

Actions prioritaires à court et moyen termes pour la conservation du dauphin à bosse de l'Atlantique *Sousa teuszii*



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Sommaire

Résumé.....	4
1. Contexte et historique	7
1.1 Histoire du CCAHD	7
1.2 Objectifs du rapport.....	8
1.3 Méthodes de travail	8
1.4 Examen.....	10
1.5 Structure du présent rapport.....	10
2. Identification des lacunes prioritaires en matière de connaissances, de ressources et de capacités	11
2.1 Lacunes en matière de connaissances	11
2.2 Lacunes en matière de ressources	13
2.3 Lacunes en matière de capacités	15
3 Actions recommandées	16
3.1 Actions prioritaires à court et moyen termes	16
3.1.1. Actions visant à combler les lacunes en matière de connaissances	16
3.1.2 Actions visant à combler les lacunes en matière de ressources	18
3.1.3. Actions visant à combler les lacunes en matière de capacités	19
3.2. Activités à plus long terme	21
3.3. Financement et soutien requis	22
4. Conclusions	26
Références	27
Annexes.....	29
A1. Objectifs potentiels à court et moyen termes pour la conservation de <i>Sousa teuszii</i>	29
A2. CCAHD membership list	33
A3. CCAHD Working Groups and compositions	35
A4. Working Group 2 Full Report: Outreach and Capacity Building	36
A5. Working Group 3 Full report: Field surveys in Senegal Gambia an Beyond	52
A6. Working Group 4 Full Report: Conservation Genetics	64
A7. Working Group 5 Full Report: Documenting and Sampling Carcasses	74
A8. Working Group 6 Full Report: Interview Surveys	82
A9. Working Group 7 Full Report: Preparing for Full Health Assessments	91
A10. Working Group 8 Full Report: Acoustic Studies	110
A11. Working Group 9 Full Report: Bycatch Monitoring and Mitigation in the Republic of Congo	126
A12. Working Group 10 Full Report: Mitigating Impacts of Costal Developments.....	140

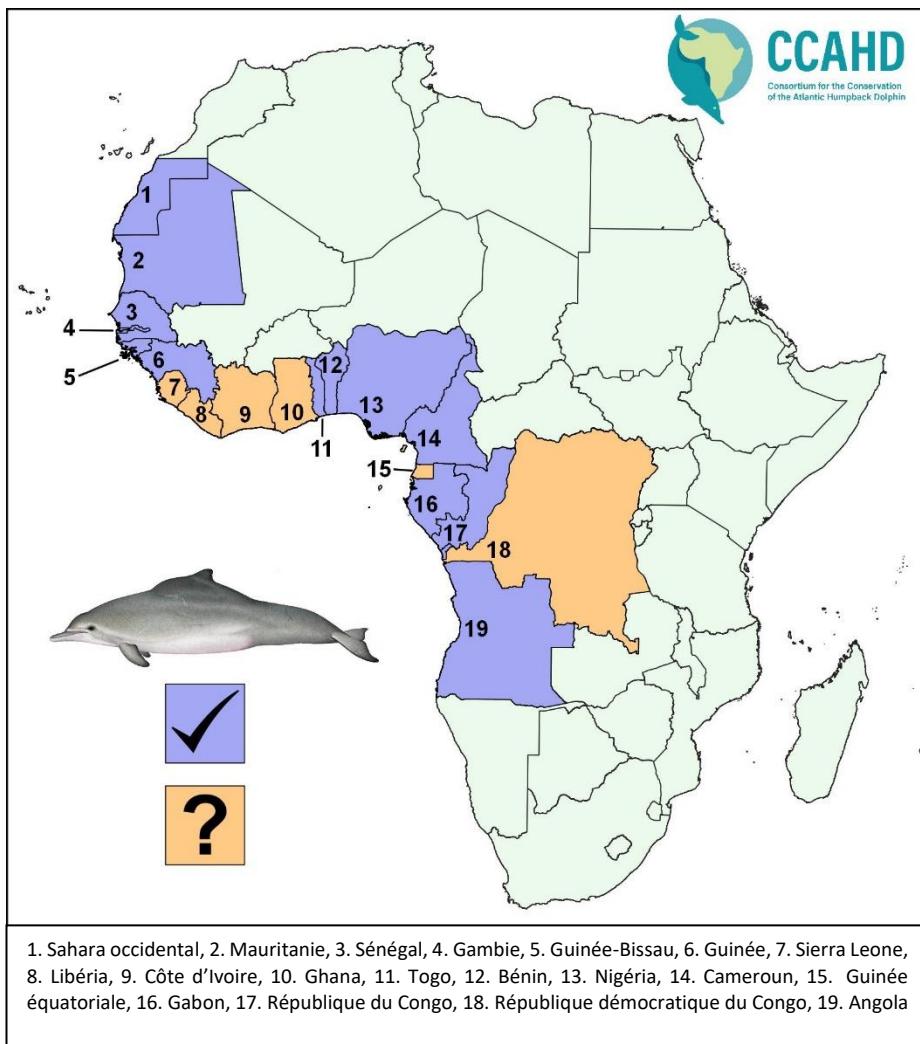
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Résumé

Le Consortium pour la conservation du dauphin à bosse de l'Atlantique (CCAHD – *Consortium for the Conservation of the Atlantic Humpback Dolphin*) a été créé en réponse aux préoccupations croissantes concernant la dégradation de l'état de conservation du dauphin à bosse de l'Atlantique *Sousa teuszii* au cours des dernières décennies. Ces préoccupations ont été de plus en plus reconnues et soulignées par plusieurs organisations internationales ces cinq dernières années, notamment par l'[UICN](#), la [CMS](#) et la [CBI](#). Classée dans la catégorie *En danger critique d'extinction* sur la Liste rouge des espèces menacées de l'IUCN, l'espèce compterait moins de 3 000 individus encore présents dans l'ensemble de son aire de répartition qui s'étend sur 19 pays depuis le Sahara occidental au nord jusqu'à l'Angola au sud.



Aire de répartition du Dauphin à bosse de l'Atlantique – Les pays en violet sont ceux pour lesquels il existe des signalements confirmés d'échouages, de prises accessoires ou des observations d'individus vivants, tandis que les pays en orange sont ceux pour lesquels il n'existe aucune donnée, probablement en raison d'un manque d'observation des cétacés. Carte reproduite avec l'aimable autorisation de Caroline Weir, Ketos Ecology.

Entre septembre et novembre 2020, les membres du CCAHD ont mené une évaluation approfondie des lacunes qui empêchent la mise en œuvre des mesures de conservation de l'espèce, et ont formulé des recommandations d'actions spécifiques pour combler ces lacunes. Les travaux ont été organisés en 12 groupes de travail, chacun portant sur des objectifs spécifiques (voir annexes 1 et 3). Dans chaque cas, les groupes de travail ont tenu des réunions virtuelles en ligne et ont échangé de multiples documents afin d'évaluer et de classer les lacunes et les actions recommandées dans leurs domaines cibles, un processus qui a abouti à des rapports finaux détaillés pour neuf groupes de travail (voir annexes 4 à 12). Deux groupes de travail supplémentaires portant sur l'Action concertée de la CMS et sur la collecte de fonds se sont chacun réunis une

fois et ont produit des plans d'action détaillés. Le groupe de travail portant sur la formation d'un groupe CCAHD de spécialistes commencera ses travaux en 2021, lorsque le CCAHD compta une plus large représentation des États de l'aire de répartition du dauphin à bosse de l'Atlantique.

Une fois les rapports et les comptes rendus des groupes de travail rédigés, les lacunes identifiées et les actions recommandées ont été rassemblées dans une matrice afin d'identifier les chevauchements et les synergies existant entre elles. Les lacunes et les actions recommandées ont été regroupées en trois grandes catégories :

1. Les lacunes en matière de connaissances et les actions à mener pour les combler ;
2. Les lacunes en matière de ressources et les actions à mener pour les combler ;
3. Les lacunes en matière de capacités et les actions à mener pour renforcer les capacités.

Les lacunes identifiées sont présentées dans la [section 2](#) du présent rapport. Les actions recommandées pour combler ces lacunes sont présentées dans la [section 3](#), la majeure partie de ces actions étant considérées comme des priorités à court et moyen termes, et un nombre plus restreint comme des priorités à plus long terme. Des estimations budgétaires très approximatives et partielles, ainsi que des indications sur les financements acquis sont fournies dans la [section 3.3](#), tandis que des estimations budgétaires plus détaillées figurent dans les rapports complets des groupes de travail aux annexes 4 à 12. Les **actions recommandées** comprennent (mais sans s'y limiter) :

- Des études sur le terrain, initialement centrées sur la région sénégalo-gambienne, mais pouvant s'étendre à d'autres États de l'aire de répartition dès que les ressources et les capacités le permettront. De multiples méthodes seront utilisées, dont la photo identification et le suivi acoustique, pour mieux comprendre la répartition, l'abondance, l'utilisation des habitats et certains aspects du comportement et de la biologie de l'espèce. En plus de combler les lacunes en matière de connaissances, ces études permettront de renforcer les capacités grâce à la participation d'organisations de conservation et de scientifiques locaux.
- La conception et la mise en œuvre d'enquêtes par entretien sur les connaissances écologiques locales (LEK – *local ecological knowledge*) pour mieux comprendre la répartition du dauphin à bosse de l'Atlantique et les menaces qui pèsent sur l'espèce. Ces enquêtes viseront les pêcheurs et les membres des communautés côtières afin de tirer parti des connaissances locales sur la répartition des dauphins, l'utilisation de leurs habitats et les menaces auxquelles l'espèce est confrontée du fait des prises accessoires ou d'autres activités côtières.
- Des évaluations approfondies des risques que représentent la pêche côtière à petite échelle et les projets de développement côtier pour le dauphin à bosse de l'Atlantique dans toute son aire de répartition. Elles pourront s'appuyer sur les enquêtes par entretien sur les connaissances écologiques locales et intégrer la modélisation des habitats et l'inventaire des constructions côtières ou autres activités industrielles prévues pouvant avoir un impact sur les habitats de l'espèce.
- L'élaboration de matériel (dans les langues cibles appropriées) pour soutenir la sensibilisation et l'information des différents groupes de parties prenantes, allant des écoles et des communautés côtières (de pêcheurs) aux gardes des parcs, aux responsables gouvernementaux ou aux acteurs du secteur privé. Ce matériel pourra être mis à disposition sur le site Web trilingue du [CCAHD](#) et lors d'ateliers ou de réunions en face à face.
- L'organisation d'ateliers et d'événements éducatifs dans les communautés côtières limitrophes des habitats des dauphins à bosse de l'Atlantique, afin de diffuser du matériel éducatif et de faire participer les communautés aux efforts de conservation, en commençant par des réseaux de sensibilisation et de signalement, et en travaillant avec un objectif à plus long terme de stratégies de conservation durable basées sur les communautés.
- Une sensibilisation ciblée des parties prenantes gouvernementales et du secteur privé portant sur le dauphin à bosse de l'Atlantique et les menaces auxquelles il est confronté, afin de promouvoir et d'offrir un soutien à la planification de la conservation et à la réduction des prises accessoires et des autres menaces.

- Un soutien accru aux scientifiques et aux organisations de conservation des cétacés dans les États de l'aire de répartition du dauphin à bosse de l'Atlantique, par des formations pratiques, des conférences à distance ou en face à face, des protocoles de collecte de données et des guides.
- La formation de réseaux locaux ou nationaux de signalement d'observations et/ou d'échouage, et le soutien aux personnes ou organisations souhaitant recueillir des données pour ces réseaux.

En identifiant ces mesures urgentes de conservation et de gestion à court et moyen termes, le présent rapport s'appuie sur d'importants travaux initiaux menés par des scientifiques et des organisations de conservation dans les États confirmés et présumés de l'aire de répartition de l'espèce, et envisage un effort coordonné dans lequel un large éventail de partenaires nationaux et internationaux mettront en commun leurs ressources et leur expertise pour commencer dès que possible à mener des recherches appliquées à la conservation et à mettre en œuvre une meilleure gestion des menaces. Il est espéré que ce rapport serve de feuille de route pour définir des buts en matière d'action et de financement.

1. Contexte et historique

1.1 Histoire du CCAHD

Le Consortium pour la conservation du dauphin à bosse de l'Atlantique (CCAHD – *Consortium for the Conservation of the Atlantic Humpback Dolphin*) a été créé en réponse aux préoccupations croissantes concernant la dégradation de l'état de conservation du dauphin à bosse de l'Atlantique *Sousa teuszii* au cours des dernières décennies. Ces préoccupations ont été de plus en plus reconnues et soulignées par plusieurs organisations internationales ces cinq dernières années, notamment par :

- Le reclassement de l'espèce de la catégorie « Vulnérable » à la catégorie [En danger critique d'extinction](#) dans la Liste rouge de l'Union internationale pour la conservation de la nature (IUCN) en 2017^[1] ;
- L'adoption d'une [Action concertée pour le dauphin du Cameroun](#) (autre nom commun du dauphin à bosse de l'Atlantique) par la Convention sur les espèces migratrices (CMS) en 2017 ;
- Les recommandations répétées du Comité scientifique de la Commission baleinière internationale (CBI) en faveur de recherches et d'actions de conservation de l'espèce, ainsi que la formation d'une équipe spéciale *Sousa* pour l'Afrique en 2020 ;
- La tenue de l'[atelier](#) « Integrated Conservation Planning for Cetaceans (ICPC) » à Nuremberg (Allemagne) en décembre 2018, qui a identifié le dauphin à bosse de l'Atlantique comme l'une des cinq espèces de petits cétacés les plus susceptibles de s'éteindre en l'absence d'interventions urgentes de conservation.

Malgré ces récentes déclarations concernant l'espèce, peu de progrès ont été réalisés à ce jour pour traduire ces préoccupations en mesures de gestion et de conservation sur le terrain dans les États de l'aire de répartition du dauphin à bosse de l'Atlantique. Lors d'une réunion à la Conférence mondiale sur les mammifères marins (WMMC – *World Marine Mammal Conference*) qui s'est tenue à Barcelone en décembre 2019, un groupe de scientifiques internationaux – dont plusieurs venant des États de l'aire de répartition du dauphin à bosse de l'Atlantique – ont discuté du manque de progrès accomplis et des moyens potentiels de redynamiser les efforts de conservation de l'espèce. Le CCAHD a ainsi été créé en 2020, dans le prolongement de la réunion de Barcelone, avec pour but général de renforcer l'élan en faveur de la conservation de l'espèce et de servir de plateforme commune pour les diverses actions des différentes organisations internationales. En particulier, le CCAHD a pour objectif d'identifier les organisations partenaires nationales et les individus au sein des États de l'aire de répartition de l'espèce et de leur donner les moyens d'agir, ainsi que de veiller à ce que les mesures de conservation et de gestion nécessaires pour l'espèce soient mises en œuvre sur le terrain. L'énoncé de la mission du CCAHD est le suivant :

Agir en faveur de la conservation à long terme des populations de dauphins à bosse de l'Atlantique (*Sousa teuszii*) et de leurs habitats par la recherche, la sensibilisation, le renforcement des capacités et l'action.

En septembre 2020, les Amis du zoo de Nuremberg ont mis à disposition des financements initiaux pour lancer le travail du CCAHD, dans le but d'atteindre trois objectifs principaux à court terme pour décembre 2020 :

1. Identifier les scientifiques et les organisations de conservation dans les pays de l'aire de répartition du dauphin à bosse de l'Atlantique et les faire participer au Consortium, en veillant ainsi à ce que le CCAHD soit pleinement représentatif de façon à optimiser les probabilités de mise en œuvre des recommandations d'actions de conservation ;
2. La production du présent rapport, qui évalue et définit les priorités à court et moyen termes en matière d'actions de gestion et de conservation du dauphin à bosse de l'Atlantique, et fournit des priorités et des objectifs clairs et réalisables pour la recherche de financements ;
3. Le développement d'un [site Web](#) trilingue (français, portugais et anglais) afin de faire mieux connaître le dauphin à bosse de l'Atlantique, de sensibiliser davantage aux menaces qui pèsent

sur lui et à son état de conservation dans tous les États de l'aire de répartition, et de fournir des ressources aux communautés locales ainsi qu'à un large éventail de parties prenantes participant à la conservation de l'espèce.

