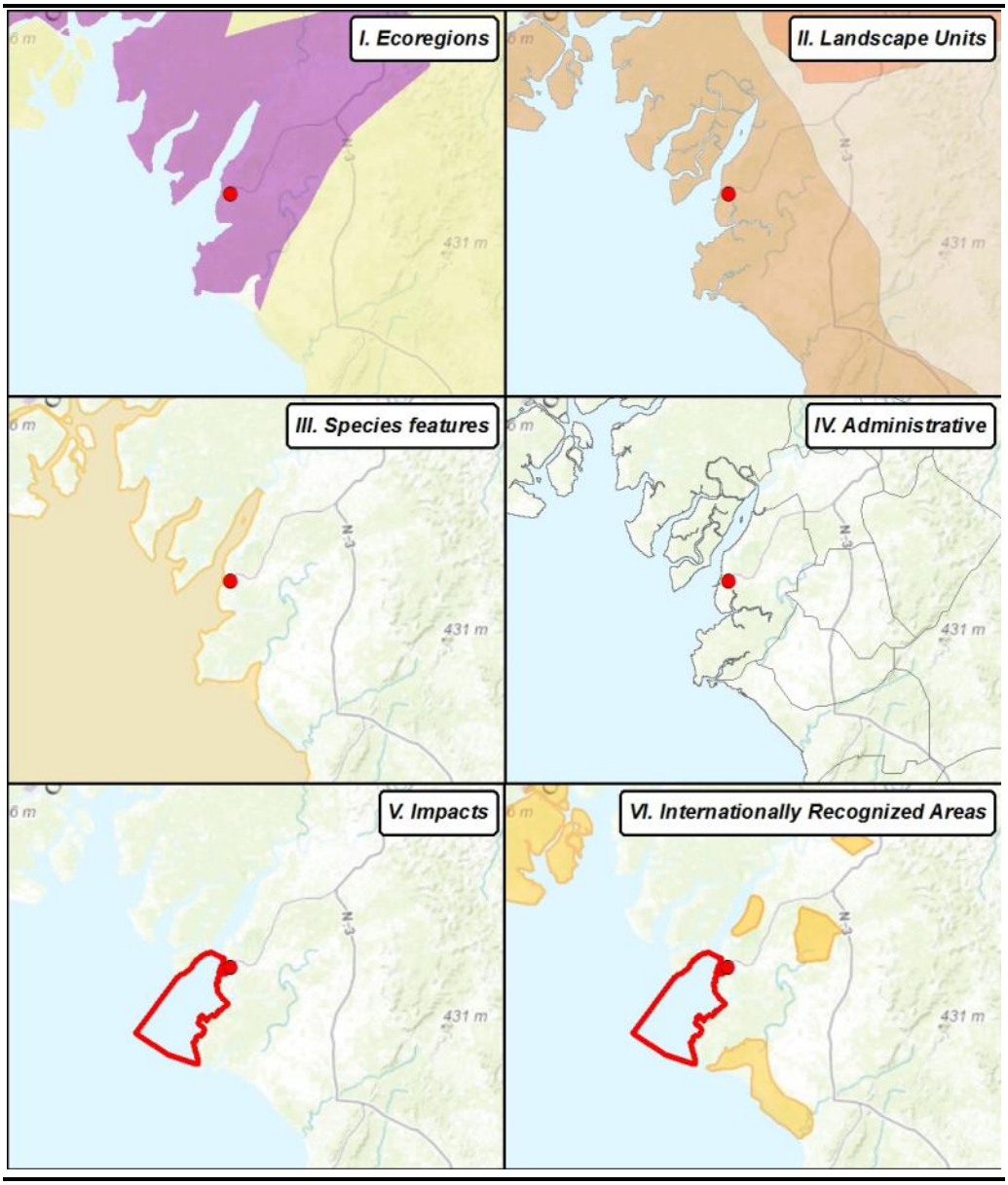
Figure 1.22 Location of GAC Port Terminal and associated facilities in relation to terrestrial ecoregion and administrative boundaries



Taking into account ecological features of the main species of relevance found in the area of influence (e.g. home ranges, extent of occurrence and identified areas of occupancy); identified landscapes and other physical/political features such as surface hydrology and administrative boundaries (*Figure 1.23*), a DMU was defined to contain:

I. An extension of the main ecoregion found within the projects area of influence (i.e. Guinean Mangroves; see *Section 7.1.5.2* of the SEIA Addendum (2015) report*)*
II. Within the main Landscape Characteristic Units present within the projects area of influence (i.e. LCU1; see *Section 7.1.3* of the SEIA Addendum (2015) report).
III. Presence of relevant species (e.g. within species ranges).
IV. Consider administrative boundaries (i.e. Boké Prefecture and its sub-prefectures).
V. Consider project footprint/activities impacts, especially the modelled sediment plume that will likely be originated from channel dredging and spoil disposal activities, which is available in the original SEIA (e.g. species displacements by direct/indirect impacts).

