National Action Plan for the Conservation of the Pygmy Hippopotamus in Liberia

Produced by

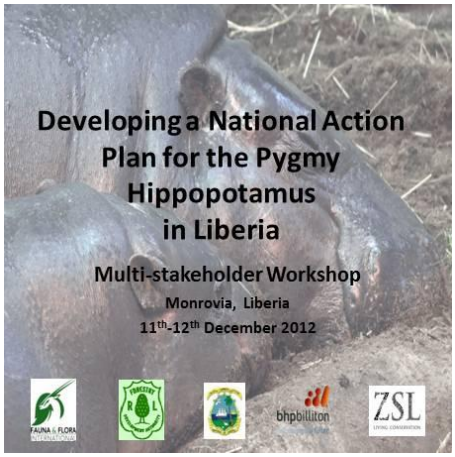
Fauna & Flora International

and

Forestry Development Authority

National Action Plan for the Conservation of the Pygmy Hippopotamus in Liberia

This Action Plan was produced following a multi-stakeholder workshop 'Developing a National Action Plan for the Pygmy Hippopotamus in Liberia', held in Monrovia on the 11th and 12th of December, 2012, funded by the Flagship Species fund and BHP Billiton.



Compiled by: David Mallon, Chloe Hodgkinson and Martina Vogt

With contributions from BirdLife International, Environmental Protection Agency, Farmers Associated for the Conservation of the Environment, Forest Cry Liberia, Forestry Development Authority, Institute for Breeding Rare and Endangered African Mammals (IBREAM), Phillip Robinson, Pygmy Hippo Foundation/Hummingbird Resources, the Zoological Society of London and the Society for the Conservation of Nature in Liberia.

This Action Plan was produced in collaboration with the IUCN/SSC Hippo Specialist Group's Pygmy Hippo Subgroup

Recommended citation: FFI and FDA (2013) National Action Plan for the Conservation of the Pygmy Hippopotamus in Liberia. Fauna & Flora International, Cambridge, UK and Forestry Development Authority, Monrovia, Liberia.

ACKNOWLEDGMENTS

This Action Plan would not have been possible without the input and support of a wide range of partners. We are grateful in particular to Martina Vogt for organising the workshop and to David Mallon for facilitating the workshop and drafting the document. Thanks are due to the Flagship Species Fund and BHP Billiton for funding the event and making the Action Plan possible. Many thanks to all the participants at the workshop for generously contributing their time and expertise. Particular thanks are due to Chris Ransom, Annika Hillers, Albert Schenk, Monique Paris, Phillip T Robinson, Matt Jones, Alex Peal and Beatrice Steck for commenting on early drafts of this document. Finally we are also grateful to the members of the IUCN/SSC Hippo Specialist Group's Pygmy Hippo Subgroup and the co-chairs, Chris Ransom and Monique Paris in particular, for providing strong technical support and enthusiasm throughout the process.

CONTENTS

ACRONYMS

ARTP	Across the River- A Transboundary Peace Park for Sierra Leone and Liberia
CEPF	Critical Ecosystem Partnership Fund
CF	Community Forests
CI	Conservation International
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
EPA	Environmental Protection Agency
ESIA	Environmental and Social Impact Assessment
EU	European Union
FDA	Liberian Forestry Development Authority
FFI	Fauna & Flora International
FMC	Forest Management Concessions
FSC	Forest Stewardship Council
FTI	Forestry Training Institute
GEF	Global Environmental Facility
GOL	Government of Liberia
IBREAM	Institute for Breeding Rare and Endangered African Mammals
IUCN	International Union for the Conservation of Nature
MUR	Multiple Use Reserve
NF	National Forest
NP	National Park
NR	Nature Reserve
PARCC	Protected Areas Resistant to Climate Change
PHF	Pygmy Hippo Foundation
PHWG	Pygmy hippo working group
PPA	Proposed Protected Area
RAP	Rapid Assessment Surveys
RSPO	Round Table for Sustainable Palm Oil
SCNL	Society for the Conservation of Nature in Liberia
SCPSC	IUCN's Species Conservation Planning Sub-committee
SCS	Species Conservation Strategy
TSC	Timber Sales Concessions
ZSL	Zoological Society of London

1 INTRODUCTION

1.1 Pygmy hippopotamus *Choeropsis liberiensis* (Morton, 1849)

The pygmy hippo is endemic to the Upper Guinea Forest of West Africa and occurs in four countries: Liberia, Côte d'Ivoire, Guinea and Sierra Leone. A suspected population in Nigeria has apparently become extinct. The historical range has become much more fragmented as forest cover has been reduced, populations have disappeared from many former sites and local extinctions have taken place. The majority of the remaining populations are found in Liberia, with populations in the other three countries found close to the Liberian border. The global distribution, status and biology are summarised by Robinson (2013).

The pygmy hippo is listed as Endangered on the IUCN Red List. Actual population size is unknown but suggested to be less than 3,000. Populations are assumed to be decreasing due to severe habitat loss and offtake for meat (Lewison & Oliver 2008). It is included in Appendix II of CITES (as *Hexaprotodon liberiensis*) which provides some controls on international trade.

1.2 National Action Plan Workshop

A Regional Conservation Strategy for the pygmy hippo was developed in December 2010 at a workshop held in Monrovia that involved stakeholders from the four range countries and international experts (Mallon et al. 2011). One of the main recommendations of the regional strategy was that each country should develop a national action plan to identify the specific conservation measures needed and facilitate their implementation.

A workshop to develop a national action plan for the pygmy hippo in Liberia was subsequently co-organised by Fauna & Flora International (FFI) and the Liberian Forestry Development Authority (FDA) and took place from 11 to 12 December 2012. The workshop was held at the Bella Casa Hotel in Monrovia and was well attended by 26 expert participants, including representatives from the IUCN Species Survival Commission Pygmy Hippo sub-group to the Hippo Specialist Group, FDA, Environmental Protection Agency (EPA), national police service, the private sector, civil society, local and international NGOs working on pygmy hippo conservation, and the press. Two people participated via a skype link and others who were unable to attend made contributions on the draft strategy Appendix 1 contains a list of participants and contributors.

The action plan and the structure of the workshop followed the Species Conservation Strategy (SCS) process developed by IUCN's Species Conservation Planning Sub-committee (SCPSC) and the workshop was facilitated in collaboration with SCPSC. The three key elements of SCS are a thorough status review, a threat analysis, and a core structure.

A draft status review and an updated map showing historical and recent distribution of the pygmy hippo in Liberia were compiled by FFI and circulated before the workshop. During day 1, a series of presentations were held by the various organisations detailing current work on the conservation of the Pygmy Hippopotamus in Liberia. The status review and distribution map were reviewed and further updated during the workshop and the final versions are included here.

The workshop began with a series of presentations on the role of key stakeholders and current conservation projects. A question and answer session and general discussion centred on the impact of the extractive industries, forestry management and the potential role of the private sector in

pygmy hippo conservation clarified several issues. The threats facing the pygmy hippo and its habitat were identified, discussed and prioritised.