1.2 Objectifs du rapport

Des recommandations pour la conservation du dauphin à bosse de l'Atlantique sont faites depuis plusieurs décennies. De nombreux projets régionaux novateurs et de grande envergure mis en œuvre à la fin des années 1990 et au début des années 2000 ont permis de mettre en lumière la situation critique de l'espèce et la nécessité d'une action coordonnée et ciblée pour sa conservation. Malgré ces efforts, la recherche et la conservation sur le terrain n'ont pas atteint l'échelle requise pour empêcher la poursuite du déclin de l'espèce. Il existe encore d'importantes lacunes dans les connaissances concernant la répartition de l'espèce, les refuges ou les sites clés potentiels ainsi que les causes de mortalité ou les facteurs de déclin. Le manque de financement et de capacités a généralement été le principal facteur limitant la mise en œuvre d'actions de conservation plus significatives, alors que l'expansion rapide de la pêche régionale au filet maillant et le développement côtier continuent de menacer l'espèce. Les initiatives et les recommandations de la CMS, de l'IUCN et de la CBI, approuvées au niveau international, ont servi de signaux d'alarme répétés aux scientifiques et aux organisations de conservation du monde entier. Les leçons tirées des déclins et des extinctions d'autres espèces et populations de cétacés côtiers (notamment le [marsouin du golfe de Californie](#)) montrent qu'il est urgent de soutenir la recherche et les actions de conservation dans les pays de l'aire de répartition du dauphin à bosse de l'Atlantique. En identifiant et en affinant les actions de conservation prioritaires, il est espéré que le présent rapport servira de feuille de route pour définir des objectifs à court, moyen et long termes en matière d'action et de financement.

Le rapport s'appuie sur des documents antérieurs qui ont défini des objectifs généraux à la suite de la première réunion du CCAHD à Barcelone (voir Weir & Collins 2020 et l'[annexe 1](#)), ainsi que sur un document de suivi qui a synthétisé et affiné ces objectifs en vue de leur examen par le Comité scientifique de la Commission baleinière internationale en mai 2020 (voir Weir *et al.* 2020). Ces objectifs s'inscrivent dans trois grands domaines :

1. Accroître la sensibilisation, les capacités et la protection, grâce à la mobilisation dans les États de l'aire de répartition ;
2. Combler les lacunes dans les connaissances, afin de soutenir les décisions de conservation et de gestion ;
3. Mettre en œuvre des actions immédiates pour faire face aux menaces.

Il a été reconnu que ces objectifs devaient être évalués et classés objectivement afin de mieux contribuer à un plan de conservation à plus long terme, tel que celui proposé par l'Action concertée de la CMS, ainsi qu'à une planification plus immédiate des mesures de conservation et des efforts de collecte de fonds. Pour cela, le présent rapport présente les résultats du processus d'évaluation des objectifs et fournit une liste compilée des recommandations d'actions prioritaires pour la conservation du dauphin à bosse de l'Atlantique. L'évaluation comprend des estimations budgétaires approximatives pour les actions prioritaires proposées, ce qui permettra aux partenaires du CCAHD de répondre rapidement aux possibilités de subvention et de financement.

1.3 Méthodes de travail

En février 2020, des invitations ont été envoyées aux participants de la réunion du WMMC à Barcelone afin de les encourager à participer à une série de groupes de travail établis pour traiter chacun des objectifs prioritaires à court et moyen termes identifiés par Weir & Collins (2020 – disponible en [annexe 1](#)) qui se basent sur les discussions ayant eu lieu lors de la réunion du WMMC. Un coordinateur a été désigné pour faciliter les travaux de chaque groupe de travail (tableau 1). Un modèle de rapport et un mandat ont été fournis à chaque coordinateur afin de guider les discussions du groupe de travail et d'optimiser la normalisation des résultats des rapports. La composition de chaque groupe de travail (voir [annexe 3](#)) a été élargie à mesure que de nouveaux membres ont été identifiés dans l'aire de répartition de l'espèce et ont été invités à participer. Il est

souligné que ce dernier processus est toujours en cours, et que la participation et le leadership de ressortissants des pays d'Afrique au sein des groupes de travail devraient augmenter sensiblement au cours du temps.

Les groupes de travail ont été invités à évaluer chaque objectif de manière objective (voir tableau 1) et à l'amender si nécessaire. Cela a été accompli de diverses manières par chaque coordinateur, notamment par une série d'appels vidéo de groupe et par la communication des projets de documents pour discussion et contribution entre septembre et novembre 2020. Le modèle de rapport comprenait les sections suivantes : 1) identifier et classer les lacunes en matière de données ou de ressources liées à chaque objectif, en particulier au regard des avantages potentiels pour la gestion et la conservation du dauphin à bosse de l'Atlantique ; 2) évaluer les méthodes potentielles pour combler ces lacunes ; 3) faire des recommandations générales d'actions prioritaires à court et moyen termes ainsi qu'à long terme pour chaque lacune identifiée ; et 4) fournir un budget approximatif et une liste de ressources nécessaires pour réaliser l'action prioritaire à court et moyen termes. Après la soumission des rapports des groupes de travail, les résultats ont été compilés par les rédacteurs dans le présent rapport de synthèse.

Tableau 1 : Groupes de travail du CCAHD et coordinateurs. Les premières réunions des groupes de travail ont eu lieu entre octobre et novembre 2020, et devraient se poursuivre.

Groupe de travail	Objectifs à évaluer tels qu'identifiés par Weir & Collins, 2020	Coordinateur(s)
Accroître la sensibilisation, le renforcement des capacités et les mesures de protection		
1	1.1. Faire progresser l'Action concertée de la CMS	Tim Collins
2	1.2. Mener des activités d'information, de sensibilisation et de renforcement des capacités dans les communautés locales et avec les scientifiques et gouvernements locaux	Lucy Keith-Diagne et Gianna Minton
Combler les lacunes en matière de connaissances		
3	2.1. Mener une étude sur l'abondance et la répartition de la population sénégalo-gambienne 2.2. Étendre l'approche sénégalo-gambienne à d'autres États clés de l'aire de répartition	Caroline Weir
4	2.3. Évaluer la diversité génétique et la structure de la population	Michael McGowen
5	2.4. Améliorer l'échantillonnage des animaux morts	Forrest Gomez
6	2.5 Évaluer la présence dans d'autres États potentiels de l'aire de répartition par des enquêtes par entretien 3.2 Mener des enquêtes par entretien pour identifier d'autres populations faisant probablement l'objet de menaces spécifiques	Gill Braulik
7	2.6 Effectuer des enquêtes préliminaires qui serviront de base aux futures évaluations sanitaires et aux techniques invasives lorsqu'elles sont jugés nécessaires pour conserver l'espèce	Forrest Gomez
8	2.7 Étudier les possibilités de suivi acoustique	Caroline Weir
Lutter contre les menaces et promouvoir l'action		
9	3.1 Mener des travaux de réduction des prises accessoires au Congo en partenariat avec l'Initiative de la CBI pour la réduction des prises accessoires	Marguerite Tarzia
10	3.3 Examiner le niveau de menace du développement côtier commercial	Tom Jefferson
11	4.2 Mettre en place un groupe de spécialistes pour identifier les objectifs prioritaires et les financements directs	Tim Collins
12	4.3 Financement. Évaluer les possibilités de financement potentiel, conseiller à leur sujet, et contribuer si nécessaire aux demandes de financement	Lorenzo von Fersen

Les modèles de rapport complétés ont été soumis par les groupes de travail 2 à 10, et sont présentés en intégralité dans les annexes 4 à 12. Le groupe de travail 1, chargé de travailler sur l’Action concertée de la CMS, s’est réuni une fois et a discuté de la formation d’un Comité de pilotage pour l’Action concertée qui comprendrait des membres du groupe de travail ainsi que d’autres scientifiques et des représentants gouvernementaux des États de l’aire de répartition du dauphin à bosse de l’Atlantique.

Le groupe de travail 11 ne s'est pas encore réuni, car le CCAHD souhaite que le nombre de membres et la participation des États de l'aire de répartition du dauphin à bosse de l'Atlantique augmentent avant que le groupe de spécialistes ou son comité de pilotage soient établis officiellement.

Le groupe de travail 12 s'est réuni une fois, et a discuté des mécanismes de réception et d'administration des fonds au nom du CCAHD, ainsi que des potentielles sources de financement pouvant être approchées en 2021. Le groupe tient régulièrement à jour un tableau de bord des possibilités de financement.

Une fois les rapports et les comptes rendus des groupes de travail terminés, les lacunes identifiées et les actions recommandées ont été rassemblées dans une matrice afin de détecter les chevauchements et les synergies existant entre elles. Les résultats sont résumés dans les sections 2 et 3 du rapport qui présentent respectivement les évaluations des lacunes en matière de connaissances, de ressources et de capacités ainsi que les actions recommandées selon les analyses des groupes de travail.

1.4 Examen

La première version du présent rapport a été achevée à la mi-décembre et a été examinée par les coordinateurs des groupes de travail. Les commentaires de ces personnes ont été intégrés et une version révisée a été partagée en français et en anglais avec l'ensemble des membres du CCAHD pour leur permettre d'apporter leur contribution. Cette contribution a ensuite été intégrée dans les rapports anglais et français en février 2021. Ce rapport est conçu comme un document « vivant », qui peut être mis à jour au cours du temps en fonction des priorités et des besoins locaux en matière de conservation.

1.5 Structure du présent rapport

Comme noté ci-dessous, chaque groupe de travail a identifié et classé les principales lacunes en matière de connaissances, de ressources et de capacités en fonction de son ou ses objectifs, dans le contexte spécifique de la conservation et de la gestion du dauphin à bosse de l’Atlantique. La section 2 du présent rapport résume les résultats de l'évaluation des lacunes d'éléments prioritaires pour la conservation selon les sous-catégories suivantes : lacunes en matière de connaissances (section 2.1), lacunes en matière de ressources (section 2.2) et lacunes en matière de capacités (section 2.3). La section 3 résume les résultats des évaluations des groupes de travail concernant les actions prioritaires recommandées pour combler ces lacunes. Toute action recommandée est directement corrélée à une lacune identifiée. Toutefois, dans de nombreux cas, une même action recommandée peut permettre de combler plusieurs lacunes identifiées par des groupes de travail distincts. Ainsi, plutôt que d'être présentées comme des corrélations directes « une lacune/une action », les actions recommandées sont énumérées en référence aux groupes de travail (parfois multiples) qui les ont formulées. Les rapports détaillés des groupes de travail figurant aux annexes 4 à 12 fournissent de plus amples détails sur la manière dont chaque action recommandée peut être mise en œuvre et sur la manière dont elle permet de combler les lacunes identifiées. La section 4 présente quelques conclusions et recommandations générales pour des actions faisant suite à ce rapport.

2. Identification des lacunes prioritaires en matière de connaissances, de ressources et de capacités

2.1 Lacunes en matière de connaissances

L'aire de répartition du dauphin à bosse de l'Atlantique s'étend depuis le Sahara occidental au nord jusqu'à l'Angola au sud ; cependant, sa présence n'a été confirmée que dans 13 des 19 pays de cette aire de répartition^[2-4]. L'absence de données confirmées dans les six autres pays pourrait être due à un manque d'efforts d'observation des cétacés dans ces pays, ou pourrait refléter une véritable discontinuité dans l'aire de répartition^[2-4].

Seules trois populations ont été étudiées sur le terrain à l'aide de méthodes de photo-identification permettant d'évaluer les effectifs, la fidélité au site et les déplacements [p. ex. 5, 6, 7]. D'autres études ont porté sur la confirmation de la présence de l'espèce, ainsi que sur l'identification des menaces, et notamment sur les prises accessoires et la chasse directe. Ces dernières études ont été menées en réalisant un suivi sur les sites de débarquement des poissons et en interrogeant les pêcheurs [p. ex. 8, 9-15]. Cependant, les efforts de relevés systématiques n'ont pas été achevés dans la plupart des pays de l'aire de répartition, et d'importantes lacunes subsistent en matière de connaissances.

Les connaissances actuellement manquantes et identifiées comme essentielles pour parvenir à une conservation efficace de l'espèce sont énumérées ci-après. La pertinence de ces connaissances pour la conservation et les groupes de travail qui les ont identifiées sont décrites (voir [annexes 3-12](#) pour plus de détails). Toutes ces lacunes en matière de connaissances ont été considérées comme prioritaires, et par conséquent la liste n'est pas classée par ordre de priorité, mais plutôt dans l'ordre des groupes de travail qui ont classé chaque lacune lors de leurs évaluations.

- **Les données quantitatives sur les causes de déclin de la population** (groupes de travail [2](#), [5](#), [6](#), [7](#), [9](#) et [10](#)). Bien que les prises accessoires dans la pêche côtière au filet maillant à petite échelle soient fortement soupçonnées d'être la principale cause de mortalité de l'espèce dans toute son aire de répartition, des données concrètes sur l'activité de pêche à petite échelle, le chevauchement spatial/temporel de l'effort de pêche avec la présence des dauphins à bosse de l'Atlantique et les enregistrements de prises accessoires font défaut pour étayer cette hypothèse dans la plupart des pays. La chasse directe et le développement côtier, incluant la construction de ports et les activités qui génèrent de la pollution et du ruissellement, peuvent également avoir un impact important sur l'espèce dans certaines zones. La production de données quantitatives sur les menaces qui pèsent sur la survie de l'espèce permettrait d'étayer la définition ciblée de mesures de réduction des menaces, et de soutenir des actions de sensibilisation et d'éducation axées sur les politiques et les pratiques visant à réduire les menaces.
- **Les informations sur la répartition spatiale et temporelle de l'espèce** (présence/absence et abondance relative) (groupes de travail [3](#), [6](#), [8](#) et [10](#)). Le manque de données recueillies de manière systématique (en fonction de l'effort) sur les périodes et les lieux où l'espèce est présente constitue un obstacle important à l'identification des zones clés où doivent être concentrés les efforts de conservation ou de réduction des menaces. Les ensembles de données existants sont limités à des sites d'étude relativement réduits ou à des périodes de courte durée.
- **Les informations sur l'abondance relative ou absolue et/ou sur les tendances des populations** (groupes de travail [3](#) et [6](#)). Actuellement, seules des estimations très rudimentaires de la taille de la population sont disponibles pour la plupart des zones^[2], et seules quatre études ont fourni des estimations de la taille de la population étayées par des données scientifiques^[5-7]. Aucune donnée sur les tendances de l'abondance au cours du temps n'est disponible. Les données sur l'abondance et les tendances des populations sont fondamentales pour l'évaluation de l'état de conservation de l'espèce. De même, les informations sur l'abondance relative de l'espèce permettraient d'identifier

les zones importantes de l'aire de répartition et de cibler les efforts sur ces zones clés qui peuvent être des refuges ou des zones essentielles. Le manque de données de base dans l'ensemble de l'aire de répartition de l'espèce entrave les efforts de mobilisation des parties prenantes qui ont le pouvoir de mettre en œuvre des politiques et des pratiques susceptibles d'améliorer l'état de conservation de l'espèce.