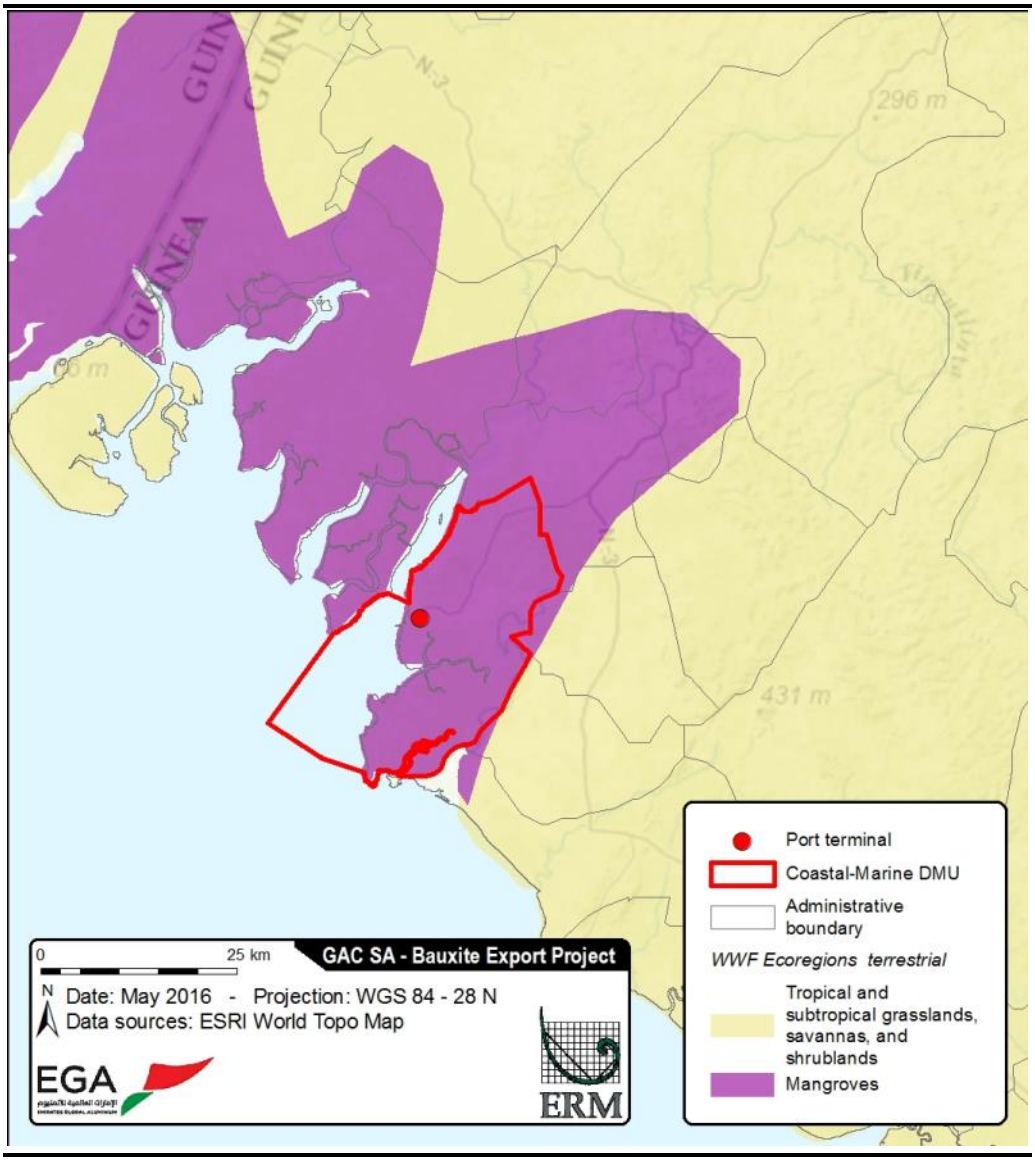
Figure 1.23 Relevant screening features for the determination of the coastal-marine Discrete Management Unit



The proposed DMU (*Figure 1.24*) is defined by the boundary limits of the Kamsar Sub-prefecture (Boké Prefecture), with the adjacent marine section to the east covering both the Rio Nuñez estuary mouth as well as the Rio Kapatchez estuary further to the southeast. The extension of the Coastal-Marine DMU is considered appropriate considering these main features:

- contains an extension of the Guinean mangrove habitat and adjacent marine waters found within the project components area of influence;
- overlaps with relevant species distributions (e.g. most species under review have limited home ranges);
- impacts over fauna (direct/indirect) will likely extend beyond the project footprint; and
- the selected administrative boundary and marine section minimally encompasses (to varying degree) all other relevant features.

Figure 1.24 Selected coastal-marine DMU for the critical habitat determination



1.5.1 Coastal-marine critical habitat determination

1.5.1.1 Criteria 1 and 2

Species identified in *Sections 7.15* to *7.19* of the SEIA Addendum (2015) as being likely to be present within the Coastal-Marine DMU have been screened in order to identify those that are classified as Critically Endangered or Endangered according to IUCN designations (i.e. globally threatened), as well as their endemicity/range restriction. *Table 1.7* shows the species identified.

Table 1.7 IUCN Red list coastal-marine species and status

Class - *species*	Common name	Red List status	Guinean status	Endemic to Eastern tropical Atlantic	Range restricted
Mammalia					
Sousa teuszii	Atlantic Humpback Dolphin	VU but likely to be upgraded to EN/CR	-	Yes	No
Actinopterygii					
Epinephelus marginatus	Dusky Grouper	EN	-	No	No
Crustacea-Malacostraca					
Afrithelphusa monodosa	Purple marsh crab	EN	-	Yes	Probable
Chondrichthyes					
Squatina aculeata	Sawback Angel Shark	CR	-	No	No
Squatina oculata	Smoothback Angel Shark	CR	-	No	No
Pristis perotteti	Largetooth Sawfish	CR	-	No	No
Pristis pristis	Common Sawfish	CR	-	No	No
Pristis pectinata	Wide Sawfish	CR	-	No	No
Rostroraja alba	Bottlenose Skate	EN	-	No	No
Fontitrygon margarita	Daisy Stingray	EN	-	No	No
Glaucostegus cemiculus	Blackchin Guitarfish	EN	-	No	No
Rhinobatos rhinobatos	Common Guitarfish	EN	-	No	No
Rhynchobatus luebberti	Lubbert's Guitarfish	EN	-	No	No
Aves					
Necrosyrtes monachus	Hooded vulture	EN	-	No	No
Gyps africanus	White backed vulture	EN	-	No	No
Reptilia					
Eretmochelys imbricata	Hawksbill turtle	CR	Vulnérable (threatened)	No	No
Caretta caretta	Loggerhead sea turtle	EN	-	No	No
Chelonia mydas	Green sea turtle	EN	Vulnérable	No	No

Class - *species*	Common name	Red List status	Guinean status	Endemic to Eastern tropical Atlantic	Range restricted
			(Threatened)		
Mecistops cataphractus	Slender-snouted crocodile	CR	-	No	Probable

Sousa teuszii

The Atlantic Humpback Dolphin is endemic to the eastern tropical Atlantic (tropical to subtropical West Africa), being limited mainly to coastal and inshore waters. Population of Atlantic Humpback Dolphins appears to be fragmented throughout its known range, with subpopulations separated by areas of low or zero density (*Reeves et al., 2012*); a recent survey in the Rio Nuñez estuary confirmed eight sea sightings being these the first records of *S. teuszii* in Guinea, with an estimated total of 47 individuals through photo-identification (*Weir, 2015*). Preferred habitats are proximity to sandbanks, brackish, mangrove-lined estuaries, and turbid waters.

Taking into consideration the confirmed presence of what may be an important subpopulation of Atlantic Humpback Dolphin within the DMU, it is considered to trigger critical habitat under Criterion 1, Tier 2.