During day 2, the Vision and Goals of the Action Plan were discussed and agreed, and a set of objectives and actions formulated to address the threats identified during day 1. Discussions were subsequently held as to which organisations would engage/lead particular actions. It was agreed to form a national Pygmy Hippo working group that would meet a minimum of once a year to monitor progress towards objectives and outcomes. Finally the meeting was closed by the Honourable Harrison S. Karnwea Sr., Interim Managing Director of the Forestry Development Authority. Appendix 2 contains the full workshop agenda.

Fig. 1. Delegates attending the Dec 2013 Workshop to prepare the first National Action Plan for the Pygmy Hippopotamus

2 STATUS IN LIBERIA

2.1 Distribution

Pygmy hippos were first recorded by Büttikofer (1890) who said they were present in most parts of Liberia that Europeans had visited, Johnston (1906) who described them as 'relatively rare' and Schomburgk (1912), who captured live animals for zoos. Local names in Liberia include water-cow, river-cow, num-bwey, nim'we, mali (Büttikofer 1890).

Very few details of the historical distribution are known, but it is generally assumed that pygmy hippos formerly occurred throughout Liberia. The original range has been reduced because of forest clearance, especially in the centre of the country, which now contains very little of the original forest cover. The global range has also decreased (Robinson 2013). Current distribution in Liberia is largely restricted to the south-east and north-west, coinciding with the largest remaining blocks of closed forest, as well as a small part of the Nimba region in the far north.

In the south-east there are confirmed recent (defined here as in the last 10 years) records (direct sighting, photograph, track or dropping) from Sapo National Park and adjacent areas, and along the Dugbe River to the north; Krahn-Bassa National Forest north-west of Sapo NP; in Grebo National Forest and nearby sites to the south and west; and along Kia Creek in Maryland/River Gee counties, including in the proposed Grand Kru-River Gee Protected Area. In 1998, pygmy hippo signs were reportedly abundant in the forests between the Cestos and Senkwehn rivers (Robinson and Suter 1999) and it is likely they still occur, although there although there have been no field surveys since then.

In the northwest, pygmy hippos are known to occur in the Gola National Forest and just outside to the east, and they were recorded on Across the River- A Transboundary Peace Park for Sierra Leona and Liberia (ARTP) field surveys in 2011-2012. ARTP surveys in Sierra Leone GRNP also obtained records along the Morro river which forms the Sierra Leone-Liberia border. Pygmy hippos have also been recorded in Wonegizi National Forest in the north of Liberia. There is some suitable habitat between Gola and Wonegizi but field surveys have not been conducted in them and it is not known whether pygmy hippos occur there.

The two main populations in Liberia are isolated from each other by an extensive area of unsuitable habitat, but each one lies close to populations in neighbouring countries: in the west, Gola National Forest and Gola Rainforest NP in Sierra Leone; Wonegizi and Ziama in Guinea; and in the East Grebo NF and Cavally Forêt Classée (Reserved Forest) in Côte d'Ivoire. Pygmy hippos occur in the Gola River and Cavalla River which form the borders with Sierra Leone and Côte d'Ivoire, respectively.