- **Les informations sur la fidélité au site, la connectivité des populations et les déplacements au sein et entre les populations étudiées (y compris les estimations de la diversité génétique et de l'état sanitaire au sein des populations et entre elles)** (groupes de travail [3](#), [4](#) et [10](#)). Il est actuellement difficile de savoir si les « populations » identifiées dans différentes régions géographiques sont isolées ou si un certain brassage se produit entre certaines régions. Il est important de mieux connaître le degré de connectivité entre les populations de dauphin à bosse de l'Atlantique dans les différentes régions afin d'être en mesure de concevoir des actions de conservation appropriées qui soutiennent le maintien de la diversité génétique. Cela permettra également d'éclairer les décisions concernant les possibilités de reproduction en captivité et de transfert en cas de déclin catastrophique.
- **Les informations sur le cycle de vie et les paramètres de reproduction** (groupes de travail [3](#), [5](#) et [7](#)). La compréhension de la structure sociale, et en particulier des paramètres de reproduction, est cruciale pour comprendre les besoins de conservation de l'espèce. Les paramètres de reproduction (p. ex. la fréquence des mises bas et l'âge auquel les animaux commencent à se reproduire) sont utilisés pour calculer les tendances de la population et les évolutions possibles.
- **La clarification du statut taxonomique du dauphin à bosse de l'Atlantique par rapport aux autres espèces du genre *Sousa*** (groupes de travail [4](#) et [5](#)). Bien que le dauphin à bosse de l'Atlantique soit actuellement reconnu comme une espèce distincte des autres espèces du genre *Sousa*, davantage d'éléments sont nécessaires pour étayer les distinctions génétiques.
- **Les données sur les maladies courantes et/ou l'exposition aux contaminants toxiques** (groupes de travail [5](#) et [7](#)). Il n'existe actuellement aucune information sur les maladies ou les contaminants susceptibles d'affecter les dauphins à bosse de l'Atlantique. Ces facteurs sont considérés comme pouvant jouer un rôle important dans le déclin des populations d'autres espèces de cétacés, et peuvent être un indicateur de l'état sanitaire et de l'intégrité de leurs habitats marins côtiers ^[16-18].
- **Les données sur le régime alimentaire et les proies** (groupes de travail [5](#) et [7](#)). Hormis quelques observations ponctuelles de captures de proies et des analyses de contenus stomacaux, les habitudes alimentaires et les préférences de l'espèce pour certaines proies restent mal connues. La connaissance des relations entre les populations de dauphins et leurs proies permettra de mieux comprendre les chevauchements avec les pêcheries et/ou d'identifier les habitats où leurs proies préférées ont été enregistrées dans les statistiques de pêche, mais où les dauphins n'ont pas encore été signalés.
- **Les informations sur les développements potentiels et les conditions environnementales des habitats des dauphins à bosse de l'Atlantique** (groupes de travail [7](#) et [10](#)). Bien qu'il soit évident que les dauphins à bosse de l'Atlantique occupent divers habitats littoraux (p. ex. les côtes exposées, les baies, les chenaux de mangrove), les facteurs environnementaux qui constituent les habitats optimaux de l'espèce, y compris à différentes saisons et à différents stades du cycle de vie, restent largement non quantifiés en raison du manque d'efforts de prospection et de données environnementales à une échelle précise. En outre, il existe des lacunes dans les données sur la manière dont ces habitats sont affectés par les implantations humaines, notamment par les eaux usées, le ruissellement côtier, l'expansion urbaine et les projets de construction. Les connaissances de l'échelle et de l'étendue des effets directs et indirects de ces activités (c.-à-d. la modification et la contamination des habitats) sur les dauphins à bosse de l'Atlantique doivent être renforcées afin d'éclairer la réduction des menaces et de mieux comprendre les impacts potentiels des futurs efforts de recherche.
- **Les données sur les statistiques physiologiques vitales** dans des circonstances naturelles, et en réponse aux bateaux, aux filets, aux captures ou aux stimuli externes (fréquence respiratoire, rythme cardiaque, etc.) (groupe de travail [7](#)). Dans le cas d'un déclin catastrophique de la population, il pourrait devenir nécessaire d'envisager une série d'options de planification intégrée de la conservation, qui pourraient, dans des circonstances extrêmes, inclure des méthodes *ex situ* (comme

[définies par l'IUCN](#)) pour protéger (une partie) des derniers individus de l'espèce^[19]. Ces options peuvent inclure une protection accrue de petites portions gérables d'habitats naturels, et même des efforts de transfert plus drastiques vers des habitats protégés. Dans ce scénario, il serait nécessaire de disposer de données sur les statistiques physiologiques normales de l'espèce, ainsi que sur ses réactions aux bateaux, à la capture et à la manipulation, avant que la taille de sa population ne devienne si réduite que tenter de collecter ces données soit considéré comme une menace inacceptable pour l'avenir de l'espèce^[19, 20].

- **La réponse de l'espèce aux traitements et médicaments** (groupe de travail [7](#)). Un petit nombre de dauphins à bosse appartenant à d'autres espèces du genre *Sousa* ont été gardés en captivité, et donc traités avec divers médicaments au fil des ans, mais on ne sait rien sur la façon dont les dauphins à bosse de l'Atlantique pourraient répondre aux traitements et médicaments si jamais il devenait nécessaire de soigner ou de réhabiliter des individus échoués ou de recourir à des stratégies de translocation et/ou de conservation *ex situ*.
- **L'efficacité du suivi acoustique dans les habitats du dauphin à bosse de l'Atlantique**, incluant la manière de distinguer les vocalisations des dauphins à bosse de l'Atlantique de celles d'autres espèces, en particulier du grand dauphin *Tursiops truncatus*, avec lequel il est fréquemment sympatrique. Mieux comprendre combien de temps *S. teuszii* vocalise, et peut donc être détecté par des dispositifs acoustiques, est également considéré comme essentiel pour évaluer si des techniques acoustiques passives peuvent être utilisées pour le suivi à long terme de la population (groupe de travail [8](#)). Les méthodes acoustiques passives se sont avérées efficaces pour le recueil d'informations et le suivi au cours du temps de la répartition de populations d'autres petits cétacés menacés, avec une réussite notable pour le marsouin du golfe de Californie (*Phocoena sinus*) dans le haut golfe de Californie^[21] et le marsouin commun de la Baltique (*P. phocoena*)^[22]. Dans de bonnes conditions, ces méthodes peuvent être utilisées pour recueillir des données en continu sur une vaste zone géographique et sur des périodes prolongées. Il n'y a pratiquement pas eu de suivi acoustique des dauphins à bosse de l'Atlantique à ce jour, et sa faisabilité dépend de la possibilité d'établir : 1) si les vocalisations des dauphins à bosse de l'Atlantique peuvent être distinguées de manière fiable de celles des autres odontocètes sympatriques ; 2) comment le taux de vocalisation affecte les possibilités de détection, et 3) si les dispositifs acoustiques peuvent être mis en place avec succès dans les habitats peu profonds soumis aux marées les plus fréquentées par l'espèce.
- **Les stratégies efficaces pour réduire les prises accessoires dans la pêche côtière à petite échelle** (groupe de travail [9](#)). Bien que l'on puisse raisonnablement supposer que les prises accessoires dans la pêche à petite échelle constituent la cause la plus importante du déclin des populations dans toute l'aire de répartition de l'espèce, la communauté scientifique reconnaît qu'il existe actuellement très peu de méthodes réellement efficaces pour réduire les prises accessoires, en particulier dans la pêche artisanale au filet maillant. Les communautés de pêcheurs et les gestionnaires de la conservation dans toute l'aire de répartition du dauphin à bosse de l'Atlantique ont besoin d'outils permettant de réduire les prises accessoires sans menacer les sources importantes de sécurité alimentaire et de revenus des communautés côtières. Ces outils peuvent impliquer des modifications des engins de pêche, la mise en œuvre de restrictions spatio-temporelles de certains types ou engins de pêche, des incitations économiques, ou une combinaison de stratégies dont l'efficacité doit être testée dans le contexte des pêcheries qui opèrent dans les habitats du dauphin à bosse de l'Atlantique.

2.2 Lacunes en matière de ressources

Bon nombre des lacunes en matière de données mentionnées ci-dessus ont été identifiées par les précédentes initiatives de recherche et de conservation du dauphin à bosse de l'Atlantique. L'un des principaux obstacles à la mise en œuvre d'actions visant à combler ces lacunes est l'énorme manque de ressources qui existe dans toute l'aire de répartition de l'espèce. Les manques de ressources identifiés par les groupes de travail concernent principalement le financement, la main-d'œuvre et les outils de communication pour atteindre les différentes parties prenantes. Les lacunes en matière de ressources portent sur :

- **Le personnel rémunéré** (tous les groupes de travail) : Avec plus de 50 membres actifs, le CCAHD bénéficie de beaucoup de bonne volonté et d'expertise en matière de conservation des cétacés. Cependant, à part environ un mois de salaire à temps partiel pour une coordinatrice, et la rémunération de travaux réduits et à court terme de consultants pour la conception et la traduction du site Web à la fin de 2020, tous les efforts du CCAHD réalisés jusqu'à présent ont été réalisés bénévolement ou généreusement pris en charge par les organisations auxquelles les membres sont affiliés. Ce niveau de travail de bénévole n'est pas durable à moyen ou long terme. Un travail correctement rémunéré, financé par des subventions, permettant de faire appel à des services de consultants ou du temps intégré dans les profils de poste existants des personnes participant aux efforts de conservation du dauphin à bosse de l'Atlantique, sera essentiel pour maintenir et étendre les efforts de conservation.
- **Les financements** (tous les groupes de travail) : Les recherches appliquées à la conservation menées sous les auspices de la CMS au début des années 2000 ont permis d'identifier un certain nombre de besoins prioritaires en matière de conservation des dauphins à bosse de l'Atlantique, et des recommandations répétées ont été faites depuis par la CMS, l'IUCN et la CBI. Jusqu'à présent, le manque de financement a été le principal obstacle à la mise en œuvre des nombreuses recommandations formulées au cours des années, notamment en ce qui concerne la collecte de données, les réunions des parties prenantes et les travaux de réduction des menaces. Cela est dû en partie au premier point ci-dessus, car aucun travail n'étant financé pour produire des propositions de financement, c'est une situation actuellement sans issue. En plus des sources de financements ponctuels pour des recherches ou des actions de conservation spécifiques, il est important pour la réduction des menaces d'identifier des sources de financements durables qui ne dépendent pas de donateurs externes/internationaux.
- **Le matériel de communication** (groupes de travail [2](#), [4](#), [5](#), [6](#), [7](#) et [10](#)) : De nombreux groupes de travail ont noté le manque de disponibilité de documents sur la présence et l'état de conservation du dauphin à bosse de l'Atlantique ainsi que sur les menaces pesant sur l'espèce. En particulier, l'accessibilité des matériels existants et futurs serait notamment améliorée s'ils étaient produits dans les langues des États de l'aire de répartition et librement disponibles au téléchargement. Divers supports de communication (allant des articles/rapports scientifiques à des affiches et du matériel éducatif) sont nécessaires pour sensibiliser et faire participer les communautés côtières (de pêcheurs), les écoles, les agences gouvernementales et les décideurs du secteur privé aux efforts de conservation des dauphins à bosse de l'Atlantique. Tous les canaux de communication possibles (p. ex. internet, les applications mobiles, les médias sociaux) doivent être évalués (en fonction des circonstances propres à chaque pays) pour la diffusion de contenu/connaissances aux populations locales.
- **Les manuels, lignes directrices multilingues et réseaux de soutien pour les personnes recueillant des données** (groupes de travail [2](#), [4](#), [5](#), [7](#) et [10](#)). Bien que divers manuels sur l'intervention en cas d'échouage, la nécropsie, l'étude des cétacés et la planification de la conservation soient disponibles en français, en anglais, en portugais et en espagnol, ils sont souvent inadaptés pour un personnel inexpérimenté, en raison de leur longueur et de leur contenu. Par conséquent, il peut être difficile pour les praticiens locaux travaillant sur le terrain de choisir les bons outils et d'extraire les informations pratiques dont ils ont besoin, en particulier s'ils doivent prendre des décisions rapides pour intervenir lors d'un échouage, faire une observation ou s'ils ont d'autres possibilités de recueillir des données. Il est nécessaire de disposer de lignes directrices, de manuels et de formulaires de collecte de données facilement accessibles, clairement illustrés, étape par étape, produits dans toutes les langues des États de l'aire de répartition. En outre, il serait utile de pouvoir fournir des conseils et un soutien en temps réel aux personnes recueillant des données et/ou intervenant en cas d'échouage. La fourniture de ces outils et leur diffusion par l'intermédiaire du site Web du CCAHD et d'autres canaux pourraient permettre d'améliorer les données et la collecte d'échantillons, et d'augmenter le nombre d'échantillons disponibles pour diverses analyses de tissus et une éventuelle préservation des cellules (groupes de travail [4](#), [5](#) et [7](#)).

2.3 Lacunes en matière de capacités

Un obstacle important à l'application des recommandations de conservation du dauphin à bosse de l'Atlantique est le manque général de sensibilisation et de capacités des parties prenantes les mieux placées pour agir. Ces parties prenantes vont des pêcheurs et des communautés côtières qui partagent l'habitat et les ressources avec les dauphins aux organisations non gouvernementales (ONG) axées sur l'environnement de plus en plus nombreuses dans les États de l'aire de répartition de l'espèce, jusqu'aux qu'aux agences gouvernementales et au secteur privé. Des lacunes spécifiques dans cette catégorie ont été identifiées par les groupes de travail et sont mentionnées ci-après. De même que précédemment, elles ne sont pas classées par ordre de priorité, mais plutôt dans l'ordre des groupes de travail qui les ont examinés.

- **Manque de sensibilisation des communautés côtières, y compris des écoliers et des pêcheurs en ce qui concerne l'état de conservation des dauphins à bosse de l'Atlantique et les menaces qui pèsent sur l'espèce** (groupes de travail [2](#) et [6](#)). Pour que les populations locales accordent une valeur à l'espèce et soient motivées par sa protection, il faut qu'elles soient conscientes de son importance et des impacts qu'elles ont potentiellement sur elle. Les partenaires du CCAHD dans les États de l'aire de répartition du dauphin à bosse de l'Atlantique confirment que de nombreuses communautés côtières ne sont tout simplement pas conscientes de la présence de l'espèce et de son état de conservation précaire, et ne connaissent pas les protections réglementaires en vigueur pour les cétacés.
- **Manque de sensibilisation des agences gouvernementales/gestionnaires responsables de la conservation marine et côtière en ce qui concerne l'état de conservation du dauphin à bosse de l'Atlantique, les menaces qui pèsent sur l'espèce et les possibilités de gestion/réduction des menaces** (groupes de travail [2](#) et [10](#)). Les agences gouvernementales peuvent ne pas connaître la répartition ou l'état de conservation du dauphin à bosse de l'Atlantique dans leur pays, et donc ne pas tenir compte spécifiquement de l'espèce lorsqu'elles approuvent des plans de développement côtier, créent et maintiennent des aires protégées, conçoivent des politiques sur la pêche ou mènent tout autre type d'activités de gestion des zones côtières. Elles peuvent autoriser involontairement des activités qui nuisent à la survie de l'espèce et qui contreviennent à la législation de protection existante. Il est également probable qu'elles ne connaissent pas les mesures potentielles de réduction des menaces qui pourraient être mises en œuvre pour réduire ou compenser les conséquences des activités côtières, ou pour lancer ou soutenir tout effort de recherche ou de conservation de l'espèce.
- **Absence de réseaux efficaces de signalement des observations, des prises accessoires ou des échouages** et de personnes ou d'organisations qui pourraient coordonner les programmes d'observation et de signalement au niveau national ou au niveau des États/provinces (groupes de travail [2](#), [4](#), [5](#) et [7](#)). L'augmentation du nombre de signalements d'observations et d'échouages permettrait de combler le manque de données sur la répartition de l'espèce, le cycle de vie et les causes de mortalité (dans le cas des échouages). Ces réseaux nécessitent des points focaux disposant d'outils et de connaissances nécessaires pour collecter/solliciter, compiler et partager les données.
- **Nombre insuffisant de scientifiques formés, expérimentés et soutenus dans les États de l'aire de répartition du dauphin à bosse de l'Atlantique, et ayant une expérience des différents aspects de la recherche appliquée à la conservation de l'espèce**, tels que la photo-identification, le prélèvement d'échantillons, etc. (groupes de travail [2](#), [3](#), [4](#), [5](#), [6](#), [7](#) et [8](#)). Des scientifiques expérimentés d'autres régions de l'aire de répartition, ou même d'ailleurs, pourraient aider à recueillir des données et à former des personnes localement. Toutefois, il est reconnu que seuls les scientifiques locaux seront en mesure de suivre efficacement et durablement les populations au cours du temps et de veiller à ce que les agences gouvernementales concernées soient activement engagées dans leur protection et leur gestion à long terme.