Figure 1.25 Sousa teuszii range in relation to DMU

Bony-Cartilaginous fish

All species of bone-cartilaginous fish considered have broad distribution ranges, and information on their population status, particularly in West Africa is very limited. Recent surveys (*EEM, 2014*) have found scarce information in regards to the presence of these species in the DMU; with only limited number of individuals indirectly identified through fish catches at markets (e.g. one individual of *S. lewini* at Port Néné; eight individuals of *G. cemiculus* caught by artisanal fishing boats in coastal waters of the DMU; two individuals of *E. marginatus* caught in boats and one individual of *F. margarita* observed at a fish market in Yongosal; all occurrences near Kamsar Port and/or within proposed DMU). Both *G. cemiculus* and *F. margarita* are susceptible to direct impacts from dredging and thus assessed further below.

Glaucostegus cemiculus

The Blackchin Guitarfish inhabits marine and brackish waters in subtropical areas. It is a demersal species, living over sandy or muddy substrates. In western Africa, the fins of the Blackchin Guitarfish are highly prized and as a result it is a major target species of artisanal fisheries operating along all coasts in this region. A reduction in the size of individuals and a strong decline in this species has been observed throughout its range in West Africa (*Notarbartolo di Sciara et al., 2016*).

EEM (2014) made specific reference to G. *cemiculus* considering its verified presence near the mineral loading port at Kamsar according artisanal fishing boat satellite tracks; where eight individuals of this species were identified at Taïgbé, Dapiar and Yongonsal.

Considering the limited amount of information available it is not possible to assess whether this species or other cartilaginous fish identified trigger critical habitat. Nonetheless, mitigation measures associated to port/dredging operations will be implemented to ensure NNL.

Figure 1.26 Glaucostegus cemiculus range in relation to DMU

Fontitrygon margarita

This species is a large (to 65 cm disc width) demersal ray from West African marine and brackish waters, including lagoons and estuaries. It has been reported as common in a wide range of coastal and estuarine fishing gears, and is marketed for human consumption. The species is now reportedly uncommon in catches and it is assessed as Endangered on the basis of a significant decline that is likely to continue as a result of continued intensive and unregulated fishing pressure for this large ray within its limited range (Compagno & Marshall, 2016).

Figure 1.27 Fontitrygon margarita range in relation to DMU

Afrithelphusa monodosa

The Purple Marsh crab has already been assessed in the previous section. Known locations where it has been found are associated to the Kamsar KBA

(described further below in this document), though it seems unlikely to be found within the proposed DMU. Considering the limited amount of information available on the presence of this species within the DMU, it is not possible to assess whether it triggers Critical Habitat. Nonetheless, mitigation measures will be implemented to ensure NNL for this species.

Vulture species

Hooded vulture has been identified in the Kamsar area according to *Wright et al., (2006)*, as well as having been observed at four locations near Kamsar during the 2014 CBG concession surveys *(EEM, 2014*); the latter studies also observed White backed vultures in the Kamsar study area.

As described in the earlier section on vulture species at the mine site (*Section 1.4.1.1*) these are wide ranging species often associated with anthropogenic environments, being difficult to assign a sensible DMU for the species; thus these are not considered a Critical Habitat triggers under this assessment. Nonetheless, mitigation measures will be required to demonstrate NNL for this species.

Marine turtles

No evidence of sea turtle nesting had been identified in the 2008 GAC SEIA, but both the 2008 ESIA as well as subsequent baseline observation performed by ERM in 2014 did identify potential nesting sites (e.g. sandy beaches) within the project area of influence, and thus the potential for additional sites within the large proposed DMU.

EEM (2014) observed one individual of Hawksbill Turtle *Eretmochelys imbricata* off the southwest tip of Binari island (southernmost section of the proposed DMU), as well as a carapace of Green turtle *Chelonia mydas* at a fishermen camp in north-west Binari island.

Sea turtles are a wide ranging species, and application of the DMU to this species is difficult, together with limited information on the use of the area by part of any of the turtle species it is not possible to ascertain if any of these can be considered a Critical Habitat trigger under this assessment. Considering their presence has been verified, mitigation measures will be required to demonstrate NNL for them.

Chelonia mydas and Eretmochelys imbricata

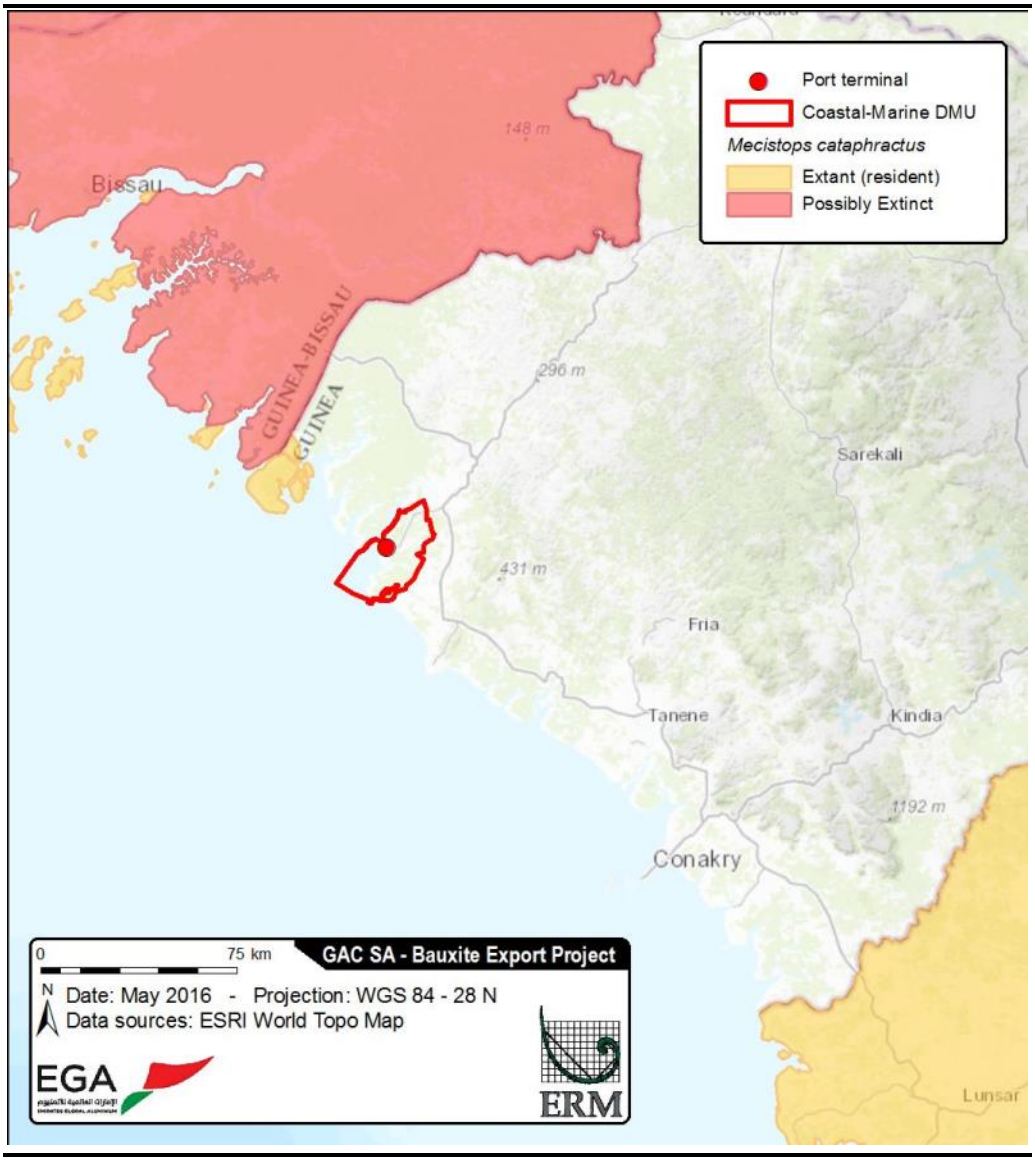
Both the Green and Hawksbill turtle have circumglobal distribution, occurring throughout tropical and, to a lesser extent, subtropical waters; they are highly migratory and undertake complex movements and migrations through geographically disparate habitats. Nesting occurs in more than 80-70 countries worldwide respectively (*Seminoff, 2004; Mortimer & Donnelly, 2008*). WWF (2004) indicates that nesting sites are found mainly on the islands of Loos, Sobanè, Goret, Tougnifilidi, Kountousadé, Khoundindé, Belair, Koukoudé,