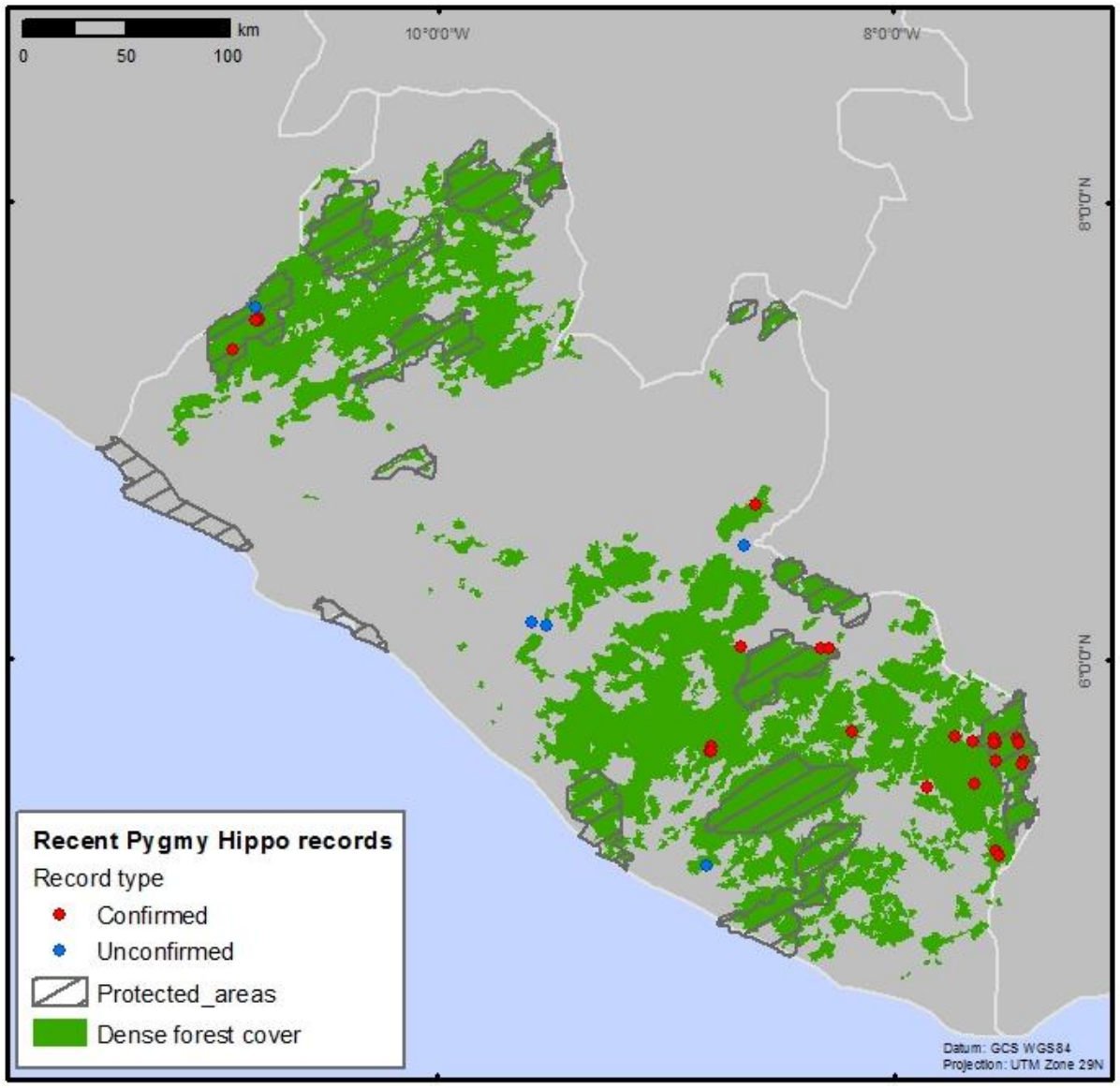


Fig 2. Recent records documented since Regional Review in Dec 2010

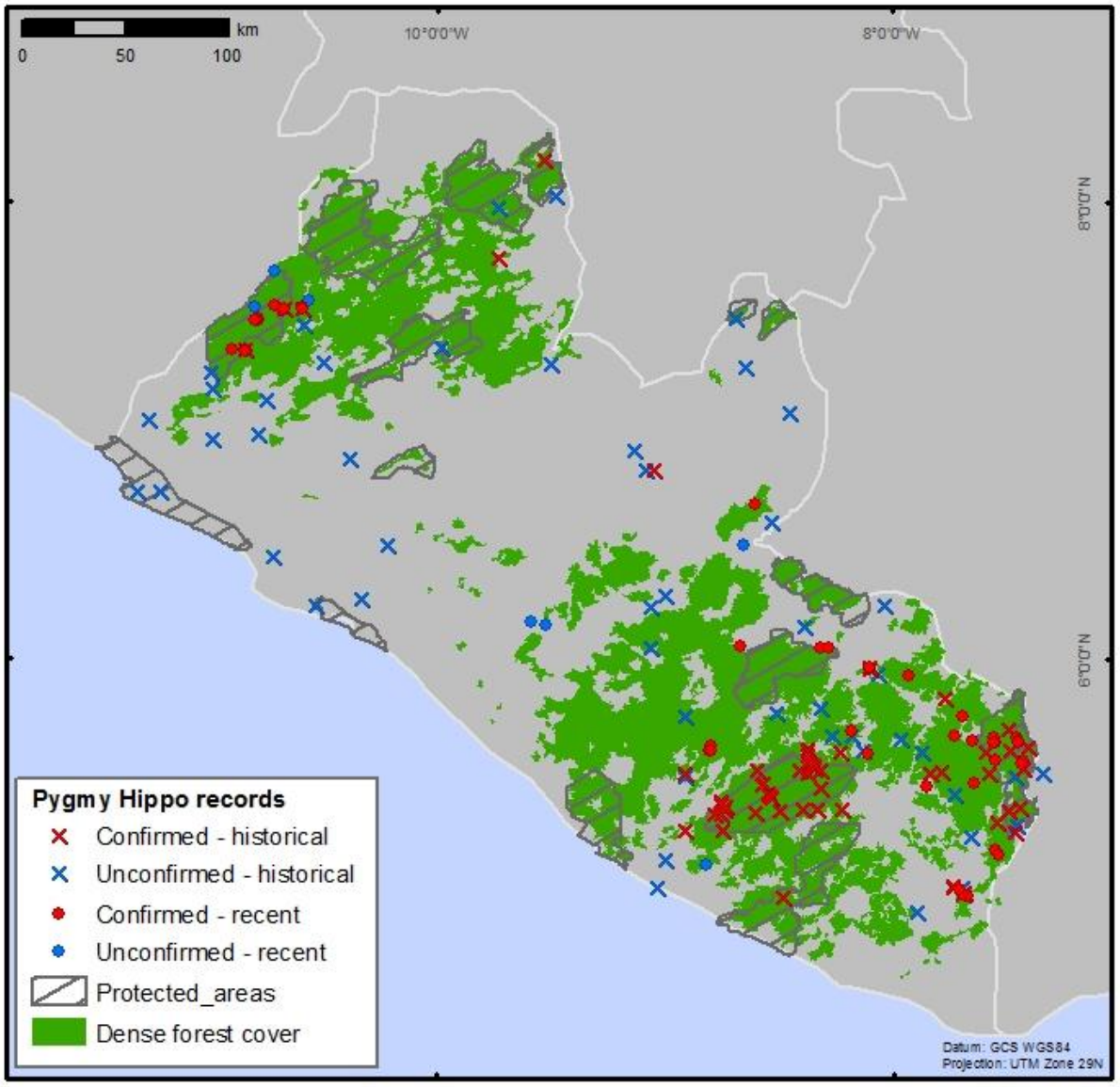


Fig. 3 Recorded incidence of Pygmy Hippos in Liberia- confirmed and unconfirmed, historical (older than 10 years) and recent (less than 10 years).

2.2 Population

The global population was been estimated at a maximum of a few thousand by Eltringham (1993) and revised to 2,000-3,000 in the IUCN Red List (Lewison and Oliver 2008). Previous estimates for Liberia were 'at least 1,000' (Verschuren 1982) and 'in the order of several thousand in 1983' (A.L. Peal, cited in Eltringham 1993). However, all these figures are based largely on informed guesswork and there is no reliable estimate of the current population size of the pygmy hippo population in Liberia (or any other countries), nor population estimates for individual sites. Recent field surveys and monitoring programmes (e.g., in Sapo National Park, Gola National Forest, Grebo NF) provide evidence of presence and some data on relative abundance but are insufficient to generate accurate estimates of density or numbers.

There is a well-managed captive population in US and European Zoos, numbering 339 animals on 31/12/2012 according to the latest edition of the international studbook (Zoo Basel 2013), although a skewed sex ratio at birth has become recently become evident.

All the indications from camera trapping and transects are that pygmy hippo numbers in Liberia are low. FFI's biomonitoring surveys in Sapo NP, 2007-2009, found pygmy hippo signs on all 16 transects established throughout the park, but only obtained 28 records in total (25 tracks, 1 dropping, 1 animal seen, 1 animal heard) giving an encounter rate of 0.12 signs/km. The trend over the three years was stable (0.09, 0.08, 0.14 respectively). During a camera-trap survey in August 2011 on lateral branches of the Sinoe River, 7/10 cameras photographed pygmy hippos and the encounter rate was 0.06 photos/day. In Gola NF, ARTP found that pygmy hippo signs were less frequent than those of elephant and chimpanzee, which are regarded as rare species there. The Wild Chimpanzee Foundation recorded over 2 signs/10km within most of Grebo Forest and less than 1 sign/10km over half their survey area in adjacent areas.

2.3 Trends

Pygmy hippo numbers globally are widely considered to be declining (Mallon et al. 2011, Robinson 2013) and the area of forest cover has certainly decreased. In Liberia, data from local hunter interviews carried out for rapid biodiversity assessments in five proposed community forest sites in Nimba and Grand Bassa counties indicate a declining trend over the past 10 years (Greengrass 2012).

Since the regional strategy meeting in December 2010, Liberia's pygmy hippo population is likely to have continued its decline due to on-going hunting and habitat loss. However, there has been an increase in monitoring programmes to increase local awareness and the capacity to protect this creature.

2.4 Importance of Liberia for pygmy hippos

Liberia lies at the centre of the pygmy hippo's historical and current distribution. It retains the largest proportion of the species' range, and the largest proportion (42%) of the remaining Upper Guinea Forest. Sapo NP is the second largest protected area in the region after Tai NP in Côte d'Ivoire and is a key site. The main Liberian populations are isolated from each other, but all have an important transboundary role. Liberia is therefore crucial to the conservation of the pygmy hippo.

3 CURRENT PYGMY HIPPO CONSERVATION ACTIVITIES

3.1 Legal

Pygmy hippos are protected under the National Wildlife Laws of Liberia, 1988 and under Section 9.12 of the Act Adopting the National Forestry Reform Law (GoL, 2006). Hunting, capturing or possession of such protected species is prohibited unless specifically authorized by the Forestry Development Authority. A new Wildlife Law has been drafted and is with the President for approval (anticipated for the end of 2013).