3 Actions recommandées

3.1 Actions prioritaires à court et moyen termes

Chaque groupe de travail a évalué les méthodes ou actions disponibles qui pourraient être utilisées pour combler chacune des lacunes prioritaires identifiées. Plusieurs méthodes ou actions étaient disponibles pour combler certaines lacunes, et les groupes de travail ont été invités à évaluer la faisabilité et les contraintes probables de chacune d'entre elles. Il leur a ensuite été demandé de sélectionner une seule activité prioritaire (dans un contexte de conservation-gestion) pour combler chaque lacune : a) à court et moyen termes (< 2 ans) ; et b) à long terme (> 2 ans). Dans certains cas, plusieurs groupes de travail ont recommandé les mêmes actions pour combler des lacunes partagées ou distinctes/multiples. En tant que telles, les actions recommandées ci-dessous ne sont pas présentées comme une corrélation directe « une lacune/une action ». Des informations plus détaillées sur les actions et méthodes recommandées et sur la manière dont elles traitent les lacunes spécifiques identifiées par chaque groupe de travail sont fournies dans les rapports des groupes de travail aux [annexes 4 à 12](#).

3.1.1. Actions visant à combler les lacunes en matière de connaissances

Comme souligné dans la section 2.1, il existe d'importantes lacunes en matière de connaissances sur le dauphin à bosse de l'Atlantique. Toutefois, les évaluations des groupes de travail ont révélé que quelques actions ciblées pourraient combler simultanément de nombreuses lacunes en matière de données, si elles étaient soigneusement planifiées et mises en œuvre. Les actions à court et moyen termes les plus prioritaires sont résumées ci-dessous. Comme pour les lacunes identifiées dans la section 2, les actions ne sont pas classées par ordre de priorité, mais plutôt dans l'ordre des groupes de travail qui ont formulé ces recommandations.

- **Mener des études de terrain dans la région sénégalo-gambienne** afin de recueillir des informations sur la répartition et l'abondance relative de l'espèce, en se concentrant sur l'enrichissement des catalogues de photo-identification pour l'analyse des recaptures/contrôles de marques ainsi que la cartographie des déplacements/répartitions individuels. Ces études devraient être menées de manière systématique et en fonction de l'effort, pour faciliter la cartographie de l'abondance relative (p. ex. taux de rencontre par unité d'effort d'échantillonnage) en fonction des habitats, des saisons et des années. Les études devraient associer des scientifiques locaux pour encourager le renforcement des capacités, ainsi que prévoir un échantillonnage environnemental pour soutenir la modélisation des habitats. Pour plus de détails sur la méthodologie recommandée pour les études, voir le rapport complet du groupe de travail [3](#). Les groupes de travail [2](#), [7](#), [8](#) et [10](#) ont également fortement soutenu les études de terrain qui peuvent permettre la formation pratique de scientifiques locaux, l'inclusion de méthodes acoustiques passives et la collecte d'échantillons pour analyser la qualité de l'eau et d'autres échantillons environnementaux.
- **Étendre les études de terrain à d'autres États de l'aire de répartition**, en mettant également l'accent sur le recueil d'informations sur la répartition, l'abondance relative ainsi que sur le lancement et l'enrichissement des catalogues de photo-identification. Le groupe de travail [3](#) a classé la Guinée et la Guinée-Bissau comme deux des pays les plus prioritaires pour les futurs travaux d'études, après ceux déjà prévus au Sénégal. Toutefois, il a été souligné qu'à ce stade, des actions sont nécessaires dans **tous les États potentiels et confirmés de l'aire de répartition**, mais la Mauritanie, la Gambie, le Nigéria, le Cameroun, le Gabon et la République du Congo sont des pays où l'espèce est connue et des études de terrain plus détaillées seraient intéressantes. Voir le rapport complet du groupe de travail [3](#) pour plus de détails sur les lieux et la méthodologie recommandés. Ces études ont également été recommandées par les groupes de travail [2](#), [7](#) et [10](#) pour leur potentiel en ce qui concerne le renforcement des capacités et la formation pratique des scientifiques locaux, ainsi que la collecte d'échantillons pour l'analyse de la qualité de l'eau et d'autres analyses environnementales.
- **Prélever des échantillons de tissus de dauphin à bosse de l'Atlantique pour des analyses génétiques.** Le prélèvement d'échantillons génétiques nécessitera une coordination ainsi que le renforcement des

capacités des scientifiques des États de l'aire de répartition qui devraient également être formés aux analyses chaque fois que cela est approprié et faisable. Dans la mesure du possible, les laboratoires de génétique des pays de l'aire de répartition devraient participer aux analyses pour renforcer les capacités et l'appropriation locales. Les analyses effectuées sur de nouveaux échantillons, ainsi que sur les quelques échantillons existants disponibles dans les collections de musées et ailleurs, pourraient être utilisées pour clarifier le statut taxonomique du dauphin à bosse de l'Atlantique au sein du genre *Sousa* et générer des génotypes mitochondriaux pour tous les échantillons de dauphin à bosse de l'Atlantique actuellement disponibles afin de combler les lacunes en matière de données identifiées au point 2.1 ci-dessus. Pour plus de détails, voir le rapport complet du groupe de travail [4](#).

- **Concevoir et lancer des enquêtes par entretien sur les connaissances écologiques locales** dans toute l'aire de répartition du dauphin à bosse de l'Atlantique afin d'évaluer la répartition actuelle (la présence/absence et éventuellement l'abondance relative) et caractériser les pêcheries et les menaces (p. ex. prises accessoires, chasse) pesant sur l'espèce. De multiples lacunes dans les connaissances relatives à la répartition, à l'abondance relative et aux menaces peuvent potentiellement être comblées par un seul entretien soigneusement conçu. Il est recommandé de travailler en plusieurs phases, en commençant par l'identification des questions auxquelles il faut répondre et la rédaction du questionnaire, la réalisation d'une étude pilote pour tester le questionnaire dans au moins deux sites, dont au moins un où l'espèce est relativement bien connue et assez commune et un autre où l'information fait défaut. Après l'étude pilote, le questionnaire devra être affiné et étendu au plus grand nombre possible d'États de l'aire de répartition, en utilisant la même méthode et en gardant à l'esprit les priorités géographiques identifiées. Pour plus de détails sur ces lieux prioritaires et la méthode proposée, voir le rapport complet du groupe de travail [5](#).
- Procéder à une **analyse bibliographique de toute la littérature sur les espèces du genre *Sousa* afin de déterminer quelles informations sont disponibles pour combler les lacunes de données sur les paramètres relatifs à l'état sanitaire et la reproduction**. Lorsqu'aucune donnée n'est disponible sur le dauphin à bosse de l'Atlantique, les données sur d'autres espèces du genre *Sousa* (de préférence *S. plumbea*) seront précieuses pour identifier les informations qui pourraient être utiles pour répondre aux questions sur l'état sanitaire et la reproduction. Pour plus de détails, voir le rapport complet du groupe de travail [6](#).
- **Mener des études acoustiques** déployant des F-POD et des SoundTraps sur des sites littoraux appropriés, en employant ou en formant des membres des communautés locales et/ou des gardes des parcs pour faire des observations visuelles simultanées (avec ou sans théodolite) afin de faciliter la distinction des vocalisations des dauphins à bosse de l'Atlantique de celles des autres espèces, et comprendre la fréquence/la probabilité de leur présence. La République du Congo ou le Gabon sont considérés comme des lieux idéaux pour cette étude, mais des sites appropriés existent probablement dans plusieurs États de l'aire de répartition, notamment au Sénégal où d'autres travaux de terrain sont prévus et déjà financés. L'utilisation d'incitations sous forme de rémunération pour la récupération de dispositifs acoustiques ou le recueil de données, s'est avérée efficace et permettrait d'acquérir une expérience précieuse. Pour plus de détails, voir le rapport complet du groupe de travail [7](#).
- **Mener des études acoustiques comprenant le déploiement de dispositifs acoustiques depuis un bateau – à la fois F-POD et SoundTraps – pour l'étude de groupes focaux** avec au moins un site où l'on sait que les grands dauphins et les dauphins à bosse de l'Atlantique sont présents – p. ex. l'Angola, le Congo, le Gabon et la Guinée-Bissau. Pour plus de détails, voir le rapport complet du groupe de travail [8](#).
- Mener une étude pilote dans une région connue pour son importance pour *S. teuszii* afin de **déployer des dispositifs acoustiques statiques dans différents types d'habitat**. Cela faciliterait les comparaisons relatives au bruit environnemental et aux difficultés du déploiement dans les sites tout en fournissant également des données initiales sur la présence de dauphins. L'activité prioritaire recommandée consiste en trois déploiements de dispositifs acoustiques (F-POD, et peut-être aussi des SoundTraps simultanés si le budget le permet) dans trois habitats différents (p. ex. chenal de

mangrove, habitat estuaire semi-fermé et côte marine exposée) dans le delta du Saloum au Sénégal pendant une année complète. L'analyse des résultats permettrait de déterminer les performances réalisables en matière de détection de *S. teuszii* et de rejet d'autres sources acoustiques dans une série d'habitats, et fournirait des données sur la présence saisonnière des dauphins sur les sites. Pour plus de détails sur la méthodologie et le budget recommandés, voir le rapport complet du groupe de travail [8](#).

- **Procéder à une évaluation rapide des prises accessoires dans le parc national de Conkouati-Douli, au Congo et sur le reste du littoral congolais** en utilisant les données disponibles dans le cadre de travaux antérieurs sur les cétacés et la pêche ^[23, 24]. Voir le rapport complet du groupe de travail [9](#) pour plus de détails.
- Dresser un **inventaire des projets de développement côtier en cours et prévus dans les pays de l'aire de répartition du dauphin à bosse de l'Atlantique** et de leur impact potentiel sur l'espèce. Une première phase de l'inventaire pourrait comporter un questionnaire dans le réseau CCAHD des partenaires des États de l'aire de répartition et l'utilisation des contacts de l'IUCN, de la CMS et de la CBI pour identifier les contacts gouvernementaux appropriés. Le financement d'un travail de consultant pourrait permettre de produire plus rapidement un inventaire de meilleure qualité. Idéalement, les données sur les développements en cours et prévus seraient stockées dans une base de données centrale en ligne accessible aux membres du CCAHD. L'analyse des impacts potentiels devrait inclure une prise en compte explicite de la disparition progressive des habitats du dauphin à bosse de l'Atlantique au profit du développement côtier, du rôle des investisseurs dans cette perte et de l'inadéquation des normes d'EIE actuelles. Pour plus de détails sur la méthode proposée, voir le rapport complet du groupe de travail [10](#).

3.1.2 Actions visant à combler les lacunes en matière de ressources

- **Concevoir une infographie basée sur des cartes** et des présentations qui soulignent que l'espèce est en danger critique d'extinction et indiquent les menaces potentielles qui pèsent sur elle et ses habitats afin de soutenir les efforts de sensibilisation et de renforcement des capacités des parties prenantes gouvernementales et du secteur privé. Une telle infographie pourrait être similaire à celles élaborées pour les [baleines à bosse de la mer d'Arabie](#) et les [dauphins à bosse de l'Indo-Pacifique](#) à Hong Kong. Voir le rapport complet des groupes de travail [2](#) et [10](#) pour plus de détails.
- **Concevoir des manuels et du matériel de soutien pour les personnes recueillant des données** incluant : des guides d'identification des espèces ; des fiches d'information ; des orientations à plusieurs niveaux sur les interventions en cas d'échouage ; des protocoles à plusieurs niveaux pour la collecte d'échantillons sur des animaux échoués vivants, des prises accessoires ou des carcasses échouées ; des formulaires de rapport d'observation ; etc. Les manuels et le matériel d'appui doivent être illustrés et présentés aussi simplement et clairement que possible. Ils devraient également être disponibles dans au moins les trois langues les plus importantes pour les États de l'aire de répartition du dauphin à bosse de l'Atlantique : anglais, français et portugais (et idéalement aussi espagnol). Pour plus de détails, voir les rapports complets des groupes de travail [2](#), [4](#), [5](#), [6](#) et [7](#).
- **Assembler des kits d'intervention/d'échantillonnage en cas d'échouage et les distribuer aux réseaux d'échouage au fur et à mesure de leur formation.** Le manque d'équipement et de moyens de stockage (p. ex. l'éthanol) pour le prélèvement et le stockage des échantillons est actuellement un obstacle au prélèvement d'échantillons sur des animaux morts, et ces équipements sont nécessaires aux protocoles d'échantillonnage et à la formation. Voir le rapport complet du groupe de travail [5](#) pour plus de détails.
- **Produire des lignes directrices sur les meilleures pratiques pour l'évaluation des projets de développement côtier** comprenant : 1) un aperçu des impacts potentiels des activités de développement côtier sur les dauphins à bosse de l'Atlantique ; 2) les exigences minimales pour la collecte et l'analyse des données de référence qui devraient être disponibles pour les études de l'impact environnemental (EIE) ; et 3) des informations sur la manière dont les impacts potentiels

peuvent être réduits. Ces lignes directrices sur les meilleures pratiques pourraient aider à guider les agences gouvernementales chargées d'évaluer et d'approuver les projets de développement côtier, et pourraient également encourager le secteur privé, en particulier ceux qui ont des « références écologiques » internationales, à mieux intégrer les besoins de conservation des dauphins à bosse de l'Atlantique dans leur planification. Pour plus de détails, voir le rapport complet du groupe de travail [10](#).

3.1.3. Actions visant à combler les lacunes en matière de capacités

- Conduire des **ateliers communautaires** visant à promouvoir une meilleure connaissance de l'espèce et une sensibilisation à ses besoins de conservation, ainsi qu'aux rôles des membres des communautés locales dans le signalement des dauphins et la réduction des menaces. De nombreuses études ont démontré la valeur et l'importance de la participation des communautés locales, en particulier des pêcheurs, à la collecte de données et aux efforts de conservation. Les ateliers communautaires, soutenus par divers matériels d'éducation et de sensibilisation, peuvent contribuer à sensibiliser la population et à la faire participer à la conservation des cétacés côtiers^[25, 26]. Pour plus de détails, voir le rapport complet du groupe de travail [2](#).
- Concevoir **des affiches, du matériel éducatif, du matériel promotionnel pour les communautés/écoles, etc.**, afin de faire connaître l'espèce et d'encourager le signalement des échouages, des prises accessoires et des observations. Le type et l'échelle des outils qui pourraient être produits sont divers et peuvent varier d'un lieu à l'autre. Au minimum, une affiche encourageant le signalement des dauphins devrait être produite dans un format dont le texte peut être facilement adapté aux différentes langues cibles (anglais, français, portugais, mais aussi espagnol, wolof, pidgin et potentiellement d'autres langues couramment utilisées dans les villages côtiers). Les coordonnées des coordinateurs régionaux du CCAHD dans chaque pays devraient figurer sur ces affiches. Le matériel pourrait également comprendre des coloriages, des histoires pour enfants et des plans de leçons et de cours, qui pourraient être une adaptation de matériel existant pour d'autres espèces dans d'autres pays. Enfin, des sacs en tissu réutilisables, des cahiers, des T-shirts et des casquettes avec un logo représentant le dauphin à bosse de l'Atlantique et des messages clés de conservation pourraient également être populaires et efficaces dans la région, et des produits similaires (fabriqués de manière responsable sur le plan environnemental et éthique) pourraient éventuellement servir d'incitation à la participation à des enquêtes par entretien et à des ateliers communautaires. Dans chaque cas, les partenaires locaux devraient aider à évaluer quels seraient les canaux et les outils de communication les plus efficaces pour atteindre chaque public cible dans chaque État de l'aire de répartition concerné. Pour plus de détails, voir le rapport complet du groupe de travail [2](#).
- **Concevoir et maintenir un site Web trilingue sur le dauphin à bosse de l'Atlantique** pour servir de plateforme centralisée où les informations et les ressources (telles que les guides d'identification et les protocoles d'échantillonnage) peuvent être téléchargées par les diverses parties prenantes, y compris les communautés locales, les écoles, les gouvernements, les ONG et le secteur privé (classement prioritaire par les groupes de travail [2](#), [4](#), [5](#), [6](#) et [10](#)).
- **Mobilisation des décideurs** en face à face et de manière virtuelle par les partenaires des États de l'aire de répartition avec, le cas échéant, le soutien d'organisations internationales et de partenaires pour sensibiliser à l'état de conservation du dauphin à bosse de l'Atlantique et aux menaces qui pèsent sur l'espèce, et fournir des conseils sur la meilleure façon de réduire les menaces potentielles (p. ex. par la réduction des prises accessoires, les meilleures pratiques pour les études de l'impact environnemental (EIE) et la réduction des impacts du développement côtier). Cela dépendra fortement des partenaires des États de l'aire de répartition et de la conception de quelques outils de communication clés (p. ex. une infographie et des présentations PowerPoint) traduits dans la langue appropriée et comprenant des détails pertinents pour le pays en question. Pour plus de détails, voir les rapports complets des groupes de travail [2](#) et [10](#).