Böngölön, and Poukhoun, and on the islands of the Cape Verga, to the southeast of the DMU. Also, according to Flora & Fauna International (FFI), green turtles have a major nesting site near Guinea Bissau (IFC, pers. comm.).

Mecistops cataphractus

In the case of the Slender-Snouted Crocodile, this species is described as present in two separate regions, West and Central Africa. Ongoing taxonomical revisions may even further divide these two populations in two divergent taxa within the species (*Shirley, 2014*). There are no confirmed records for Guinea to date, although it is considered likely to occur in the country. Given the freshwater habitat preferred by this species, it is not expected to occur within the marine and brackish waters of the Rio Nuñez estuary (EEM, 2014). Considering the lack of data, especially for Guinea and the DMU (*Figure 1.28*), it cannot be assessed if it triggers critical habitat under Criterion 2.

Figure 1.28 Mecistops cataphractus range in relation to DMU



1.5.1.2 Criterion 3

Migratory species identified in the coastal-marine DMU

Sections 7.16, 7.17 and *7.19* of the SEIA Addendum (2015) provide a list of species recorded within the GAC Port-Terminal areas during the field surveys. Of these, some 40 species are characterized as migratory (both birds and turtles, *see Table 1.8*). All bird species are listed as Least Concern (LC) by the IUCN with the exception of Eurasian Curlew *Numenius arquata* which is listed as Near Threatened (NT), and all of the identified marine turtle species.

Table 1.8 ***IUCN Red List of migratory species found in the Port-Terminal area of influence.***

Class - *species*	Common name	Red list status	Guinean status
Aves			
Actitis hypoleucos	Common Sandpiper	LC	-
Alcedo cristata	Malachite kingfisher	-	-
Ardea alba	Great White Egret	LC	-
Ardea cinerea	Grey Heron	LC	-
Ardea melanocephala	Black-headed Heron	LC	-
Ardeola ralloides	Squacco Heron	LC	-
Bubulcus ibis	Cattle Egret	LC	-
Calidris alba	Sanderling	LC	-
Calidris canutus	Red Knot	LC	-
Calidris ferruginea	Curlew Sandpiper	LC	-
Calidris minuta	Little Stint	LC	-
Charadrius dubius	Little Ringed Plover	LC	-
Egretta garzetta	Little Egret	LC	-
Mesophoyx intermedia	Intermediate egret	-	-
Glareola pratincola	Collared Pratincole	LC	-
Haematopus ostralegus	Eurasian Oystercatcher	LC	-
Himantopus himantopus	Black-winged Stilt	LC	-
Hirundo lucida	Red-chested Swallow	LC	-
Ixobrychus minutus	Common Little Bittern	LC	-
Larus ridibundus	Black-headed Gull	LC	-
Limosa lapponica	Bar-tailed Godwit	LC	-
Merops persicus	Blue-cheeked Bee-eater	LC	-
Milvus migrans	Black Kite	LC	-
Numenius arquata	Eurasian Curlew	NT	-
Numenius phaeopus	Whimbrel	LC	-
Pandion haliaetus	Osprey	LC	-
Pelecanus onocrotalus	Great White Pelican	LC	-
Calidris pugnax	Ruff	LC	-
Pluvialis squatarola	Grey Plover	LC	-
Recurvirostra avosetta	Pied Avocet	LC	-
Riparia riparia	Sand Martin	LC	-
Streptopelia semitorquata	Red-eyed Dove	LC	-
Threskiornis aethiopicus	African Sacred Ibis	LC	-
Tringa nebularia	Common Greenshank	LC	-
Tringa ochropus	Green Sandpiper	LC	-
Tringa totanus	Common Redshank	LC	-
Vanellus spinosus	Spur-winged Lapwing	LC	-
Reptiles			
Eretmochelys imbricata	Hawksbill turtle	CR	Annex I
Dermochelys coriacea	Leatherback turtle	VU	Annex I
Lepidochelys olivacea	Olive ridley turtle	VU	Annex I
Caretta caretta	Loggerhead turtle	EN	Annex I
Chelonia mydas	Green turtle	EN	Annex I

No migratory or congregatory bird species have been found to trigger critical habitat under Criterion 3. Whereas for the case of turtles, no information is available about the presence of minor-major turtle nesting sites within the

Kamsar sub-prefecture that could suppose the presence of over 1% of a turtle species global population.

1.5.1.3 Criterion 4

The current habitat classification used in this report is explained in *Section 7.18* of the original ESHIA. These habitats are an integral part of a Guinean Mangrove ecoregion.

The Guinean Mangrove ecoregion encompasses the best developed mangroves in Western Africa, providing important habitat for migratory birds and endangered species such as the West African Manatee and the Pygmy Hippopotamus. The mangroves areas are nowadays considerably modified by urban encroachment, with land uses such as industrial and agricultural applications forming a mosaic close to populated areas and other significantly large areas that still retain their natural state. WWF categorizes this ecoregion as Vulnerable.