3.2 Habitat

Liberia is situated in the middle of the West African coast, bordered by Sierra Leona, Cote d'Ivoire and Guinea. With a total land area of 11.1 million hectares, it is covered in an estimated 3.4 million hectares of relatively intact Upper Guinea forest, widely recognized as a global biodiversity hotspot and home to more than a quarter of Africa's mammals (Myers et al. 2000). Extensive deforestation through the West African region, which has reduced the forest to around 14% of its original size, now means Liberia harbours around 42% of the last remaining Upper Guinea forest and two of the three largest remaining blocks.

The Upper Guinea Forest forms part of the Guinean Forest of West Africa global hotspot (Bakarr et al. 2004) and Conservation International (CI) has carried out a programme of forest cover assessments, corridor analysis, and rapid assessment surveys (RAP). These were not necessarily targeted at pygmy hippos, but at forest inventories. A programme of grants and investments was carried out under the Critical Ecosystem Partnership Fund (CEPF) up to the end of 2011 and a second round of CEPF funding has since been agreed.

3.3 Forestry Development Authority (FDA)

The Forestry Development Authority was created in December 1976 and has overall responsibility for national policy, legislation and management for forestry and wildlife. The policy is based on the Forestry Reform Law 2006 and National Forestry Policy and Implementation Strategy (GOL/FDA 2006). Part of FDA's institutional mandate is to integrate commercial, community and conservation forest use. The objectives for the forestry sector can be grouped into three broad themes: establishing a permanent forest estate made up of National Forests and National Parks/protected areas; optimising the contribution of forestry to the national economy; and increasing public involvement in forest conservation and management through the creation of communal forests and agroforestry programmes.

At present there are seven Forest Management Concessions (FMC) covering 1,007,266 ha (but only three are being actively operated at present); 10 Timber Sales Concessions (TSC) covering 50,000 ha (four in operation) and a currently unconfirmed number of Community Forests (CF). The issue of Public Use Permits (PUP) is under review.

The national forest policy aims to establish control over bushmeat hunting, to bring the level of hunting down a sustainable level and stop the hunting of protected species. Further responsibilities concerning wildlife conservation include: collecting and analysing biological and socio-economic

information; establishing an appropriate protected areas network; increasing community participation in wildlife management in all forest areas, in particular, through collaborative management of protected areas; increasing public awareness of forest conservation issues; strengthening and improving alternative livelihood opportunities to reduce rural dependence on forests and wildlife, and improving co-operation with neighbouring countries to address trans-boundary conservation issues.

Underfunding is a major obstacle to the FDA's effectiveness; for example, the current annual budget of $6 million is only 66% of the amount requested.

3.4 Environmental Protection Agency (EPA)

The Environmental Protection Agency was established in 2003 under the EPA Act and has executive authority over all environmental activities and programmes relating to environmental management in Liberia. It coordinates, monitors, supervises and consults with relevant stakeholders on all activities in the protection of the environment and sustainable use of natural resources.

3.5 Protected Areas

There are currently three officially recognised protected areas in Liberia (Table 1): Sapo National Park (180,365 ha), East Nimba Nature Reserve (13,579 ha) and Lake Piso Multiple Use Reserve (97,159 ha). Pygmy hippos occur in Sapo NP. They might have occurred in East Nimba in the past but today are most probably extirpated. They formerly occurred in Lake Piso with the last record approximately 40 years ago. Currently these PAs make up 4% of Liberia's land area.

Sapo National Park was Liberia's first protected area, established in 1983 and extended in 2003 to its current size. It is the second largest protected block of forest remaining in West Africa (after Tai NP in Côte d'Ivoire) and is a key site for pygmy hippos (Collen et al. 2008, 2011). Management effectiveness has increased and several thousand illegal miners were evicted from within the park in October 2010.

FDA has identified a set of proposed protected areas, which would increase PA coverage to 10% of the country (Table 1). Three priorities for gazettement are Gola, Grebo, and Wonegizi national forests, all of which contain pygmy hippo populations.

Gola National Forest has received significant funding allocated from various donors, including the EU, GEF, and the Aage V. Jensen Charity Foundation to assist ratification and gazettement, although progress has been slow. However, FDA has recently started a consultation process with local communities on demarcation of the boundary between the national forest and community forest. A memorandum of understanding was signed in December 2011 between the government of the Republic of Liberia and the government of the Republic of Sierra Leone on cooperation in management, research, protection and conservation of the Greater Gola Transboundary Peace Park.

Among the other Proposed PAs, Grand Kru-River Gee has recent records of pygmy hippos and they are also likely to be present in Senkwehn PPA.

Table 1. Protected Areas and Proposed Protected Areas in Liberia containing, or potentially containing, pygmy hippo populations

Site	Area (ha)	Pygmy hippo status[1]
Sapo National Park*	180,363	Confirmed recent
East Nimba NR*	13,500	Unconfirmed historical
Lake Piso MUR*	13,500	Confirmed historical
Proposed PAs		
Bong Mountain	24,813	Unknown
Foya	164,628	Unknown
Gbi	88,409	Unknown
*Gola Proposed National Park	88,000	Confirmed recent
Grand Kru-River Gee	135,100	Confirmed recent
Grebo National Forest	97,136	Confirmed recent
Kpo Mountains	83,709	Unknown
Krahn Bassa National Forest	513,962	Confirmed recent
Margibi Mangrove	23,813	Unknown
Senkwehn (Cestos)	80,328	Confirmed historical (1998)
West Nimba	10,482	Unknown
Wologizi - Wonegizi	137,427	Confirmed recent

[1]Confirmed recent occurrence (last 10 years)

*****Note that only the three Protected Areas and Gola Proposed Protected Area are under any kind of management for the purposes of the conservation of biodiversity

3.6 Society for the Conservation of Nature in Liberia (SCNL)

SCNL was founded in 1986 and is Liberia's oldest civil society conservation organization. Its mission is to safeguard the country's biodiversity and ecosystems for future generation and it supports responsible environmental stewardship for Liberia's remaining rainforest. SCNL received support in December 2012 from the Mohamed bin Zayed Species Conservation Fund to initiate an environmental awareness campaign in June 2013 entitled "Respect Our Environment Month", which coincides with World Environment Day on 5 June. The campaign will mark the 30th anniversary of the founding of Sapo National Park. The pygmy hippopotamus will also feature as Liberia's flagship wildlife species, as a follow up to the conservation workshop / strategy. The objective of this effort is to increase public awareness of the importance of environmental and wildlife conservation efforts in the future prosperity and heritage of the Republic of Liberia. One of the mechanisms for this program will be to encourage the inclusion of information about the environment in school curricula throughout the country.

3.7 Fauna & Flora International (FFI)

FFI were first invited to work in Liberia by SCNL in 1997. Since then they have led field activities for the Liberia National Forest Reassessment 2001-2004 and worked on strengthening forest management in post-conflict Liberia, 2005-2010. This has included working closely with the FDA to re-establish management of Sapo NP. A bio-monitoring programme has been run in Sapo NP from 2007-2012 which has investigated the distribution, abundance, habitat, and threats facing a number of key indicator species, including the pygmy hippo, using transects. Since 2010, the number of transects has increased to 89 and habitat descriptions have been added. A training programme was carried out for 25 FDA staff in revised monitoring protocols, navigation, habitat description, distance sampling, and basic computer operation.