- Dispenser **une formation aux gardes des parcs, aux agences chargées de la pêche et aux dirigeants des communautés de pêcheurs qui sont sur le terrain et ont la possibilité de recueillir et de transmettre des données.** Bien qu'il y ait peu d'aires marines protégées (AMP) classées au sein de l'aire de répartition du dauphin à bosse de l'Atlantique, plusieurs pays sans AMP ont des zones côtières protégées (voir figure 1). Les gardes de ces zones côtières, les agents des pêches chargés de suivre les ports et les sites de débarquement de poissons ainsi que les dirigeants respectés des communautés de pêcheurs seront bien placés pour recueillir les observations et les informations sur les échouages de dauphins à bosse de l'Atlantique (dans le cas des gardes), ou les prises accessoires. Le fait d'alerter ces parties prenantes sur l'état de conservation précaire de l'espèce pourrait améliorer les signalements et les connaissances sur la répartition et les menaces, et accroître les possibilités de prélèvement d'échantillons. Pour plus de détails, voir les rapports complets des groupes de travail [2](#), [4](#), [5](#), [6](#) et [10](#).
- Créer **des réseaux nationaux d'échouage et de signalement**, incluant une formation des coordinateurs/points focaux. Les observations ponctuelles signalées par le public ainsi que les échouages et les enregistrements de prises accessoires peuvent fournir une indication précieuse sur la présence du dauphin à bosse de l'Atlantique et donner un aperçu de lieux précédemment non connus et/ou mettre en évidence des hauts lieux potentiels de prises accessoires ou d'autres menaces où des interventions de conservation sont nécessaires de toute urgence. Le Cameroun et le Sénégal, par exemple, ont déjà mis en place des réseaux de signalement efficaces initialement axés sur la conservation du lamantin et des tortues marines, mais qui mettent désormais davantage l'accent sur les cétacés. Dans d'autres pays, un soutien plus important pourrait être nécessaire pour identifier des points focaux et s'assurer qu'ils disposent des outils et du soutien nécessaires pour obtenir, rassembler et archiver efficacement les données. Pour plus de détails sur cette activité prioritaire, voir les rapports complets des groupes de travail [2](#), [4](#), [5](#), [6](#) et [10](#).
- **Identifier et soutenir les scientifiques, les institutions universitaires et les laboratoires** qui peuvent faire progresser la recherche sur les cétacés dans les États de l'aire de répartition du dauphin à bosse de l'Atlantique. Il est essentiel que les capacités locales soient développées pour les activités de recherche et de suivi à long terme des cétacés, et que les scientifiques locaux (p. ex. des ONG, des agences gouvernementales ou des universités) reçoivent autant de soutien que possible de la part de collègues plus expérimentés, tant de l'intérieur que de l'extérieur de la région. Le soutien peut être fourni par des systèmes de binôme/mentor, similaires à celui mis en place depuis 2015 pour les chercheurs sur le lamantin dans la région, et également en place par l'intermédiaire du réseau de Conservation et recherche sur les mammifères aquatiques d'Afrique de l'Ouest (COREWAM – Conservation and Research of West African Aquatic Mammals) [p. ex. ²⁷]. Les recherches sur les mammifères marins dans les universités de la région pourraient être soutenues en proposant des conférences (en personne ou virtuelles) données par les membres du CCAHD. Pour plus de détails, voir le rapport complet du groupe de travail [2](#). Cependant, cette activité a également été identifiée comme prioritaire par les groupes de travail [3](#), [4](#), [5](#), [7](#) et [10](#).
- Organiser des **ateliers régionaux de formation pratique** pour l'acquisition de techniques de terrain comme les études sur la répartition, la photo-identification, les interventions en cas d'échouage, le prélèvement d'échantillons sur les carcasses, etc. Bien que tous les travaux de terrain organisés sous les auspices du CCAHD et de ses partenaires fassent participer des scientifiques locaux et renforcent les capacités locales, un atelier régional de formation pratique, organisé dans un lieu où il est presque certain d'observer des dauphins à bosse de l'Atlantique, pourrait être un moyen très efficace de donner aux scientifiques de toute la région une expérience pratique des travaux de terrain réalisables depuis un bateau (photo-identification, échantillonnage de paramètres relatifs aux habitats, déploiement de dispositifs acoustiques, etc.), des techniques d'entretien et/ou d'intervention en cas d'échouage et de prélèvement sur les carcasses. Voir le rapport complet du groupe de travail [2](#) pour plus de détails. Cette activité a également été classée comme prioritaire par les groupes de travail [3](#), [4](#), [5](#), [6](#) et [10](#).

- **Entreprendre la mobilisation des parties prenantes et des décideurs. Cartographie et coordination avec d'autres initiatives pertinentes dans le parc national de Conkouati-Douli, et dans l'ensemble du Congo** pour rétablir les réseaux et s'assurer que les conditions favorables sont en place pour mettre en œuvre un projet pilote de réduction des prises accessoires en collaboration avec l'Initiative de la CBI pour la réduction des prises accessoires (BMI – *bycatch mitigation initiative*). Ce projet serait mené dans le but de reproduire l'approche dans d'autres pays de l'aire de répartition du dauphin à bosse de l'Atlantique. Voir le rapport complet du groupe de travail [9](#) pour plus de détails sur la méthode par étapes proposée pour le développement de ce projet.

3.2. Activités à plus long terme

Outre les priorités à court et moyen termes énumérées au point 3.1, les groupes de travail ont également été invités à identifier certaines priorités de financement à plus long terme. Les activités à long terme recommandées sont les suivantes :

- **Prélèvements de biopsie** sur des dauphins à bosse de l'Atlantique. Les prélèvements de biopsie lors des études sur le terrain (voir section 3.1.1 ci-dessus) pourraient éventuellement donner un plus grand nombre d'échantillons pour l'analyse génétique et pour d'autres analyses qui fourniraient des informations sur les charges en contaminants (par l'analyse de la graisse) et le régime alimentaire (par l'analyse des isotopes stables). Les échantillons génétiques peuvent également fournir des informations sur le sexe des individus identifiés ainsi que sur les liens de parenté/relationnels entre les individus échantillonnés. Ceci est considéré comme une priorité pour les groupes de travail [3](#), [4](#), et [5](#). Cependant, la biopsie est considérée comme une technique « invasive » et *n'est pas recommandée sans une prise en compte réelle du bien-être animal*, y compris de certaines considérations plus spécifiques aux dauphins à bosse de l'Atlantique qu'à de nombreux autres delphinidés (p. ex. le fait que l'espèce soit *En danger critique d'extinction*, la sensibilité de l'espèce aux dérangements et la mauvaise qualité de l'eau dans de nombreux sites qui pourrait potentiellement augmenter les risques d'infections). Par conséquent, une évaluation complète des risques et des protocoles de meilleures pratiques serait essentielle pour les biopsies et les autres techniques invasives sur cette espèce, et des études de suivi seraient recommandées afin de veiller à ce que les individus sur lesquels une biopsie est pratiquée ne subissent aucun effet négatif à court, moyen ou long terme. En outre, l'obtention d'une autorisation de biopsie et d'importation d'équipement de biopsie peut être compliquée et prendre du temps dans les États de l'aire de répartition de l'espèce. Il a été jugé prudent de recueillir davantage de données de base sur les populations à échantillonner par des techniques non invasives avant de se lancer dans des prélèvements de biopsie. Voir le rapport complet du groupe de travail [3](#) pour plus de détails.
- **Placement opportuniste de balises satellites sur des dauphins à bosse de l'Atlantique échoués ou ayant fait l'objet de prise accessoire.** Le groupe de travail [5](#) a recommandé qu'un petit nombre de balises satellites soient conservées dans des lieux centraux dans les États de l'aire de répartition où l'on sait que des populations relativement importantes de dauphins à bosse de l'Atlantique sont présentes. Bien que les chances soient très minces qu'un dauphin à bosse de l'Atlantique s'échoue vivant ou survive à un enchevêtrement dans un filet à un moment et dans un lieu où des équipes de terrain sont sur place et ont accès aux conseils et à l'expertise nécessaires pour poser une balise, le fait d'être préparé à un tel événement bien que peu probable pourrait permettre d'obtenir un ensemble de données précieuses sur le comportement et les déplacements des dauphins à bosse de l'Atlantique (voir par exemple [McHugh et al. 2021](#)). Cela fournirait également des informations utiles sur la manière dont l'espèce réagit à la manipulation humaine. Cette technique a été utilisée en toute sécurité avec d'autres populations de dauphins côtiers, mais comme pour la biopsie, étant une technique relativement invasive, elle n'est recommandée ici que *sur les sites où des équipes de recherche expérimentées ayant l'expertise vétérinaire nécessaire sont disponibles pour fixer les balises, et où des équipes sont également disponibles pour suivre la progression de l'animal marqué*. Voir le rapport complet du groupe de travail [2](#) pour une évaluation plus détaillée des risques et des facteurs de réduction des menaces qui pourraient être associés à ce travail.

- **Mise en œuvre d'essais d'engins et de pratiques de pêche alternatifs dans le parc national de Conkouati-Douli, au Congo.** Après la nouvelle mobilisation prévue des parties prenantes, et l'évaluation rapide des risques de prises accessoires recommandée aux sections 3.1.1 et 3.1.3 (pour laquelle un financement partiel est déjà disponible), le groupe de spécialistes de la CBI sur la réduction des prises accessoires collaborera avec les partenaires locaux pour mener des essais contrôlés d'engins et de pratiques visant à réduire les prises accessoires. Ils seront évalués et, en cas de succès, la réplique dans d'autres régions de l'aire de répartition de l'espèce sera envisagée. Voir le rapport complet du groupe de travail 9 pour plus de détails. Les essais visant à réduire les prises accessoires devraient également comprendre l'identification de mécanismes de financement durables et de systèmes d'incitation fondés sur le marché qui réduisent la dépendance à l'égard des subventions ponctuelles et des sources de financement externes.
- Travail avec les parties prenantes gouvernementales pour **définir, classer et soutenir des aires marines protégées ou mettre en œuvre d'autres mesures de gestion** pouvant éliminer ou réduire de manière significative les menaces dans les principaux habitats des dauphins à bosse de l'Atlantique. C'est, bien entendu, le but ultime de toutes les actions mentionnées ci-dessus. Bien que les AMP soient perçues comme l'un des moyens les plus efficaces pour sauvegarder les habitats des dauphins et éliminer les menaces, sans gestion efficace et sans contrôle de l'application des réglementations, le classement d'une AMP sur le papier peut être moins efficace que d'autres mesures de gestion plus ciblées qui éliminent ou réduisent des menaces spécifiques. Voir le rapport complet des groupes de travail 9 et 10 pour plus de détails.

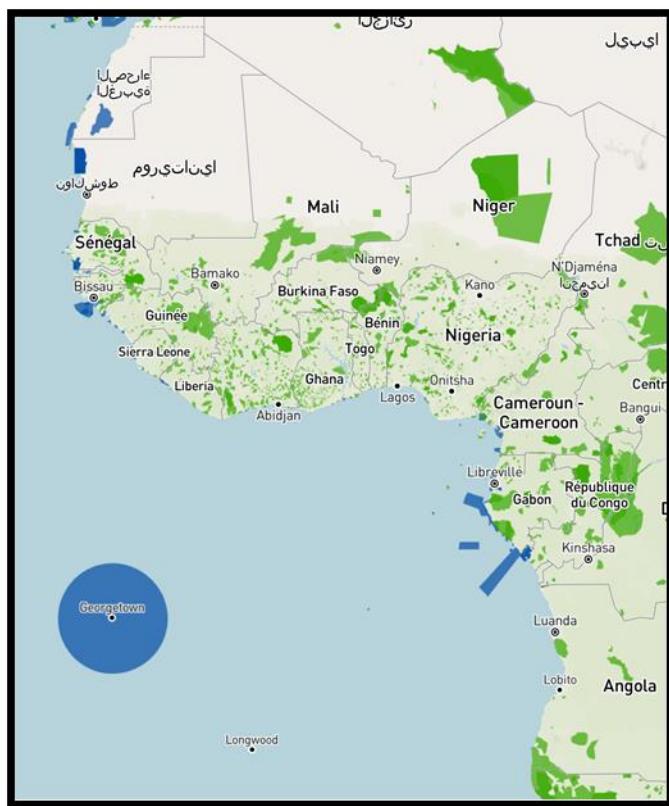


Figure 1 : Aires protégées marines (bleu) et terrestres/côtières (vert) dans l'aire de répartition du dauphin à bosse de l'Atlantique (d'après la base de données mondiale des zones protégées, WDPA <https://www.protectedplanet.net/en/thematic-areas/wdpa>).

3.3. Financement et soutien requis

Comme indiqué au point 3.1.2, le manque de financement a été à ce jour un obstacle majeur à la mise en œuvre des mesures de conservation du dauphin à bosse de l'Atlantique. Le tableau 2 résume certains des coûts estimés (approximatifs et à titre indicatif uniquement) de la mise en œuvre des priorités identifiées ci-

dessus. Le tableau ne comprend pas d'estimations pour les objectifs à long terme. Pour des estimations et des ventilations plus détaillées des coûts, voir les rapports des groupes de travail fournis dans les annexes 4 à 12.

Dans de nombreux cas, les coûts approximatifs indiqués dans le tableau 2 ne concernent qu'un seul atelier ou une seule étude en un seul lieu, alors qu'en fin de compte, plusieurs efforts parallèles sont nécessaires dans plusieurs pays en même temps. Par ailleurs, dans certains cas, il pourrait être possible de réaliser simultanément plusieurs des activités recommandées, afin de réduire les coûts. Par conséquent, aucun sous-total ou total général n'est fourni, car ceux-ci pourraient donner une fausse impression du financement total requis pour soutenir l'espèce dans l'ensemble de son aire de répartition.

Le tableau inclut les coûts estimés pour le financement permanent de la coordination et du fonctionnement du réseau CCAHD et de son site Web, bien qu'ils n'aient été traités par aucun groupe de travail dans le cadre de ses attributions. Le nombre de membres du CCAHD ne cesse d'augmenter et, depuis la création du Consortium, il y a eu une vague de planification de la conservation, d'activités de collecte de fonds et la création d'un site Web trilingue alimenté par des ressources de base pouvant être utilisées par les parties prenantes de la région pour soutenir les efforts de conservation du dauphin à bosse de l'Atlantique. Afin de maintenir l'élan qui se développe en faveur de l'espèce, il sera essentiel de soutenir des postes rémunérés au moins à temps partiel pour les coordinateurs, ainsi que pour les partenaires des États de l'aire de répartition responsables de la mise en œuvre des activités clés sur le terrain. Un financement devrait également être assuré pour garantir la mise à jour et la maintenance régulières du site Web du CCAHD, qui servira de pôle de connaissances et de moyen de diffusion des actualités, des mises à jour et des ressources liées aux travaux du CCAHD.

Tableau 2 : Résumé des financements et des soutiens requis pour les actions prioritaires de conservation du dauphin à bosse de l'Atlantique. Il convient de noter que dans la plupart des cas, il s'agit d'estimations de coûts pour des actions menées dans un seul État de l'aire de répartition et qu'elles ne sont donc qu'indicatives des coûts liés à la conservation sur un seul site, et NON dans l'ensemble de l'aire de répartition de l'espèce.