- Coastal and Estuarine: the coastline that characterizes the DMU is highly conditioned by the freshwater flows from Rio Nuñez, specifically high levels of suspended sediment and a soft substrate seabed. These estuarine conditions thus provide for a rich and characteristic biodiversity of these types of habitats. Estuarine environments may vary from lagoons to high discharge rivers to inverse hypersaline estuaries (*Baran, 2000*). The West African coastal zone is rich in estuaries and lagoons. Estuaries are abundant in the area from the Senegal to Guinea; whilst lagoons are generally present from Côte d'Ivoire to the Niger Delta in Nigeria (*Teugels and Falk, 2000*). This type of habitat can be considered a **mix of modified/natural habitat**.

- Intertidal mudflats and sandbanks: mudflats and sandbanks are a common occurrence where marked tidal regimes will leave areas cyclically exposed. The granulometry of the sediment will vary according to the energy of the currents involved (low energy usually associated to silty/muddy surfaces, while higher energy can be sandy/coarse material). The occurrence of this type of habitat will be mostly associated with coastal oceanographic conditions (with or without estuarine conditions). Since these habitats are relatively dynamic (e.g. sandbanks can be modified by currents and storm surges), they are thus considered as **natural habitat**.

- Sandy beaches: commonly associated to areas of high energy, and a common occurrence along the African coastline. The occurrence of this type of habitat in the DMU is most evident in more exposed coastline areas south of Kamsar where narrow beach strips can be observed. Beaches are also considered to be dynamic, with strong currents and

swells being responsible of constantly shaping existing areas, thus considered a **natural habitat**.

- Mangroves: significantly large areas of mangroves can be observed directly adjacent to the coastline, as well as inland, through intricate freshwater channels. *UNEP (2007)* estimated that mangrove areas in Guinea have been subject to a moderate decline from 1980 (close to 3000 km²) to 2006 (close to 2000 km²), where the key driver of change has been identified as the rapid population growth in the coastal zone, which can be evidenced by the significant construction of housing adjacent to the Boké-Kamsar road (and railroad) as well as the significant area of agricultural fields (e.g. rice paddies). Other identified threats are wood and salt extraction. It is worth noting in this section that sensitive species such as Chimpanzees and Red Colobus may use this type of habitat, though there is no information in regards to the abundance of this species within the DMU or other mangrove areas in Guinea. Significant areas of mangroves are present within the DMU, especially adjacent to the coastline and thus still provide much of the ecosystem services (e.g. sediment retention, storm surge protection) which they are renowned for, and thus considered a **natural habitat**.

- Modified lands: significant areas exist where agricultural/industrial practices have replaced once a natural mangrove area, but as in the case of inland rural areas may still provide a viable habitat for fauna species. These lands are considered as **modified habitat**.

Table 1.9 Critical habitat identification of highly threatened or unique ecosystems

Identified habitat within the DMU	Similar designations and/or habitats	Critical habitat criteria			Critical habitat trigger
		At risk of significantly decreasing in area or quality	Small spatial extent	Presence of unique assemblages of species	
Coastal and Estuarine Habitats	Subtidal zone	No	No	No	No
Intertidal Mudflats and Sandbanks	Intertidal zone	No	No	No	No
Sandy Beach	n.a.	No	No	No	No
Mangroves	n.a.	Yes	Probable	Probable	Yes
Modified lands	Agricultural and Industrial areas	No	No	No	No

1.5.1.4 *Criterion 5*

The coastal-marine DMU is within the Guinean mangrove ecoregion. Topographically, it is located over a landscape unit that ranges from 10 to 100

m spanning a mosaic of habitat types which have limited "intra-variation" attributes; factors expected to have a minor contribution towards evolution and speciation processes.

The Guinean mangroves of the coastal-marine DMU area are considered to be part of a Global 200 site (WWF Scientific code: AT1403), acknowledged by the importance of mangroves towards the conservation of natural attributes such as serving as habitat for migratory birds and endangered species such as the West African Manatee *Trichechus senegalensis* and the Pygmy Hippopotamus *Choeropsis liberiensis*.

Both the Pygmy Hippopotamus and the West African Manatee are considered to be Evolutionarily Distinct and Globally Endangered (EDGE) species. The Republic of Guinea has a fragmented Pygmy Hippo population occurring in the forest zone of the south-east. There are records since 2000 from the Ziama Biosphere Reserve, Diécké Forest Reserve, Mont Béro Reserve, and also in Tinzou Community Reserve (*Ransmom et al., 2015*); thus are not expected to be found in the Project DMU.

Trichechus senegalensis

Limited information is available on the West African Manatee in Guinea. The country has extensive suitable habitat, but no systematic studies have been carried out. Manatees occur in the Soumba, Konkouré and Fatala estuaries, Sangareyah Bay, Rio Komponi, Rio Nuñez and the border area of the Guinean southern coast, notably in the Benty estuary. In Boffa and Boké, Manatees have been observed during the rainy season, in channels when they are feeding (*Diagne, 2015*)

The CBG expansion SEIA (*EEM, 2014*) observed a single individual during a 2013 field survey between the Island of Binari and the Bank of Dapiar, indicating that the species is frequently mentioned as being present in the Rio Nuñez Estuary according to fishermen interviews. Furthermore, the study indicates that in March 2014, a manatee was hit near the beginning of the CBG dredged channel and captured and sold at the fishing port of Kamsar.

Considering the lack of data, it cannot be assessed if the DMU contains any significant populations/ subpopulations of this species to triggers Critical Habitat under Criterion 5. Nonetheless, mitigation measures will be implemented to ensure NNL for this species.