The most recent initiative is the Sapo Conservation Centre (SCC). Constructed in early 2013, SCC is located within Jalay Town, adjacent to Sapo NP, Sinoe County. It has been established in collaboration with the Liberian FDA, the University of Liberia (UL) and the Forestry Training Institute (FTI). The Centre was created to train Liberian Forestry students and professionals in biodiversity conservation and research and to facilitate access to Liberia's biodiversity for national and international researchers. The Centre is intended to address the lack of capacity for applied conservation and ecological research. SCC is overseen by a Steering Committee, made up of Liberian Forestry Development Authority (FDA), the University of Liberia (UL), Fauna & Flora International (FFI), the Zoological Society of London (ZSL) and the Forestry Training Institute (FTI) representatives as well as representatives of the Environmental Protection Agency of Liberia (EPA) and the Liberian Ministry of Internal Affairs.

3.8 Pygmy Hippo Foundation (PHF)

The Pygmy Hippo Foundation is a UK registered charity established in July 2011 by Hummingbird Resources, a gold mining company. Its primary aim is to assist the development of Sapo NP and produce measures to protect the pygmy hippo, based on a catchment management approach. An MoU was signed in November 2012 between FDA, PHF and Leadership for Conservation in Africa (LCA) to carry out a feasibility study on an integrated conservation and development plan and Public-Private Partnership involvement in management of Sapo NP.

3.9 Across the River- A Transboundary Peace Park for Sierra Leone and Liberia (ARTP)

The ARTP Project began in May 2009 and covers Gola Rainforest National Park (Sierra Leone), the proposed Gola National Park (Liberia) and corridor areas between them. The project aim is to secure

the long-term conservation of the Upper Guinea Forests, their biodiversity and global carbon storage benefits through national and international partnerships for improved forest governance across the Sierra Leone – Liberia border. The pygmy hippo is a key landscape species for research activities in 2010-2012. From April 2011 to July 2012 67 2-km long transects were surveyed in Gola National Forest. Surveys in Gola Rainforest National Park in Sierra Leone also showed records of pygmy hippo along the border, but also a significant reduction in range. The project ends in 2013 so the future of work on the Liberian side is unclear. Research into the conservation genetics of pygmy hippo in Sierra Leone is continuing with the University of Chester, UK.

3.10 Institute for Breeding Rare and Endangered African Mammals (IBREAM)

Although not working in Liberia, some research projects in Tai NP in Côte d'Ivoire have the potential to be informative on pygmy hippo biology and ecology. Planned research projects for two PhD students 2013-2015 include: dietary analysis to establish the proportions of browse and graze; identifying the role of pygmy hippos in seed dispersal; estimating abundance and occupancy; identifying environmental and biological determinants of home range and denning sites; and health and disease considerations. Methods will include distance sampling from droppings; mark-resight; and GPS and VHF collaring devices, and IBREAM is currently testing a box trap for capture (as alternative to pitfall traps that are believed to cause morbidity and even mortality in cases). Recent reports from this work indicate that pygmy hippos do become habituated to these traps and have, on several occasions, been filmed walking through the open traps, although trapping has not yet been attempted.

3.11 Zoological Society of London

ZSL's EDGE (Evolutionarily Distinct and Globally Endangered) programme prioritises species that are both evolutionarily distinct and highly threatened for proactive conservation action. The pygmy hippo was ranked 21st highest mammal priority and has been selected as one of the 10 priority EDGE mammal species. ZSL has partnered FFI and FDA to implement a camera trapping study in Sapo National Park which recorded the first photograph and film of a wild Liberian Pygmy Hippo.

3.12 Other national NGOs

There are several NGOs working in the forest sector whose activities may have relevance for pygmy hippos. These include Forest Cry and Famers Associated to Conserve the Environment (FACE) which has been involved in linking farmers and communities with forest and mangrove management.

3.13 IUCN/SSC Hippo Specialist Group Pygmy Hippo Sub-group

While Pygmy hippos fall within the responsibility of the IUCN/SSC Hippo Specialist Group, a Pygmy Hippo Sub-group was formed in June 2009 to reflect the importance of the species. The group focusses on the need for coordinated interventions and the use of best practice to guide approaches. One of the group's first actions has been the production of the 2011 Regional Conservation Strategy, and members have been closely involved in the production of this Action Plan.

4 THREATS

The threat analysis involved participants working in small groups to identify the direct and indirect threats facing pygmy hippos and their forest habitats in Liberia, as well as underlying drivers and wider constraints affecting conservation action. Threats were then reviewed and prioritised in a whole-group session.

The most severe direct threat was agreed to be loss and degradation of forest cover. The impact of hunting on pygmy hippos seems to be uneven. Further threats were widespread lack of awareness at all levels of government and society of the pygmy hippo's importance and threatened status and the need for its conservation.

4.1 Habitat loss and fragmentation

The main causes of deforestation are commercial logging; mining; traditional slash-and-burn agriculture, especially for dry rice cultivation; agricultural expansion by smallholders, and clearance for commercial plantations, particularly rubber and oil palm (Christie et al. 2007, Norris et al. 2010).

Commercial plantations have the greatest impact as they replace destroy large areas of original forest cover and replace it with monocultures of non-indigenous species that support very little original wildlife, in particular those that depend on native forest. For example, 475,000 ha of primary forest have been cleared for rubber plantations (EPA 2008). Estimates of the overall rate of forest loss are 0.35-0.5% annually (Christie et al. 2007, Shearman 2009).

Extraction of mineral resources already generates a significant amount of Liberia's foreign exchange earnings. The country contains large deposits of iron ore, diamonds, and gold and more concessions have been granted that are still at the exploration stage. The severity and extent of the damaging impact depends in part on the type of mining - open cast, strip mining, deep mines and small-scale artisanal mining. In addition to the direct habitat destruction, mining may also increase sediment loads in rivers and cause pollution from chemicals used in extraction processes.

There are further secondary effects: construction of mining (and logging) roads opens up new areas to poachers and farmers and the presence of workers invariably increases local demand for bushmeat. Large infrastructure developments further increase fragmentation; for example, the proposed new railway from the Putu iron ore mine to the coast may pass east or west close to Sapo NP and will add an additional physical barrier to the movement of all terrestrial animals.

An Environmental and Social Impact Assessment (ESIA) is required for all major developments, but compliance and subsequent monitoring are in many cases inadequate. Ideally, all would be obliged to comply with the international standards, such as the International Finance Corporation (IFC) Performance Standards for mining developments, Round Table for Sustainable Palm Oil (RSPO) Principles and Criteria for oil palm developments, and Forest Stewardship Council (FSC) certification for timber concessions.

Fragmentation is a further consequence of habitat loss. The evergreen forest in the south-east is divided into sub-blocks by degraded forest, such as between the Grebo and Krahn-Bassa National Forests and Grebo National Forest and Sapo National Park. A degraded strip along the Liberia –Côte d'Ivoire border now separates Grebo National Forest in Liberia and Tai National Park in Ivory Coast.