Activité	Unité	Estimation approximative du coût total (USD)	Contrepartie financière ou don en nature potentiel à compter de décembre 2020 (cela n'inclut pas tous les dons très généreux de temps et d'expertise offerts par les membres du CCAHD)
Activités recommandées pour combler les lacunes en matière de connaissances (et simultanément en matière de capacités dans certains cas)			
Études de terrain dans la région sénégal-gambienne	Étude de 3-4 semaines	50 000 USD	50 000 USD de la fondation Loro Parque prévus pour 2021, mais des fonds supplémentaires sont nécessaires pour 2022 et au-delà. 2 SoundTraps donnés par Ocean Instruments , et 4 F-POD donnés par Chelonia Ltd .
Réplique des études de terrain sur d'autres zones d'habitats où la présence du dauphin à bosse de l'Atlantique est connue ou suspectée	Étude de 3-4 semaines par site	50 000 USD	
Confirmation du statut taxonomique du dauphin à bosse de l'Atlantique dans le genre <i>Sousa</i>	Analyse de +/- 100 échantillons	15 000 USD	
Séquençage et analyse des données génomiques du dauphin à bosse de l'Atlantique	Analyse de tous les échantillons disponibles	53 000 USD	Le Smithsonian National Museum of Natural History dispose d'une contribution de 5 000 USD par an fournie par Rebecca Gwin and James Glen Mead Endowment pour la recherche sur les mammifères marins.
Études acoustiques déployant des F-POD et des SoundTraps avec observations simultanées sur le littoral	2 sites dans un pays/une zone d'étude pendant plusieurs mois	44 380 USD	2 SoundTraps donnés par Ocean Instruments, et 4 F-POD donnés par Chelonia Ltd pour une utilisation au Sénégal en 2021. Voir le rapport du groupe de travail 8 pour plus de détails.

Activité	Unité	Estimation approximative du coût total (USD)	Contrepartie financière ou don en nature potentiel à compter de décembre 2020 (cela n'inclut pas tous les dons très généreux de temps et d'expertise offerts par les membres du CCAHD)
Études acoustiques depuis un bateau comprenant le déploiement de dispositifs acoustiques pour l'étude de groupes focaux	Une seule étude ciblée depuis un bateau, d'une durée de 10 jours	30 000 USD	
Étude pilote sur un site de <i>S. teuszii</i> , afin de déployer des dispositifs acoustiques statiques dans différents types d'habitats	Un an de suivi dans 3 habitats sur le site d'étude	51 600 USD	
Inventaire des projets de développement côtier en cours et prévus dans les pays de l'aire de répartition du dauphin à bosse de l'Atlantique	Création d'une base de données partagée	20 000 USD	
Conception et lancement des enquêtes par entretien sur les connaissances écologiques locales sur des sites prioritaires	Conception et test du questionnaire, déploiement dans 3 pays	40 000 USD	Financement potentiel de certains volets des enquêtes sur la pêche – disponible dans le cadre de l'Initiative de la CBI pour la réduction des prises accessoires.
Analyse bibliographique de toute la littérature portant sur le dauphin à bosse de l'Atlantique et des autres espèces du genre <i>Sousa</i> pour extraire et compiler des informations sur l'état sanitaire et la reproduction. Inclure la consultation des établissements qui maintiennent des <i>Sousa</i> en captivité, quelle que soit l'espèce.	Analyse bibliographique complète	10 000 USD	
Activités recommandées pour combler les lacunes en matière de ressources (et dans certains cas également en matière de capacités)			
Financement de la coordination du CCAHD et de la maintenance du site Web (voir AHD.org)	1 jour par semaine pendant un an	20 000 USD	Les Amis du zoo de Nuremberg ont soutenu la coordination et la conception du site Web en 2020, et ont indiqué leur intérêt à poursuivre leur soutien en 2021.
Conception d'une présentation infographique et de présentations sur carte pour les parties prenantes gouvernementales et du secteur privé	1 infographie en 4 langues	2 000 USD	Sera partiellement soutenu par une subvention SSC EDGE de l'UICN obtenue pour la sensibilisation des instances gouvernementales.
Conception de manuels et de matériel de soutien pour les personnes recueillant les données – guides d'identification des espèces ; fiches d'information sur l'intervention en cas d'échouage, le prélèvement d'échantillons, le signalement des observations, etc.	Plusieurs lignes directrices/ protocoles en 4 langues	40 000 USD	Uko Gorter a déjà élaboré gratuitement un guide d'identification des espèces de mammifères marins en format A4 pour la région. Des fiches d'information sur les espèces ont été élaborées pour le dauphin à bosse de l'Atlantique et le grand dauphin, et sont disponibles en anglais, français et portugais.
Production d'un manuel ou d'un guide des meilleures pratiques pour l'évaluation et la réduction des impacts des activités de développement côtier	Guide des meilleures pratiques en 4 langues	20 000 USD	
Réalisation d'une évaluation rapide des risques liés aux prises accessoires sur la côte congolaise	Un rapport/une publication sur l'évaluation des risques	25 000 USD	L'initiative de la CBI pour la réduction des prises accessoires pourrait disposer d'une contrepartie financière pour cette activité. Des fonds limités sont également disponibles grâce à une subvention antérieure de l'US Marine Mammal Commission.
Activités recommandées pour combler les lacunes en matière de capacités et de sensibilisation			
Organisation d'ateliers communautaires	Ateliers d'une demi-journée ou d'une	7 500 USD	Le financement d'un atelier communautaire est inclus dans la subvention de la Fondation Loro

Activité	Unité	Estimation approximative du coût total (USD)	Contrepartie financière ou don en nature potentiel à compter de décembre 2020 (cela n'inclut pas tous les dons très généreux de temps et d'expertise offerts par les membres du CCAHD)
	journée entière sur cinq sites		Parque pour le travail de terrain dans le delta du Saloum en 2021.
Conception (en format papier et numérique/en ligne) d'affiches, de matériel éducatif et de matériel promotionnel pour les communautés/écoles	Affiche et ensemble de matériel pédagogique adaptable à la région	10 000 USD	
Mobilisation des décideurs politiques et réunions en face à face et virtuelles	Cinq actions de mobilisation soutenues par une infographie et des présentations PowerPoint	10 000 USD	Ce projet sera (partiellement) couvert par une subvention SSC EDGE de l'IUCN qui doit être mise en œuvre de janvier à juillet 2021. L'Action concertée de la CMS prévoit une réunion régionale en face à face de spécialistes et de représentants des gouvernements, et des fonds sont disponibles pour la soutenir.
Formation (dans des instituts/universités) adressée aux gardes des parcs et aux agences des pêches qui sont sur le terrain et ont la possibilité de collecter et de transmettre des données.	Organisation de 1 à 3 conférences dans des instituts situés sur 5 sites	5 000 USD	
Création de réseaux nationaux d'échouage et de signalement , y compris formation des coordinateurs/points focaux	Points focaux et outils de communication sur 5 sites	25 000 USD	L'AACF a des propositions de subventions en attente pour former un nouveau réseau national d'échouage pour la Gambie et un réseau de signalement en Guinée.
Identification et soutien aux scientifiques, institutions universitaires et laboratoires qui peuvent faire progresser la recherche sur les cétacés dans les États de l'aire de répartition du dauphin à bosse de l'Atlantique	Conférences dans 5 instituts	5 000 USD	
Organisation d'ateliers régionaux de formation pratique sur les techniques de terrain.	Deux ateliers régionaux d'une semaine pour environ 10 personnes – un sur les études depuis un bateau, un sur les interventions en cas d'échouage	20 000 USD	
Mobilisation des parties prenantes et des décideurs dans le parc national de Conkouati-Douli, au Congo, pour créer des conditions favorables aux essais de réduction des prises accessoires		25 000 USD	L'initiative de la Commission baleinière internationale pour la réduction des prises accessoires pourrait disposer d'une contrepartie financière pour cette activité. Des fonds limités sont également disponibles grâce à une subvention antérieure de l'US Marine Mammal Commission.

La collecte de fonds pour plusieurs de ces activités a déjà commencé, avec trois subventions obtenues, et plusieurs autres demandes prévues ou en cours.

4. Conclusions

Le présent rapport souligne certaines des mesures de conservation et de gestion les plus urgentes à court et moyen termes, nécessaires pour assurer la survie à long terme du dauphin à bosse de l'Atlantique. Il s'appuie sur d'importants travaux initiaux menés par des scientifiques et des organisations de conservation dans les États confirmés et présumés de l'aire de répartition de l'espèce, et envisage un effort coordonné dans lequel un large éventail de partenaires nationaux et internationaux mettront en commun leurs ressources et leur expertise pour commencer dès que possible à mener des recherches appliquées à la conservation et à mettre en œuvre une meilleure gestion des menaces. La collecte de fonds sera un élément important pour atteindre cet objectif et garantir que ces efforts sont maintenus durablement.

Les pistes suivantes sont fondamentales pour assurer le financement et le soutien des actions prioritaires identifiées à partir de janvier 2021 :

- **Poursuite du développement et du renforcement du CCAHD**, pour accroître la participation des partenaires des États de l'aire de répartition, non seulement à la mise en œuvre des projets dans ces pays, mais aussi aux groupes de travail, aux efforts de collecte de fonds et aux prises de décisions. Le groupe de travail 11, chargé de la formation d'un groupe de spécialistes ou d'un comité de pilotage pour le CCAHD, ne s'est pas encore réuni, car la sensibilisation des scientifiques spécialistes des cétacés et des ONG environnementales dans les États de l'aire de répartition est toujours en cours. La formalisation d'un tel panel devrait être une priorité pour 2021. La formation du groupe sera menée en étroite collaboration avec le groupe de travail 1 qui porte sur la mise en œuvre de l'Action concertée de la CMS, et dont le comité de pilotage comprendra également des scientifiques et des parties prenantes gouvernementales des États de l'aire de répartition du dauphin à bosse de l'Atlantique. Cependant, la bonne volonté et la collaboration informelle qui ont été établies devraient être mises à profit immédiatement pour commencer la collecte de fonds et les projets sur le terrain.
- **Collecte de fonds pour les priorités identifiées**. Le groupe de travail 12 a discuté des lignes directrices et des mécanismes d'approche des financements et tient à jour une liste de possibilités de subventions (voir section 3.3 ci-dessus). Le présent rapport, et en particulier les annexes détaillées contenant les rapports des groupes de travail, devrait permettre aux membres du CCAHD de réagir rapidement et efficacement aux possibilités de financement, en agissant selon les priorités identifiées et en utilisant les justifications, les méthodes et les estimations budgétaires qui ont été préparées.
- **Consolidation des efforts de conservation**. Le CCAHD, en tant que collectif de scientifiques, d'ONG et d'individus, continuera à travailler en collaboration avec les organisations de conservation et de gestion concernées, notamment (mais pas exclusivement) la CMS, la CBI et l'IUCN, afin d'optimiser la conservation à long terme des dauphins à bosse de l'Atlantique et de réduire au minimum la duplication des efforts ou la dilution des ressources.

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Annexes

A1. Objectifs potentiels à court et moyen termes pour la conservation de *Sousa teuszii*

Préparé par Caroline Weir & Tim Collins – Distribué le 29 janvier 2020

SYNOPSIS

Dans ce document, nous avons identifié un certain nombre d'objectifs à court et moyen termes pour faire progresser les efforts de conservation de *Sousa teuszii*. Ces objectifs intègrent les objectifs identifiés lors de l'atelier ESOCC¹ à Nuremberg en décembre 2018, et ceux identifiés lors de la réunion ad hoc qui s'est tenue à la Conférence mondiale sur les mammifères marins (WMMC) à Barcelone en décembre 2019. Ces objectifs ne sont pas classés par ordre de priorité (mais leur classement pourrait être une bonne idée) et devraient être considérés comme des points de départ pour d'autres discussions et accords. Nous reconnaissions également que l'adoption d'un plan de conservation à plus long terme, tel que l'Action concertée de la CMS, devrait demeurer l'objectif global de ces efforts.

Contrairement à d'autres petits cétacés dont l'état de conservation est très préoccupant et qui sont présents dans un petit nombre d'États ou même un seul État (tels que le baiji/dauphin du Yangzi Jiang et le marsouin du golfe de Californie), l'aire de répartition actuelle de *Sousa teuszii* comprend (au moins) 13 pays : Sahara occidental, Mauritanie, Sénégal, Gambie, Guinée-Bissau, Guinée, Bénin, Togo, Nigéria, Cameroun, Gabon, République du Congo et Angola. Il est donc peu probable qu'une approche trop générale de la conservation de *Sousa teuszii* soit appropriée. Il convient de reconnaître que les États de l'aire de répartition présentent des différences dans leurs cadres législatifs en vigueur pour protéger les dauphins et maintenir la biodiversité, dans les quantités et les types d'habitats disponibles pour les dauphins (*Sousa teuszii* est présent depuis les côtes marines exposées jusqu'aux systèmes fluviaux dans différentes parties de son aire de répartition), et dans les niveaux d'exposition aux menaces actuellement documentées. Par exemple, la population de *Sousa teuszii* dans le sud du Sénégal et en Gambie est relativement importante, utilise divers habitats marins, estuariens et fluviaux et semble être une population relativement peu menacée (bien que certains cas de mortalité aient été documentés). Par contre au Congo, *Sousa teuszii* est présent exclusivement le long des côtes marines exposées où il est peu commun et où des menaces importantes ont été identifiées (les prises accessoires et le commerce de sa viande). Bien que ces exemples soient très simplifiés, ils montrent que les actions nécessaires pour la conservation de *Sousa teuszii* doivent tenir compte de facteurs spécifiques de chaque zone. En outre, les moyens logistiques dans son aire de répartition varient en fonction des ressources, des infrastructures, et de la langue locale, et ces considérations pratiques doivent être prises en compte pour identifier où les actions sont plus susceptibles de réussir.

Dans l'ensemble, la plupart des actions nécessaires pour faire progresser la conservation de *Sousa teuszii* s'inscrivent dans trois domaines clés :

Accroître la sensibilisation, le renforcement des capacités et les mesures de protection. Travailler avec les gouvernements et autres agences compétentes (y compris les consultants en environnement) des États confirmés ou potentiels de son aire de réparation afin d'accroître la sensibilisation, de gérer les menaces et d'améliorer/mettre en œuvre les éléments de législation (tant pour les dauphins que pour la préservation de leurs habitats). Impliquer activement le secteur privé, y compris les développeurs. Mener des actions d'éducation et de sensibilisation sur les dauphins à l'adresse des communautés côtières locales (particulièrement les pêcheurs). Soutenir le renforcement des capacités par la formation et l'intégration de biologistes locaux et d'autres professionnels de la faune sauvage (p. ex. les gardes de parcs et agents des eaux et forêts).

¹ https://tiergarten.nuernberg.de/uploads/ttx_news/ESOCC.pressrelease.pdf

Combler les lacunes en matière de connaissances. La collecte des données sur le terrain est pertinente pour combler les lacunes en matière de données, en donnant la priorité aux données nécessaires pour appuyer des décisions éclairées en matière de conservation et de gestion. Cela inclut les estimations d'abondance de base (et les tendances actuelles), la répartition, la diversité génétique/la structure des populations, les causes et les taux de mortalité, le cycle biologique et l'état sanitaire.

Mettre en œuvre des mesures immédiates pour faire face aux menaces. À l'adresse des États de l'aire de répartition où des menaces spécifiques (p. ex. les prises accessoires) ont déjà été clairement identifiées comme ayant des impacts significatifs sur les populations de dauphins, et par conséquent où la mise en œuvre d'actions immédiates peut être justifiée même en l'absence de données scientifiques solides sur la taille ou les tendances de la population.

Avec le synopsis ci-dessus à l'esprit, nous proposons plusieurs objectifs à court et moyen termes qui représentent des options现实的和 réalisables pour relancer les efforts de conservation de l'espèce.