Figure 1.29 Trichechus senegalensis range in relation to DMU

1.5.1.5 *Protected areas and/or Internationally recognized areas*

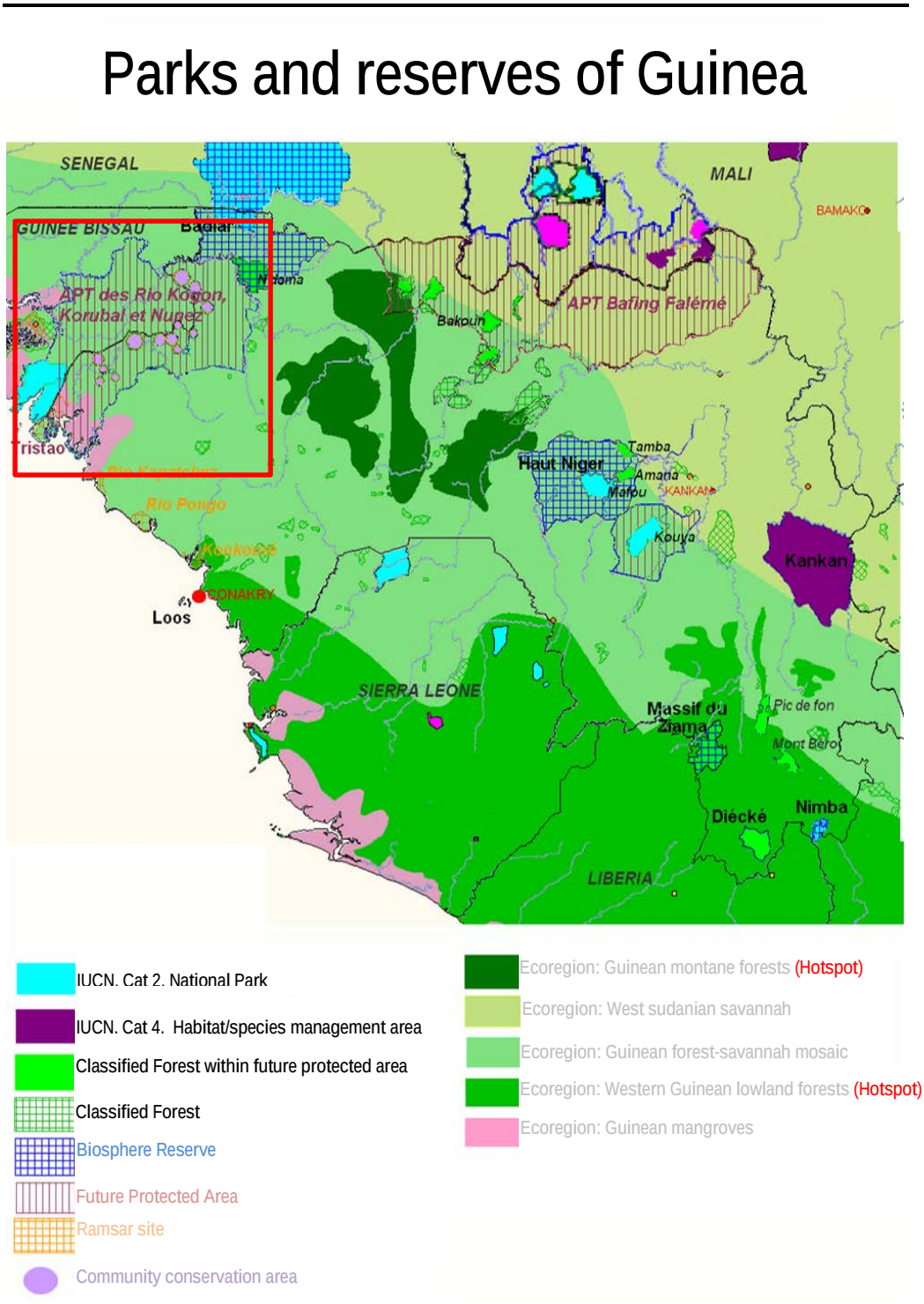
Rio Kogon, Korubal & Nuñez Transboundary Area

Established in 2006, it covers a vast area of about 1.7 million ha of which 800,000 ha are in Guinea (*USAID, 2012*). Its objective is to create a reserve that is co-managed with the population, with both community conservation areas and strictly protected areas. The area is shared between the watersheds of Rio Corubal (Koliba) and Kogon and, to a lesser extent, Rio Gêba (Kayanga) Rio Cumbija (Balana) and Rio Nuñez. It includes a forest-savanna mosaic in and along the coastline on a 20 to 80 km wide band, along with sub-humid dense forest and mangrove, though dense forests actually present occur only in relatively small areas *(IUCN/PACO, 2008*).

The AGIR project had identified 42 community conservation areas (ZCC) in the Guinean part of the reservation: 14 have been delimited (51,849 ha), 9 were

in the scoping phase, 19 were being implemented. The assumption of the project was to give these ZCC the status of community forests at a national or cross-border level (*IUCN/PACO, 2008*).

Figure 1.30 Location of the Rio Cogon, Korubal and Nuñez Transboundary Area



Source: IUCN/PACO, 2008. Rio Cogon, Korubal and Nuñez Transboundary Area shown in red outline