Disturbance is yet another adverse factor. For example, it has been estimated that about 80% of Liberia's forests now lie within 3 km of a road (Shearman 2009).

4.2 Poaching

Bushmeat is an integral part of the diet in Liberia and across West Africa. Even where alternative meat sources, such as goat or chicken are available, it tends to be consumed only on special occasions, with bushmeat preferred as the 'everyday meat' (Greengrass 2011). Pygmy hippos are poached predominantly for meat, but some body parts may be used in rituals or folk medicine (Robinson 1970). The pygmy hippo's cryptic nature provides a degree of protection against hunting (Robinson 1971) and access becomes very difficult during the rainy season, which may also reduce the incidence of poaching. In some parts of the country, there is a traditional taboo against hunting pygmy hippos.

One survey of bushmeat hunting and consumption around Sapo NP (Greengrass 2011) revealed that in two villages, 80% and 92% of respondents had not eaten pygmy hippo meat in the previous year. However, two commercial hunting camps on the southern edge of SNP visited during the same survey had killed 2 and 4 pygmy hippos respectively in the previous few months.

It seems clear that commercial poaching poses a much bigger threat than local or subsistence hunting. Commercial poachers are better organized to hunt systematically, operate on a larger scale, are able to target larger species and have the resources to transport smoked or prepared meat to distant urban centres, thus greatly increasing the market for bushmeat consumption. Commercial hunting can also disrupt and outcompete local subsistence hunting.

The extent to which pygmy hippo is consumed is unknown and further complicated by the difficulty in diagnosing the species in markets once the meat is smoked ready for sale. While it is difficult to assess the impact overall of poaching on pygmy hippo populations, the removal of any individuals of a species living at low densities is potentially damaging to the population. Eradication of bushmeat consumption is completely unfeasible but aiming to reduce or prevent the harvest of key species such as pygmy hippo should be a realistic aim.

4.3 Policy and Institutional Weakness

A central challenge to better habitat protection is the lack of an integrated land-use strategy, whereby forestry, mining and agricultural concessions are granted by different government ministries or agencies with the result that many sites have overlapping designations.

Government development priorities are focused on minerals and agriculture, not biodiversity and budget allocation in all areas is generally inadequate. For instance, the FDA's annual budget is only 66% of what was requested, seriously hindering its effectiveness, and resulting in, amongst other issues, the delaying of the gazettement of new protected areas.

Related issues include lack of an appropriate land tenure system and land use feasibility studies, inadequate zonal regulations for villages, towns and unclear system of ownership and access to land (EPA 2008).

4.4 Lack of capacity

Because of the civil conflict that lasted for over 14 years and ended in 2003 there has been little opportunity to build capacity in natural resource management as the crisis disrupted the training of

natural resource personnel and destroyed the infrastructure for research and education. This gap is being addressed through training programmes including the recent launch of the SCC project.

4.5 Lack of awareness

Lack of awareness of the importance of biodiversity conservation, and the national significance of the pygmy hippo, is widespread at all levels from central government downward to the community level and needs to be remedied to build a solid base of support for conservation action at all levels

4.6 Climate Change

It was agreed that global climate change potentially represents a threat to pygmy hippos, but the lack of quantitative data on regional and site-level impacts meant that it was difficult to be precise or to prioritize action. An IUCN-WCMC project to assess Protected Areas Resistant to Climate Change (PARCC) in West and Central Africa began work in 2012 with funding from the World Bank/Global Environmental Facility. A workshop was held in Togo in July 2012 to assess the climate change vulnerability of all West African mammal species.

5 ACTION PLAN

5.1 Vision and Goal

The workshop agreed that the Vision and Goal for pygmy hippo conservation formulated at the regional workshop should also be adopted for pygmy hippos in Liberia, to ensure that the national action plan was integrated closely with the regional and global overall strategy for the species.

Vision: *A world where viable populations of pygmy hippos thrive throughout their range in healthy ecosystems, acting as a flagship species for the Upper Guinea Forest, coexisting in harmony with human populations, retaining cultural importance, for the benefit of present and future generations*.

Goal: *To assess the current status of the pygmy hippo across its range and ensure effective protection of, and connectivity between, known populations*.

5.2 Objectives and actions

Working again in small groups, participants articulated the objectives necessary to attain the overall goal and to address the main threats identified during the problem analysis (above). Each objective was then assigned a set of actions that were in turn necessary to ensure it was achieved. Actions were time-limited and the agencies or individuals responsible for leading the delivery identified.

5.3 Pygmy hippo working group

A national PHWG was set up to coordinate implementation of the action plan. This was made up of representatives from all key sectors and the coordinator Mr Richard Sambolah.

5.4 Workshop resolution

As a final step, workshop participants drafted a resolution requesting the government of Liberia to consider designating the pygmy hippo as Liberia's national animal. The acting Director of the FDA,

the Honourable Mr. Harrison S. Karnwea, in formally closing the meeting, promised to transmit this request directly to the government. The resolution is included in Appendix 3.

5.5 National Action Plan for the Conservation of the Pygmy Hippopotamus in Liberia 2013-2017 – Logical Framework

VISION			
A world where viable populations of pygmy hippos thrive throughout their range in healthy ecosystems, acting as a flagship species for the Upper Guinea Forest, coexisting in harmony with human populations, retaining cultural importance, for the benefit of present and future generations.			
GOAL			
To assess the current status of the pygmy hippo across its range in Liberia and ensure the effective protection of, and connectivity between, known populations.			
OBJECTIVE	**ACTION**	**REPSONSIBLE**	**TIME SCALE**
Objective 1. Rate of habitat loss reduced	1.1 Ensure that oil palm companies develop and implement management plans that seriously address biodiversity conservation, including the Pygmy Hippo	Government agencies FFI /LINSOP to produce national interpretation of RSPO Principles and Criteria	By end of 2013
	1.2 Monitor oil palm concession mitigation plans to ensure effectively implemented	EPA, CSOs	Ongoing
	1.3 Restrict commercial agricultural concessions to degraded forest areas and prevent their establishment in high forest	MoA, IMCC	Ongoing
	1.4 Monitor sustainable logging activities to ensure negative impact limited as far as is possible	FDA, CSOs	Ongoing
	1.5 Enforce regulations to ban activities which	EPA, MoA (BNF)	Ongoing

	poison water bodies		
	1.6 Organise workshops on sustainable practices for the private sector with concrete examples of what can be done e.g. promote RSPO standards (including HCV, no clearing of primary forests etc) to palm oil sector, FSC to timber sector, IFC PS6 to mining sector	International NGOs, CSOs	End 2013
	1.7 Promote uptake of sustainable/best practices by private sector i.e. expose companies not operating sustainable/best practices in media to general public, govt etc. (hopefully resulting in pressure on companies to improve and govt. to monitor and enforce or demand best practice from companies)	SCNL to take advocacy lead	Ongoing
	1.8 Ensure ESIAs are carried out to international standards	EPA	Ongoing
	1.9 Highlight the importance of corridors to all govt. departments which allocate concessions	FDA	End 2013
	1.10 Encourage and enable farmers to adopt stable agriculture and agro-forestry practices. For example cocoa farming	MoA, NGOs	End 2014
Objective 2. Illegal harvest of PH reduced	2.1 Raise awareness on importance of PH among rural communities	FDA, CSOs, NGOs	ongoing
	2.2 Provide support for sustainable livelihoods which result in a decrease in hunting	Government and donors	Ongoing
	2.3 Enforce regulations on registration of hunting	MoJ	Ongoing