OBJECTIFS À COURT ET MOYEN TERMES

1. Accroître la sensibilisation, le renforcement des capacités et les mesures de protection

Objectif 1.1. Faire progresser l'action concertée de la CMS (court et moyen termes)

La plus grande partie de l'engagement nécessaire des parties prenantes serait atteinte en faisant progresser l'Action concertée (A.C) de la CMS. Les deux premières actions nécessitent de :

- Mettre en place un comité de pilotage et organiser une réunion des parties prenantes. Un financement est requis.
- Créer un groupe de travail (G.T), qui élaborera par la suite le plan d'action quinquennal.

Objectif 1.2. Créer un groupe d'experts pour déterminer les priorités et le financement direct (à court terme)

- Il s'agirait d'un groupe central formé à court terme pour orienter les besoins immédiats et soutenir l'élan, mais il pourrait également être intégré au groupe de travail de la CMS.

2. Combler les lacunes en matière de connaissances

Objectif 2.1. Mener une étude sur l'abondance et la répartition de la population sénégal-gambienne (à court terme)

Cette population est peut-être l'une des plus importantes et est apparemment soumise à certaines des pressions anthropiques les plus faibles (en reconnaissant que cela ne signifie pas du tout qu'il n'y ait aucune menace). La logistique et les connexions gouvernementales au Sénégal peuvent être facilitées par l'African Aquatic Conservation Fund (AACF). C'est donc une population idéale pour mettre en place un programme de suivi à long terme et dont nous devons rechercher la viabilité pour l'avenir. Les renseignements les plus récents sur la répartition et la taille de la population datent d'octobre/novembre 2015. Nous proposons initialement deux études intra-annuelles à différentes saisons, car les données issues d'entretiens suggèrent des variations spatio-temporelles. Un suivi annuel serait nécessaire par la suite. Des permis/accords sont exigés du Sénégal et de la Gambie, la dernière étude ayant été limitée au Sénégal. L'utilisation du permis est prévue pour une année.

Objectif 2.2. Étendre l'approche sénégalo-gambienne à d'autres États clés (moyen à long terme)

Nous soulignons que la Guinée, la Guinée-Bissau et le Gabon/Congo sont trois zones clés où vivent des populations de *Sousa teuszii*, et où des études sur l'abondance et la répartition sont nécessaires. En particulier, il n'existe pas de données récentes provenant d'une population potentiellement importante en Guinée-Bissau.

Objectif 2.3. Évaluer la diversité génétique et la structure de la population (moyen terme)

La clarification de la structure de la population est une exigence essentielle pour établir des priorités de conservation à long terme. En outre, nous devons comprendre si les petites populations situées à l'extrême nord et l'extrême sud de l'aire de répartition (Sahara occidental et Angola) sont essentielles au maintien de la diversité génétique de l'espèce, afin de définir des priorités dans les actions. Les échantillons de tissus (ainsi que les permis de collecte et les permis d'exportation CITES) peuvent être difficiles à obtenir et nécessiter des délais plus longs. Étudier l'ADNe (pas d'exigences de la CITES pour les échantillons d'eau) et envisager la possibilité d'envoyer des kits d'échantillonnage à des contacts dans les États de l'aire de répartition pour étudier la diversité des haplotypes dans différentes zones. Établir une base de données d'échantillons archivés, y compris des crânes/restes de squelettes à partir desquels du matériel génétique pourrait potentiellement être extrait.

Objectif 2.4. Améliorer l'échantillonnage des animaux morts (moyen terme)

Identifier les types d'échantillons les plus importants pour le cycle biologique, l'évaluation de l'état sanitaire et la génétique. Établir des protocoles d'échantillonnage/nécropsie de base (dans les langues pertinentes) pouvant être suivis avec une formation simple et avec les ressources disponibles de manière réaliste dans les États de l'aire de répartition. Dans les principaux États de l'aire de répartition où le personnel approprié existe, mettre en œuvre la formation et le soutien relatif à l'équipement d'échantillonnage. Accorder la priorité au prélèvement d'échantillons dans les États de l'aire de répartition où les animaux morts sont les plus accessibles, p. ex. au Congo.

Objectif 2.5. Évaluation de la présence dans d'autres États potentiels de l'aire de répartition

Évaluations de base via des enquêtes par entretien, en particulier dans les États de l'aire de répartition confirmés avec peu de signalements (p. ex. le Nigéria et le Togo), ceux qui n'ont pas de signalements récents (p. ex. le Ghana) et dans les pays qui ne sont pas des États potentiels de l'aire de répartition (p. ex. la Sierra Leone), pour établir la présence et la répartition. Ces données initiales éclaireront les futurs efforts de suivi et faciliteront la mobilisation des gouvernements. Cette partie pourrait être menée en même temps que des études sur les menaces (objectif 3.2).

Objectif 2.6. Effectuer des travaux préliminaires qui serviront de base aux futures évaluations de l'état sanitaire et aux travaux invasifs (court à moyen terme)

Pour réparer à une évaluation documentée pour savoir s'il est justifiable de capturer des animaux (pour de futures évaluations de l'état sanitaire ou des translocations) ou de mener des recherches invasives (p. ex. biopsie ou marquage), nous proposons plusieurs études préliminaires :

- Élaborer une stratégie progressive d'évaluation de l'état sanitaire en partenariat avec des spécialistes appropriés.
- Évaluer la qualité de l'eau dans les zones cibles potentielles afin de déterminer les niveaux de bactéries fécales humaines et d'autres polluants dans les cours d'eau qui pourraient infecter les

plaies ouvertes. Les côtes marines exposées sont-elles des environnements à moindre risque à cet égard que les rivières/estuaires ?

- Collaborer avec d'autres projets de capture ou de recherche invasive sur les populations de *Sousa* ailleurs dans le monde, via un échange d'informations et une éventuelle participation à la formation du personnel.
- Réaliser une analyse bibliographique des informations existantes sur d'autres populations de *Sousa*.

Objectif 2.7. Étudier les possibilités de suivi acoustique (moyen terme)

Les appareils acoustiques peuvent fournir de bonnes informations sur la présence des cétacés, mais jusqu'à présent, l'utilisation de C-POD n'a pas permis de distinguer les *Sousa* et les *Tursiops*. Les nouvelles technologies (p. ex. F-POD, SoundTraps) pourraient permettre d'y parvenir. Une étude de faisabilité préliminaire aiderait à évaluer si les méthodes acoustiques pourraient ou non identifier spécifiquement *Sousa teuszii* et donc être intégrées dans des plans de suivi à long terme rentables.

3. Mettre en œuvre des mesures immédiates pour faire face aux menaces

Objectif 3.1. Financer les travaux de réduction des prises accessoires en République du Congo (court terme)

Bien qu'une certaine mortalité de *Sousa teuszii* ait été documentée dans la plupart des États de l'aire de répartition, il existe peu de pays où l'on dispose de données suffisantes dans un contexte contemporain montrant un impact direct sur la population. Le Congo est une exception et la réduction des prises accessoires (avec le soutien du Gouvernement) pourrait potentiellement être mise en œuvre efficacement à court terme avec des résultats immédiats. Un programme de réduction des prises accessoires pourrait également incorporer des nécropsies et d'autres prélèvements (évaluations de l'état sanitaire), c'est-à-dire relancer et étendre les travaux antérieurs de Tim.

Objectif 3.2. Mener des enquêtes par entretien pour identifier d'autres populations faisant probablement l'objet de menaces spécifiques (à court et moyen termes)

Évaluations de la mortalité et des menaces au moyen d'enquêtes par entretien, ciblant les communautés de pêcheurs et les marchés. Pourraient être effectuées en même temps que des enquêtes sur les menaces (objectif 2.5). Les mêmes limitations potentielles sont mises en évidence que pour l'objectif 2.5.

Objectif 3.3. Examiner le niveau de menace du développement côtier commercial (à court et moyen termes)

Dans certains pays, les entreprises étrangères investissent considérablement dans le développement d'installations portuaires côtières pour l'exportation de minéraux (les estuaires de la Guinée sont notamment l'une de ces régions). Bien que des évaluations de l'impact environnemental soient effectuées, elles sont souvent fondées sur des données insuffisantes. Compte tenu du statut d'espèce en danger critique d'extinction de *Sousa teuszii*, les impacts de tels développements sur l'espèce et son habitat devraient faire l'objet d'une enquête, et les entreprises devraient être encouragées à effectuer des évaluations de base plus approfondies et à financer un suivi à plus long terme dans le cadre des mesures de compensations. Une première lettre indiquant ces préoccupations pourrait être lancée dans le cadre de l'IUCN.

A2. CCAHD membership list

This is a provisional membership list that will be updated as close as possible to the time of final publication.

Name/Nom	Sousa teusz range state	Affiliated organisation
Abdellahi Samba Bilal	Mauritania	Laboratoire d'Ecologie et Biologie des Organismes Aquatiques/ Institut Mauritanien de Recherches Océanographiques et des Pêches (IMROP)
Aissa Regalla	Guinée-Bissau	département de Suivi et Conservation de la Biodiversité à l'Institut de la biodiversité et des Aires Protégées (IBAP)
Alexandre Dah	Ivory Coast	CEM = Conservation des Espèces Marines Côte d'Ivoire
Aristide Kamla Takoukam	Cameroon	African Marine Mammal Conservation Organisation
Barbara Taylor	International	NOAA
Bob Brownell	International	NOAA
Carolina Martinez	Equatorial Guinea	Tortugas Marinas de Guinea Equatorial
Caroline Weir	International	Ketos Ecology
Cedrick Fogwan	Cameroon	African Marine Mammal Conservation Organisation
Charley Potter	International	Smithsonian Institution
Charlotte Boyd	International	KBA
Cheibani Senhoury	Mauritania	Conseiller scientifique du directeur parc national du Banc d'Arguin (PNBA)
Constant Ndjassi	Liberia	Flora Fauna International
Ciapha G. Abule	Liberia	Save my Future Foundation
Cynthia Smith	International	National Marine Mammal Foundation
Dee Allen	International	US Marine Mammal Commission
Doug de Master	International	Society for Marine Mammalogy
Edem Eniang	Nigeria	University of Uyo, Dept. of Forestry & Natural Environmental Management
Ellen Hines	International	Estuary & Ocean Science Center, San Francisco State University
Els Vermeulen	International	Mammal Research Institute Whale Unit - University of Pretoria
Ema Dilambaka	Congo Republic (Conkoutati)	WCS Congo/Exeter University
Forrest Gomez	International	National Marine Mammal Foundation
Gianna Minton	International	Megaptera Marine Conservation
Gill Braulik	International	St. Andrews University, IUCN Cetacean Specialist Group
Giuseppe Notarbartolo di Sciara	International	CMS
Grant Abel	International	IUCN Cetacean Specialist Group/ICPC
Heidrun Frisch-Nwakanma	International	CMS
Howard Rosenbaum	Senegal	WCS
Idrissa Bamby	Republic of Guinea	Centre National des Sciences
Isidore Ayissi	Cameroon	Institute of Fisheries and Aquatic Sciences (ISH) of Yabassi, University of Douala
Javier Almunia	International	Loro Parque Foundation
Joseph Sefah Debrah	Ghana	University of Cape Coast
Judicael Regis Kema Kema	Gabon	National Parks Agency (ANPN)

Lindsay Porter	International	International Whaling Commission (Small Cetacean Committee)
Lorenzo Rojas-Bracho	International	International Whaling Commission, Conservation Committee
Lorenzo von Fersen	International	Nuremberg Zoo
Luc Badji	Senegal	African Aquatic Conservation Fund
Lucy Keith-Dagne	Senegal	African Aquatic Conservation Fund
Marguerite Tarzia	International	International Whaling Commission
Marina Nganguia	Congo Republic	ASMEFA
Mark Peter Simmonds	International	Humane Society Internaitonal
Matt Leslie	International	Swarthmore College
Michael McGowen	International	Smithsonian Institution
Moulaye Wagne	Mauritania	Institut Mauritanien de Recherches Océanographiques et des Pêches (IMROP).
Nick Tregenza	International	Chelonia Ltc.
Nicola Hodgins	International	Whale and Dolphin Conservation
Oumar Ba	Senegal	Brid Life International?
Peter Corkeron	International	New England Aquarium
Randall Reeves	International	IUCN SSC Cetacean Specialist Group
Randall Wells	International	Sarasota Dolphin Project
Rima Jabado	International	(CMS) Sharks MoU
Rita Amaral	International	University of Lisbon, Center for Ecology, Evolution and Environmental Changes
Romain Beville	Congo	NOE
Ruth Leeney	International	Independent Researcher
Salvatore Cerchio	International	African Aquatic Conservation fund
Samuel Turvey	International	Zoological Society London
Sofie van Parijs	International	NOAA
Stephanie Plön	International	Bayworld Centre for Research and Education (BCRE), South Africa
Thomas Jefferson	International	Viva Vaquita
Tilen Genov	International	Morigenos
Tim Collins	International	Wildlife Conservation Society
Vincent Ridoux	International	La Rochelle University
Yandeh Sallah-Muhammed	The Gambia	Gambia Marine and Environmental Conservation Initiative

Additional contacts for mailing - CMS Concerted Action

Gabriel Hoinsoudé		
Segniagbeto	Togo	
Zacharie Zohou	Benin	Institut de Recherches Halieutiques et Océanologiques du Bénin (IRHOB)
Abdul-Rahman Dirisu	Nigeria	
Severin Tchibozo	Benin	Centre de Recherche pour la Gestion de la Biodiversité
Melanie Virtue	International	CMS Secretariat
Koen Van Waerebeek	International	Independent Researcher

A3. CCAHD Working Groups and compositions

Working Group	Convenor	Working Group Participants
1 CMS Concerted Action	Tim Collins	Heidrun Frisch-Nwakanma, Nicola Hodgins, Gianna Minton, Giuseppe Notarbartolo di Sciara, Lindsay Porter, Howard Rosenbaum, Mark Simmonds, Marguerite Tarzia, Ibrahima Ndong, Cedrick Fogwan, Edem Eniang, Lucy Keith-Diagne, Koen Van Waerebeek, Caroline Weir
2 Outreach and Capacity Building	Lucy Keith-Diagne and Gianna Minton	Gill Braulik, Sal Cerchio, Tim Collins, Tilen Genov, Nicola Hodgins, Ibrahima Ndong, Cedrick Fogwan, Edem Eniang, Yandeh Sallah-Muhammed, Matt Leslie, Lindsay Porter, Mark Simmonds, Lorenzo von Fersen, Caroline Weir, Gianna Minton, Marguerite Tarzia, Luc Badji
3 Senegal-Gambia surveys	Caroline Weir	Sal Cerchio, Tim Collins, Tilen Genov, Nicola Hodgins, Lucy Keith-Diagne, Regis Kema Kema, Matt Leslie, Ibrahima Ndong, Lindsay Porter, Els Vermeulen, Randy Wells, Gianna Minton
4 Genetic diversity	Michael McGowen	Ana Rita Amaral, Tim Collins, Tilen Genov, Lucy Keith-Diagne, Matt Leslie, Howard Rosenbaum, Caroline Weir, Gianna Minton, Aristide Takoukam
5 Sampling of strandings and bycatch	Forrest Gomez	Tim Collins, Tilen Genov, Lucy Keith-Diagne, Dee Allen, Matt Leslie, Cynthia Smith, Stephanie Ploen, Randy Wells, Caroline Weir, Gianna Minton
6 Interview surveys in range states	Gill Braulik	Gill Braulik, Sal Cerchio, Tim Collins, Tilen Genov, Nicola Hodgins, Tom Jefferson, Lucy Keith-Diagne, Regis Kema Kema, Lindsay Porter, Marguerite Tarzia, Samuel Turvey, Rima Jabado, Edem Eniang, Ellen Hines, Caroline Weir, Gianna Minton
7 Preparation for health assessments	Forrest Gomez	Grant Abel, Tim Collins, Tilen Genov, Lucy Keith-Diagne, Matt Leslie, Cynthia Smith, Stephanie Ploen, Dee Allen, Caroline Weir, Randy Wells, Gianna Minton
8 Acoustic monitoring	Caroline Weir	Sal Cerchio, Tim Collins, Peter Corkeron, Tilen Genov, Lucy Keith-Diagne, Nick Tregenza, Randy Wells, Gianna Minton
9 Bycatch Mitigation in Congo	Marguerite Tarzia	Tim Collins, Nicola Hodgins, Lindsay Porter, Lorenzo Rojas Bracho, Caroline Weir, Gianna Minton
10 Threats from coastal development	Tom Jefferson	Tim Collins, Lucy Keith-Diagne, Lindsay Porter, Caroline Weir, Gianna Minton
11 Establishment of an expert panel	Tim Collins	Nicola Hodgins, Tom Jefferson, Giuseppe Notarbartolo di Sciara, Lindsay Porter, Lorenzo Rojas Bracho, Mark Simmonds, Els Vermeulen, Caroline Weir, Gianna Minton
12 Fund raising	Lorenzo von Fersen	Tim Collins, Nicola Hodgins, Lindsay Porter, Marguerite Tarzia, Caroline Weir, Gianna Minton

A4. Working Group 2 Full Report: Outreach and Capacity Building

Data gaps and conservation management needs

What is already known/available for your WG Target with regard to *Sousa teuszii* (if possible, please include an appropriate reference list)?