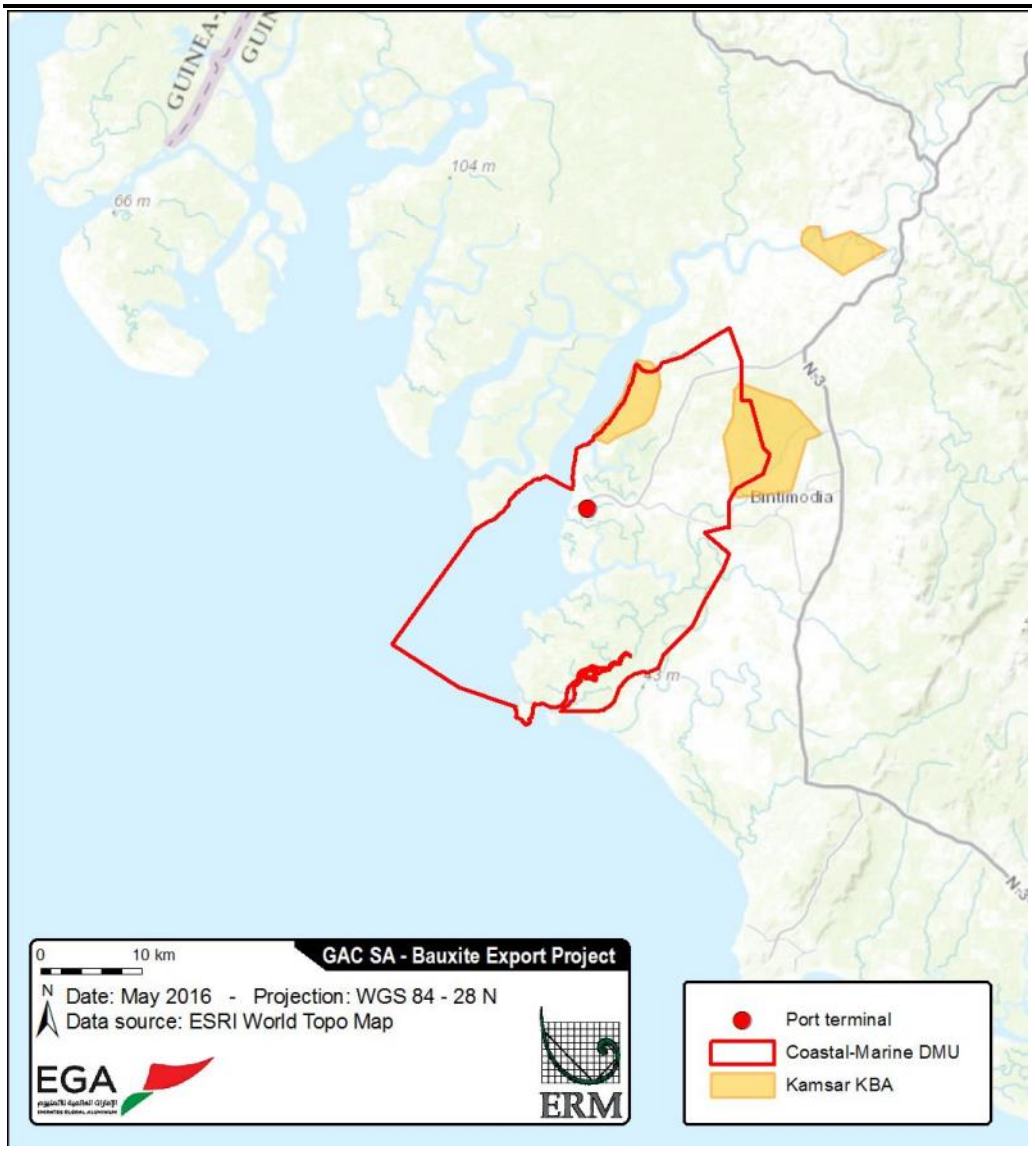
Kamsar Key Biodiversity Area

This site has been designated for the Western Chimpanzees identified at the site (*Wright et al., 2006*) as well as for the Purple Marsh Crab *Afrithelphusa monodosa. EEM (2014)* indicates that the Kamsar KBA designation may have to be subject to review, since it is suggested that chimpanzees no longer occur in the Kamsar area. The same is partially applicable for *A. monodosa*; considering that latest surveys where it has been identified are located to the Northwest of the village of Kamsar (i.e. Sarabaya and Batipon locations (*Wright et al., 2006*); within the KBA).

During the rail ESIA (ERM, 2016), specific biodiversity surveys were conducted in the area of the Kamsar KBA that is crossed by the rail (the northernmost area). The site is a large wetland mainly covered with rice fields. Other identified natural habitats include wooded savanna and gallery forests, mainly along the Rio Nuñez. No species of conservation concern were recorded during the surveys, but the presence of some of these species (especially *A. monodosa*) cannot be excluded.

Following a precautionary approach, the three areas that compose the Kamsar KBA can be considered as Critical Habitat.

Figure 1.31 Location of Kamsar KBA in relation to DMU



Source: Birdlife, 2015d

Rio Kapatchez Important Bird and Biodiversity Area (IBA)

The Rio Kapatchez IBA is located to the south of the DMU (partially overlapping), where main biodiversity features that characterize this area, according to *Birdlife (2015d)* are:

- Mudflats used by *Phoenicopterus minor* (counts of 5,000–10,000 individuals), *P. ruber* and *Recurvirostra avosetta*.

- Several waterbird species nest in the mangroves such as: *Scopus umbretta*, *Ciconia episcopus* and, possibly, *Mycteria ibis*. In addition, large numbers of wintering waders use the mudflats.

- A sandy islet known as Khôni Benki is an important high-tide roost for waders.

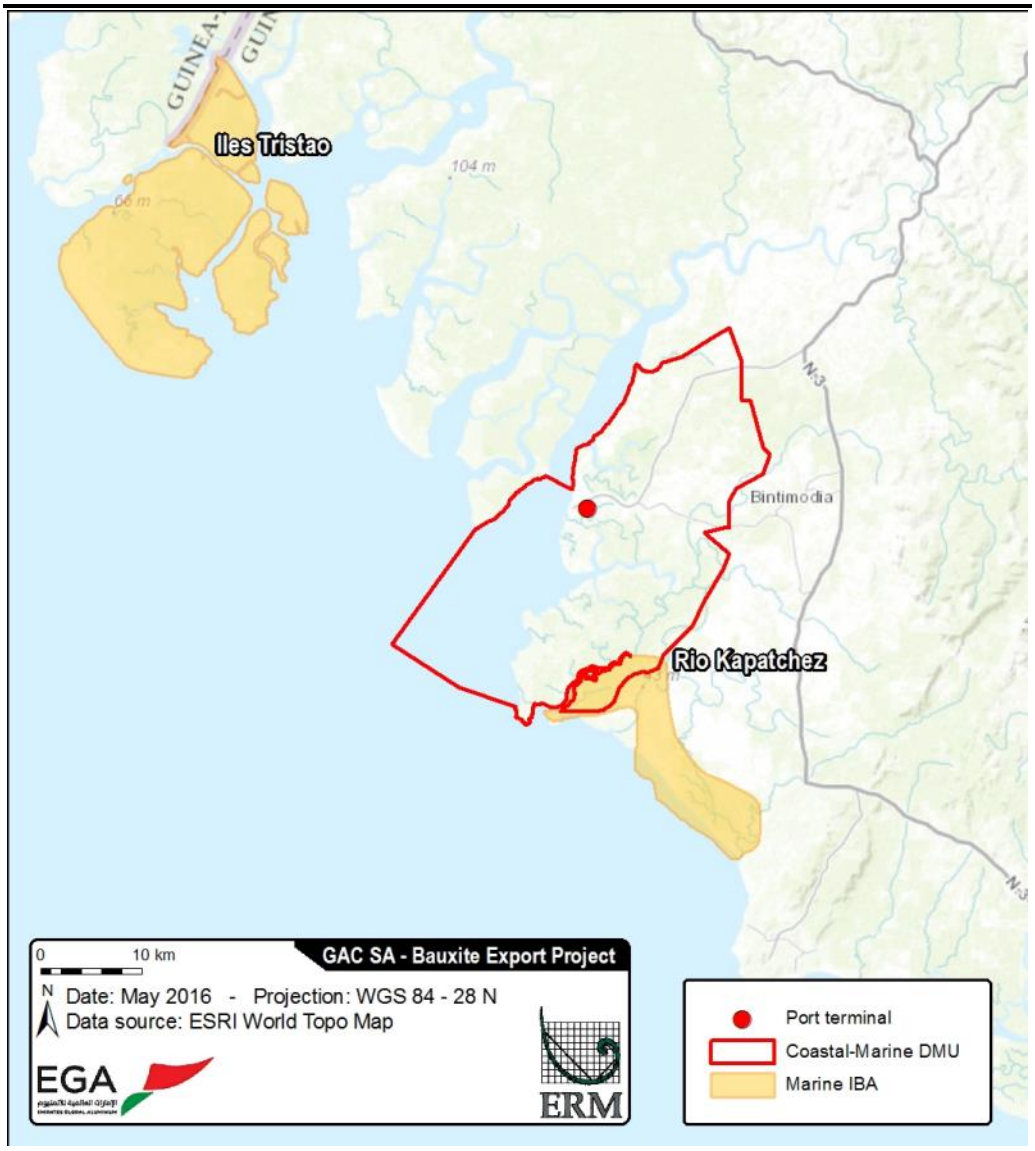
- Freshwater marshes and rice-fields are used by nesting *Phalacrocorax africanus*, *Anhinga rufa, Casmerodius albus, Dendrocygna viduata* and probably, *Ardeola ralloides*.