	guns		
	2.4 Introduce hunting and closed seasons	FDA, MoJ, MIA	End 2013
	2.6 Strengthen enforcement of existing hunting laws and support judicial system	FDA, MoJ, MIA	Ongoing
	2.7 Insert conservation requirements into mining/logging/plantation concession contracts, e.g. companies must prevent illegal hunting by staff and families, must provide alternative protein sources, roads into concessions must be gated when in operation and blocked off when no longer being used	EPA, FDA, MLME	End 2013
	3.1 Create public awareness through: Mural drawings, Fliers, Radio and television spot messages, Radio dramas, Theatre performances, Community interaction forums, Inclusion in the school curriculum, World Environment Day	NGOs/MoE/FDA/CSOs SCNL to lead billboard campaign	 June 2013
Objective 3. Awareness of pygmy hippo conservation increased at all levels	3.2 Organise PH celebration day	SCNL/FDA	By end of 2013
	3.3 Conduct effective conservation behavior change campaigns in rural communities, including schools and journalists by understanding behaviours and developing appropriate behaviour change activities	FACE; SCNL	In 2013
	4.1 Produce of adequate integrated land use policy	GoL, Land Commission	2015
	4.3 Encourage government to implement land use planning policy nationwide	MIA, EPA, FDA, NGOs, CSOs	2015

	4.4 Increase awareness of PH at all levels of government; cabinet meetings quarterly; legislative meetings quarterly; all national meetings or forums	EPA, FDA, NGOs, CSOs, GoL	Ongoing
Objective 4. Effectiveness of PH conservation at policy level increased	5.1 Obtain adequate funding for PH conservation	Donors, International NGOs, GoL	Ongoing
	5.2 Build capacity for adequate monitoring and protection	EPA, FDA, NGOs ARTP to train forest guards in Gola	 First half of 2013
	5.3 Create a pygmy hippo working group	FDA, EPA, FFI, Forest Cry, FACE, FESSA, IUCN, PHF, ZSL Coordinator: Richard Sambolah	Immediately
Objective 5. National strategy implemented	5.4 Review the plan annually, report progress and revise as necessary	PHWG	Anually
	5.5 Provide adequate training/capacity for PH conservation	GoL, University of Liberia, NGOs FFI/CEERCL to hold 2 training courses	 By December 2013
	5.6 Ensure transparency In designing and implementing projects	NGOs	Ongoing
	5.7 Promote cooperation between NGOs and all	PHWG, NGOs	Ongoing

	projects working on PH conservation		
	5.8 Recommend to GoL adoption of PH as national animal of Liberia	PHWG, FDA	Submission to GoL by December 2013
Objective 6. Effectiveness of the protected area network enhanced	6.1 Gazette PPAs with PH populations as soon as funds are available (e.g. through World Bank CoPAN and ExPAN projects)	FDA List of PPA with PH provided	By 2017
	6.2 Identify and map Important corridor areas linking PH populations	FDA, NGOs, CSOs	2014
Objective 7. Transboundary cooperation maximised	7.1 Ensure transboundary cooperation in all relevant areas (SL, Guinea, Côte d'Ivoire)	FDA, NGOs, CSOs	Ongoing
Objective 8. Monitoring and survey efforts maximised	8.1 PH monitoring programs established in all protected areas	FDA, NGOs, CSOs	2014
	8.2 Potential habitat surveyed for PH presence, with corridor areas a priority		Mid 2014

References

Bakarr, M., Oates, J.F., Fahr, J., Parren, M.P.F., Rödel, M.-O. & Demey, R. (2004). Guinean forests of West Africa, pp. 123-130. In: Mittermeier, R.A., P.R. Gil, M. Hoffman, J. Pilgrim, T. Brooks, C.G. Mittermeier, J. Lamoreux & G.A.B. Da Fonseca (eds). Hotspots Revisited: Earth's Biologically Richest and Most Endangered Terrestrial Ecoregions. CEMEX & Conservation International, Mexico City & Washington DC.

Christie, T., Steininger, M.K., Juhn, D. and Peal, A. 2007. Fragmentation and clearance of Liberia's forests during 1986-2000. Oryx, 41, 539-543.

Collen, B. Howard, R., Konie, J., Daniel, O. and Rist, J. 2011. Field surveys for the Endangered pygmy hippopotamus Choeropsis liberiensis in Sapo National Park, Liberia. Oryx, 45, 35-37.

Eltringham, S.K. 1993. The Pygmy Hippopotamus. Pp 55-60 in: W.L.R. Oliver, ed. Pigs, peccaries and hippos: status survey and action plan. IUCN. Gland, Switzerland and Cambridge, UK.

EPA 2008. Liberia's Fourth National CBD Report. Environmental Protection Agency, Monrovia.

FDA (2006). National Forestry Policy and Implementation Strategy. Forestry Development Authority, Monrovia.

Greengrass, E. 2011. Exploring the Dynamics of Bushmeat Hunting and Trade in Sapo National Park. Fauna & Flora International, Cambridge, UK.

Johnston, H. 1906. Liberia. 2 vols. Hutchinson & Co, London, UK.

Lewison, R. & Oliver, W. 2008. *Choeropsis liberiensis*. In: IUCN 2010. IUCN Red List of Threatened Species. Version 2010.2. <www.iucnredlist.org>. Downloaded on 26 July 2010.

Mallon, D., Wightman, C., De Ornellas, P. and Ransom, C. (Compilers) 2011. Conservation Strategy for the Pygmy Hippopotamus. IUCN Species Survival Commission. Gland Switzerland and Cambridge UK.

Myers, N., Mittermeier, R. A., Mittermeier, C.G., da Fonseca, G.A.B.. & Kent, J. 2000. Biodiversity Hotspots for Conservation Priorities. Nature. 403, 853-858.

Norris, K. Asase, A. Collen, B. Gockowksi, J. Mason, J. Phalan, B. Wade, A. 2010. Biodiversity in a forest-agriculture mosaic – The changing face of West African rainforests. Biological Conservation, 143, 2341-2050.

Robinson, P.T. 1970. The status of the pygmy hippopotamus and other wildlife in West Africa. A thesis. Submitted to Michigan State University in partial fulfilment of the requirements for the degree of Master of Science, department of Fisheries and Wildlife.

Robinson, P.T. 1971. Wildlife Trends in Liberia and Sierra Leone. Oryx, 11, 117-121

Robinson, P.T. 1981. The reported use of denning structures by the pigmy hippopotamus (Choeropsis liberiensis). Mammalia, 45, 506-508.

Robinson, P.T. 2013. *Choeropsis liberiensis* Pygmy Hippopotamus. Pp. 80-83 in J. Kingdon and M. Hoffmann, eds. Mammals of Africa. Vol VI. Bloomsbury Publishing, London, UK.

Robinson, P.T. and Suter, J. 1999. Survey and preparation of a preliminary conservation plan for the Cestos-Senkwehn riversheds of South-eastern Liberia. Report of the World Bank-World Wildlife Fund Global Forest Alliance- WildInvest Project: January-March 1999.

Schomburgk, H. 1912. On the trail of the pygmy hippo. An account of the Hagenbeck Expedition to Liberia. Bull. New York Zoological Society, 16, 880-884.

Shearman, P.H. 2009. An Assessment of Liberian Forest Area, Dynamics, FDA Concession Plans, and their Relevance to Revenue Projections. A report commissioned by Green Advocates, Monrovia, Liberia. Rights and Resources Initiative, Washington DC.

Steck, B. 2013. Pygmy hippopotamus (*Choeropsis libiriensis* Morton, 1849) international Studbook 2012. Zoo Basel, Switzerland.

Appendix 1. List of participants

Workshop Participants			
Ophelia N. Carpenter	Initiative for Peace & Development	Executive Director	developmentpad@yahoo.com
Dickson Chowolo	Forest Cry Liberia	Executive Director	forestcryliberia04@yahoo.com
Sam Collins	Liberia National Police	Spokesman	samcollins_105@yahoo.com
Patricia C.F. Dawolo	Ministry of Internal Affairs	Secretary	patricia.dawolo@yahoo.co.uk
Joseph N. Flomo	FESSA	Executive Director	flomojnyan@yahoo.com
Theo V. Freeman	FDA	Technical Manager	theo.freeman10@yahoo.com
Jerry C. Garteh	ARTP	Research Technician	jnuleegarteh@yahoo.com
Edward Gbeintor	FDA	Manager Wildlife	gbeintore@yahoo.com
Jens Lund Hansen	FFI	Country Manager	jens.lund@fauna-flora.org
Francis Harris	Liberia Media Initiative	Admin/Finance Officer	francisharris65@yahoo.com
Chloe Hodgkinson	FFI	Programme Manager	chodgkinson@fauna-flora.org
Tim Illingworth	PHF/HBR	Country Manager	tim.i@hummingbirdresources.co.uk
Harrison S. Karnwea	FDA	Managing Director	hkarnwea@yahoo.com
T. Mulbah Kesselie	ELBC	Reporter	t.mulbahkesselie@yahoo.com
Cecilia Kollie	EPA	Assist. Manager Cons.	cekollie@yahoo.com
Miaway Luo I.	FDA	Manager Awareness	pluo45@yahoo.com
David Mallon	IUCN	SCPSC	d.mallon@zoo.co.uk
Gertrude Nyaley	FDA	Manager	gwkorvayan@yahoo.com
Alex Peal	SCNL	Founder	alexpeal66@yahoo.com
Gordon B. Sambola	FACE	Field Coordinator	bgsambola77@yahoo.com
Richard Sambolah	FFI	Programme Officer	sambolah12@yahoo.com
Albert Schenk	ARTP	Project Manager	albert.schenk@birdlife.org
Amos Smith	SCNL	Advocacy Officer	amos_s@rocketmail.com
Tina Vogt	FFI	Technical Advisor	martina.vogt@fauna-flora.org
Mary Weah	FFI	Office Manager	mary.weah@fauna-flora.org
Chris Ransom	ZSL/IUCN SSC Pygmy Hippo Sub group	Programme Manager/Chair	Chris.ransom@zsl.org
Unable to attend workshop but commented on draft Action Plan			
Phillip Robinson	University of Toledo/IUCN SSC PHSG		
Monique Paris	IBREAM/ IUCN SSC PHSG		
Matt Jones	PHF		
Beatrice Steck	Basel Zoo		

Appendix 2. Workshop agenda

Day 1, 11th December 2012

08:15-09:00	Registration
09:00-09:30	Official opening and welcome remarks, by Theo Freeman, Technical Director, Forestry Development Authority
09:30 -10:00	Introduction by David Mallon, IUCN/SSC Species Conservation Planning • Aims of the workshop • Self introductions • Workshop Programme
10:00-11:00	Presentations • FDA (Gertrude Nyaleh) • IUCN Pygmy Hippo Specialist Sub-Group (Chris Ransom) • FFI Liberia (Chloe Hodgkinson)
11:00-11:30	Coffee/Tea
11:30-13:00	Presentations • Pygmy Hippo Foundation (PHF, Tim Illingworth) • Sapo NP Program (FFI, Tina Vogt) • ARTP (Birdlife International, Jerry C. Garteh) • Côte d' Ivoire Program (IBREAM; Monique Paris via Skype)
13:00-14:00	Lunch
14:00-15:30	Discussion on forest policy and pygmy hippo conservation. Status review: discussion and amendments (*All participants*) Mapping: discussion and amendments (*All participants*) Review of progress since 2010 and lessons learned
15:30-16:00	Coffee/Tea
16:00-17:30	Threats brainstorming and group work (*All participants*) Threats details and prioritisation (*4 working groups*) Threats discussion (*All participants*)
17:30	End of Day 1

Day 2, 12th December 2012

09:00-09:30	Review of Day 1
09:30-10:00	Vision and Goals
10:00-11:00	Objectives
11:00-11:30	Coffee/Tea
11:30-13:00	Activities and responsibilities (1)
13:00-14:00	Lunch
14:00-15:00	Activities and responsibilities (2)
15:00-15:30	Coffee/Tea
15:30-16:30	Workshop summary and next steps
16:30-17:00	Closing by Honourable Harrison S. Karnwea Sr., Interim Managing Director of the Forestry Development Authority

Appendix 3. Workshop Resolution

A workshop was held in Monrovia on 11-12 December 2012 to develop a National Action Plan for the Pygmy Hippo *Choeropsis libiriensis*. The workshop noted that the Pygmy Hippo is an Endangered species, only found in four countries of West Africa. Its population is small, fragmented and declining. It is a flagship for the conservation of the Upper Guinea Forest and has cultural importance to many people. Most of the remaining population of this unique animal is found in Liberia. Participants at the workshop included representatives of government, civil society, NGOs, the media and the private sector.

The workshop reviewed the current status of the PH in Liberia, identified and assessed the main threats to it and developed a set of objectives and activities to ensure its survival in Liberia.

The workshop recommends that the Government of Liberia gives urgent consideration to adopting the Pygmy Hippo as the national animal of Liberia and supports all action to implement the Action Plan.

Appendix 4. Websites of Participating Organisations

Organisation	Website URL
BirdLife International	www.birdlife.org
Environmental Protection Agency	http://postconflict.unep.ch/liberia/index_2a.php?m=2&sm=2a
Fauna & Flora International	www.fauna-flora.org
Forestry Development Authority	www.fda.gov.lr/
Institute for Breeding Rare and Endangered African Mammals (IBREAM)	www.ibream.org
Pygmy Hippo Foundation	www.pygmyhippofoundation.org
The Society for the Conservation of Nature in Liberia.	www.scnlib.net/conservation/
The Zoological Society of London	www.zsl.org