A recent report by *Birdlife (2013)* indicates that this site may no longer meet IBA criteria, since according to recent surveys the site appears to no longer support the bird populations it once did in the past. *Veen et al. (2009)* found no sign or presence of any breeding colonies or suitable sand banks to support roost sites (e.g. that were not inundated at high tide). Moreover, Khoni Benki, a former seabird breeding colony, had disappeared due to high tide inundation. The two species that trigger the IBA Criteria A4 for congregations are the Little Tern (*Sternula albifrons*) and the Royal Tern (*Thalasseus maximus albidorsalis*). The Wetlands International waterbird database indicates global population estimates at 190,000 and 225,000 indivduals respectively. According to the Birdlife Rio Kapatchez Data sheet, indidivualsas of S. albifrons and T. maximus where estiomated in 1,800 and 1,470 inidivduals, hence not triggering the Criterion 3 Tier of habitat sustaining over 1% of the global population.

Figure 1.32 shows the location of identified Important Birds Areas (IBA's) in relation to the DMU, where the two most notables IBA's defined by Birdlife Criterion A4 (Congregations) are located to the east and south of the DMU, being Îles Tristao (>30 km) and Rio Kapatchez within the DMU) respectively.

There is currently no information available that may characterize the coastal marine DMU as representing a major flyway where migratory birds would congregate on a cyclical/regular basis in a number in excess of 1% of its global population. Though the Rio Kapatchez IBA may unlikely be impacted from Project activities, the IBA can be considered as a Critical Habitat and mitigation measures will be implemented to ensure NNL for these sensitive species.

Figure 1.32 Location of Important Bird Areas (IBA's) in relation to DMU



Source: Birdlife, 2015, modified by ERM

1.5.2 *Conclusions of critical habitat assessment for the Port Area*

The Atlantic Humpback Dolphin has been found to trigger Critical Habitat for the proposed Port DMU, though subsequent monitoring surveys as part of GAC's Environmental Monitoring Program, may further reveal data that can support the inclusion of additional Critical Habitat trigger species.

In terms of habitats, the mangrove habitat is considered to represent a Critical Habitat, given its relative historical decline within West Africa as well as within Guinea, whilst ongoing anthropogenic activities (e.g. habitat conversion for agricultural uses, further port expansions from other operators, etc.) will continue to exert pressure on this type of habitat.

The Kamsar KBA and the Rio Kapatchez IBA, both of which partially overlap with the DMU, are identified as Critical Habitat, even though both sites might

not be as sensitive as previously thought. Also, as put in GN117 of IFC PS6, "*Projects proposed inside legally protected or internationally recognized areas should result in tangible benefits to the conservation objectives of that area*".

It should be noted that all the species identified in this section (*Section 1.5.1*), whether triggers (regardless of Tier designation) or not, will be considered in subsequent monitoring surveys as part of GAC's Environmental Monitoring Program and Biodiversity Management Plan, with directed actions (e.g. surveys in all types of habitats) to confirm their presence/abundance in the concession and application of NNL/NG measures.

Table 1.10 Summary table of Critical Habitat designations for the Port DMU

Trigger	Criteria	Tier	Assoc. Habitat
Sousa teuszii (species)	1	2	Coastal and inshore waters
Mangroves (habitat)	4	n.a.	n.a.
Kamsar KBA	LPIRA	n.a.	Rice field, gallery forests, wooded savanna
Rio Kapatchez IBA	LPIRA	n.a.	Mangroves, sand dunes, rice fields, mud flat

(P): indicates that the assessment of CH has been made on a precautionary basis.
PA / IRA= Legally protected and internationally recognized area

Table 1.11 Summary table for species requiring as minimum NNL measures for the Port DMU.

Species	Assoc. Habitat
Afrithelphusa monodosa	Agricultural Mosaic
Necrosyrtes monachus	Tree savannah, Agricultural Mosaic
Gyps africanus	Tree savannah, Agricultural Mosaic
Gyps rueppelli	Tree savannah, Agricultural Mosaic
Chelonia mydas	Coastal and inshore waters
Glaucostegus cemiculus	Coastal and inshore waters
Eretmochelys imbricata	Coastal and inshore waters
Fontitrygon margarita	Coastal and inshore waters
Trichechus senegalensis	Coastal and inshore waters

1.6 *IMPLICATIONS OF THE CRITICAL HABITAT ASSESSMENT UPDATE*

The recent availability of additional information on the biodiversity features that characterize the projects area of influence have allowed the review of the revised version 02 CHA for the Mine and Port Areas of the GAC SEIA to be three-fold:

I. Confirm the original Critical Habitat triggers that had been identified in the original and revised versions;
II. Consider additional Critical Habitat triggers as well as additional species of conservation/stakeholder importance that due to lack of information had not been identified or deemed to trigger Critical habitat.
III. For all CR/EN and endemic species where the CH analysis was unable to determine CH trigger status due to 'lack of information' the achievement of NNL for these species will act as a proxy.

The SEIA Addendums (2015 & 2016) documents presented for sensitive biodiversity a series of management actions (i.e. Terrestrial Biodiversity and Marine Biodiversity Management Plans) that are envisaged or currently being implemented by GAC in order to provide NNL/NG as per IFC PS6 requirements in both critical and natural habitats in order for all species to have associated mitigation measures, and that sufficient information is obtained through subsequent surveys to allow for NNL.

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