Working Group Target: Working Group 2 was tasked with the following target identified by Weir et al. (2020):

- 1.2. *Outreach/Awareness/Capacity building activities in communities and with local scientists and governments*

Background

Outreach, awareness-raising and capacity building focused on *Sousa teuszii* (St) conservation has been limited in the countries where the species occurs. The CMS WAF CET initiative in the late 1990s and early 2000s was the first regional effort that helped to raise local awareness of the species and to involve local scientists in beach, interview, and boat-based survey work (Van Waerebeek et al., 2003a; Van Waerebeek et al., 2003b). This project involved scientists in The Gambia, Senegal, and Guinea-Bissau. Follow-up work involving technical support from Dr. Koen van Waerebeek to local scientists in these countries as well as Togo, Ghana, Nigeria, Cameroon and Guinea has resulted in a wealth of publications on cetacean distribution and conservation status in the region, on which local scientists are either co-authors or first authors (Ofori-Danson et al., 2003; Van Waerebeek et al., 2009; Bamby et al., 2010; Uwagbae and Van Waerebeek, 2010; Ayissi et al., 2014; Segniagbeto et al., 2014; Van Waerebeek et al., 2017).

In Senegal, coastal research, accompanied by environmental education and awareness-raising activities is currently being conducted by the African Aquatic Conservation Fund ([AACF](#)), whose activities focus primarily on manatees and turtles and stranded cetaceans. In Cameroon, the African Marine Mammal Conservation Organisation ([AMMCO](#)) has also been involved in outreach and education activities, but until recently, also with a focus on manatees. In Gabon cetacean research conducted through the Wildlife Conservation Society (WCS) (Collins et al., 2013) and the Worldwide Fund for Nature (WWF) (Minton et al., 2017) was accompanied by limited outreach and capacity building. WCS collaborated with the national Parks Agency to create a poster that would promote reporting of *Sousa teuszii* sightings and strandings (see Appendix 1). One scientist involved in WWF-coordinated research between 2012 and 2015 is now working as the warden of six marine and coastal protected areas and working toward a PhD on cetacean conservation. In Congo, dedicated *Sousa teuszii* research efforts involved the effective recruitment and training of community-based focal points who reported cetacean sightings and strandings, as well as park rangers who were able to systematically collect shore-based sightings data in a manner that allowed assessment of density and relative abundance of the species in the Conkouati Douli National Park (Collins et al., 2013).

While these efforts have been extremely valuable, and have facilitated recent reassessments of *Sousa teuszii* distribution (Weir and Collins, 2015) and conservation status (Collins, 2015; Collins et al., 2017) throughout the species' range, these assessments highlighted significant data gaps. Dedicated research on the species

has only been conducted in five of the 13 countries where the species is known to occur. In the remaining eight, the species presence is known only from scattered (opportunistic) sighting or stranding records. In six additional countries, there are no records of the species, but in only one of these (Ghana) have there been any dedicated surveys to document cetacean distribution, providing a possible indication that the lack of records may reflect an actual absence of the species rather than a failure to document it (although documented direct takes are also known to occur in Ghana).

The lack of records reflects a low overall level awareness and capacity among the stakeholders in the region involved in for wildlife and coastal research and management. Some coastal communities are not aware that dolphins inhabit their waters, and many are also unaware of legal protections in place for cetaceans. If they are aware, they are unlikely to have any concept that one of the species they observe and potentially catch in their fishing nets, catch or kill, is Critically Endangered. Government agencies in some range states are similarly unaware, and thus are unable to initiate or support any research or conservation efforts for the species. Addressing data gaps, assessing threats to the critically endangered species, and development of effective mitigation and management plans have to start with outreach, awareness raising and capacity building. These efforts need to simultaneously target a variety of St range-state stakeholders, ranging from fishers and coastal communities to coastal and marine protected area staff, to government agencies responsible for fisheries as well as wildlife management and conservation. The sustainability of effective population monitoring and conservation management will also hinge on capacity building at multiple levels, from community members who are trained to log and report sightings and strandings, to local scientists who can lead local conservation based research efforts, to government officials who can prioritise *Sousa teuszii* conservation in policy and planning.

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Identifying priority conservation management data gaps

Working Group 2 used a shared Google Sheet to rank the priority resource and data gaps that could be addressed through outreach and capacity building activities, and then to rank and assess the suggested activities that could be conducted to address these gaps. This was done separately for Outreach and Awareness raising gaps and activities and for Capacity building gaps and activities.

OUTREACH AND AWARENESS RAISING		
Priority rank	Identified data/resource gap	Relevance to achieving conservation/management outputs for <i>Sousa teuszii</i>
1	Lack of awareness of St conservation status and threats among coastal communities, including school children and fishers	If fishers and coastal communities become aware of both the rarity and protected status of St, they may take more precautions to avoid entanglement and to report sightings and strandings when they occur. This will help to address data gaps, and potentially mitigate threats (although realistically they may not feel able to change their fishing practices unless we come up with viable alternatives and economic incentives or compensations – so these solutions will need to follow awareness-raising if any real change is to occur).
2	Lack of awareness of St conservation status and threats among government agencies / managers responsible for marine / coastal conservation	Government agencies cannot be expected to take <i>Sousa teuszii</i> into account when approving coastal development plans, creating and maintaining protected areas, designing fisheries policy, or conducting any other kind of coastal zone management activities if they are not aware of the species' distribution and conservation status. They may allow activities to occur that are detrimental to the species' continued survival and contravene existing protective legislation.
3	Lack of effective reporting networks for live sightings or strandings	Increased reports of live sightings and strandings will help to fill data gaps on the species' distribution and causes of death (in the case of strandings).
4	Lack of understanding of the specific threats that need to be mitigated (and thus what awareness/education activities could effectively support mitigation).	Understanding the threats that are causing mortality and population declines is essential to designing materials and tools to help reduce those threats, although this also falls under other CCAHD working groups.
CAPACITY BUILDING		
1	Need for government managers with knowledge of tools that can be used to effectively protect St and mitigate threats	Once aware of the perilous conservation status of St, government agencies need to understand and have available tools that can be used to reduce threats and protect populations.
2a*	Need for focal points to coordinate national or state/province-level sighting and reporting networks	Effective reporting networks will lead to better understanding of the species' current distribution and threats, but these networks require focal points with the

		tools and understanding to collect/solicit, collate and share data.
2b*	Need for more scientists in St range states with experience in different elements of St conservation-based research	Scientists from outside the region can help to collect data and train locals, but only local scientists will be able to effectively and sustainably monitor populations over time and ensure that government agencies are actively engaged in long-term protection and management.
*Note that these two gaps were considered of equal priority to address		

OUTREACH AND AWARENESS RAISING	
Data/resource gap - Priority rank 1: Lack of awareness of St conservation status and threats among coastal communities including school children and fishers	
1. Please list (as numbered points) possible methods/approaches to addressing the data/resource gap and assess their achievability and likely constraints (Colour coding indicates WG 2s ranking of the activities' priority and feasibility as a high priority/short term activity (within the next 2 years) , a medium priority/medium term activity (2-3 years) , or a longer term/lower priority .)	<ul style="list-style-type: none"> • Conduct community based workshops, townhalls or meetings/workshops: This was considered achievable in the countries where we have identified partners that engage in this type of work for other species or for marine and coastal environments generally (e.g. Senegal, Cameroon, The Gambia and Gabon). Funding is needed to support the local partners that would conduct these workshops to cover their time, per diems of attendees, meeting venues, refreshments and materials. • Design and distribute posters (emphasizing uniqueness of species and value of reporting strandings, bycatch and live sightings): This was considered feasible, especially if posters are designed in a way that they can be printed and posted, and/or shared via social media/apps. They would need to be available in English, French and Portuguese at a minimum, and should be produced in a way that they could be translated into other local languages as well. • Lesson plans on dolphin biology, marine coastal ecology, threats and conservation: These were determined to be feasible, and <u>examples</u> of materials produced for other cetacean species in other languages are available for adaptation/translation. Funding would be required to engage a curriculum developer/artist/educator with the experience necessary to ensure that the adapted materials are appropriate culturally as well as being accurate for the species. Materials should be available in French, English, Portuguese and 'Pidgin'. • T-shirts, bags, caps etc. with St conservation messages printed on them. These may be effective to reinforce conservation measures and raise awareness, and could be handed out as prizes or gifts during community workshops. Bags that could replace single-use plastics would also reinforce sustainable practices and reduce marine litter. However, these were deemed less of a priority than other activities.

	<ul style="list-style-type: none"> • Story books, colouring books, etc.: These were deemed slightly lower priority than lesson plans, although they could feed into lesson plan content as well. • Development and maintenance of the CCAHD Website to help make outreach tools available to a wide audience. This is highly feasible, as the website is already under construction and will include a section for downloadable resources. However, it is noted that coastal communities and fishers are unlikely to access websites regularly themselves, so this may be a resource that is used more often by the NGOs, teachers, trainers and other stakeholders who organize workshops and educational outreach activities. • Social Media campaign (supported by catchy slogans, posters etc.): A social media campaign could use the posters, infographics and other outreach tools that are developed for the CCAHD, but would require better preparation, and engagement of a wider range of stakeholders to be successful. This was viewed as a medium-term strategy that can be implemented once networks are better established in the targeted range states. • Use of local/national celebrities to promote St conservation messages: This could support a social media campaign – and use other media channels as well, and will be most effective once local networks and government stakeholders have been consolidated and are ready to engage. • Music videos were deemed effective as a means to raise awareness in coastal communities in Madagascar. How these are received from one community in St range states to another may vary, as may the target languages – so these may be more difficult to develop in a way that they can be applied throughout the range, but could be considered as a longer-term objective to support other activities in certain communities.
With regard to the activities (short/medium action), please provide a broad indication of: (i) likely budget requirement (ii) likely core resource/equipment requirements; (iii) potential co-funding and/or donations in kind and/or equipment donations that could support this activity	<p>(i) See consolidated budget estimates below.</p> <p>(ii) These actions require human resources rather than equipment. They require time for organisation and facilitation of community workshops and other outreach efforts. <u>Examples</u> of posters, educational materials etc. that have been used for other species in other locations are available, but funding is needed to contract qualified individuals who can adapt these materials for use in coastal communities in St range states.</p> <p>(iii) AACF has offered to assist with the ad hoc French translation of emails and documents to send out to range state partners, organisation of community workshops in the Saloum Delta, Senegal, as well as dissemination of outreach materials to coastal communities there. WDC, IWC and WCS have made examples of materials available and may be able to help with their adaptation.</p>
OUTREACH AND AWARENESS RAISING	
Data/resource gap - Priority rank 2: Lack of awareness of St conservation status and threats among government agencies/managers responsible for marine/coastal conservation	

<p>1. Please list (as numbered points) possible methods/approaches to addressing the data/resource gap and assess their achievability and likely constraints (Colour coding indicates WG 2s ranking of the activities' priority and feasibility as a high priority/short term activity, a medium priority/medium term activity, or a longer term/lower priority.)</p>	<ul style="list-style-type: none"> • Design a (map-based) infographic conveying <i>Sousa teuszii</i> range, knowledge gaps and threats • Design power point presentations - in relevant languages for range states. • Engagement by in-country CCAHD members - in person meetings: Local NGO partners and scientists may be best placed to engage their relevant government agencies. They can use the power point presentation and infographics developed to support their engagement. • Development and maintenance of the CCAHD website so that it is an effective resource for local government stakeholders. • Provide training at academies for park rangers and fisheries agencies to include a unit/presentation on <i>Sousa teuszii</i> conservation status and threats. This could be an adaptation of the power point presentation above. • Engagement from IGOs (CMS, IWC, etc) to invite relevant government agencies in each range state to conservation planning discussions.
<p>With regard to the activities (short/medium action), please provide a broad indication of:</p> <p>(i) likely budget requirement (ii) likely core resource/equipment requirements; (iii) potential co-funding and/or donations in kind and/or equipment donations that could support this activity</p>	<p>(i) See compiled rough cost estimates below</p> <p>(ii) These actions require human resources rather than equipment. They require time for organisation and facilitation of engagements with relevant government agencies and other outreach efforts. Funding is needed to contract qualified individuals who can design and translate an infographic. Coordination time may be needed to help CCAHD members contribute to the design of an effective power point presentation and/or video that can be used to engage government stakeholders.</p> <p>(iii) AACF has offered to assist with the design of presentations and ad hoc French translation of emails and documents to send out to range state partners as well as outreach to government agencies, as have a number of other CCAHD members in St range states. However, their time should be reimbursed.</p>

OUTREACH AND AWARENESS RAISING	
Data/resource gap - Priority rank 3: Lack of effective reporting networks for live sightings or strandings	
<p>1. Please list (as numbered points) possible methods/approaches to addressing the data/resource gap and assess their achievability and likely constraints (Colour coding indicates WG 2s ranking of the activities' priority and</p>	<ul style="list-style-type: none"> • Designate national and/or province-state-level focal points for data collection, and establish national or province/state-level reporting networks - WhatsApp groups etc. The logistics and costs for this will vary from country to country. Cameroon and Senegal, for example, already have effective reporting networks in place that were initially driven by Manatee conservation work, but now include greater focus on cetaceans. In other countries, more support may be needed to identify focal points and ensure they have the tools and support they need to elicit, collate, and effectively archive records.

<p>feasibility as a high priority/short term activity, a medium priority/medium term activity, or a longer term/lower priority.)</p>	<ul style="list-style-type: none"> • Posters and online content to promote reporting of sightings and strandings with hotlines or details on how to report • Create step-by step manuals and/or videos demonstrating how to collect basic data and samples from strandings (also translated into target languages) • Work with national parks agencies/authorities to ensure that rangers in coastal/marine parks are alerted to the value of reporting strandings and/or live sightings during patrols - SMART could facilitate this. This could be combined with training for park rangers and fisheries agencies (see above and below). • Expand and adapt the use of reporting Apps -(e.g. Siren -developed in Cameroon, and available for adaptation and use in other range states: https://www.ammco.org/telecharger_siren, Seafari - http://www.seafariapp.org/). This was considered valuable, but as a second step after data focal points have been identified in each country, as records must be sent to local partners who can collate and work with reports as they come in. • Online virtual ‘webinars’ or seminars for potential reporting network members or leaders, containing basic information on St status, threats, and how to recognise the species, report sightings, report strandings, and collect samples. These could be facilitated by local NGOs or scientists, who could invite their members or contacts to participate. • Development and maintenance of the CCAHD Website to help make ID guides and reporting tools available to a wide audience, and to facilitate reports if reporting individuals find the website but not their country focal point. The website will have an interactive map that takes users to full country profiles for each range state that will include contact details for country focal points and a contact form.
<p>With regard to the activities (short/medium action), please provide a broad indication of:</p> <p>(i) likely budget requirement</p> <p>(ii) likely core resource/equipment requirements;</p> <p>(iii) potential co-funding and/or donations in kind and/or equipment donations that could support this activity</p>	<p>(i) See rough compiled budget below.</p> <p>(ii) These actions require human resources and the development of communication tools rather than equipment.</p> <p>(iii) Co-funding or donations in kind</p> <ul style="list-style-type: none"> • Uko Gorter has already offered to design an A4 marine mammals of West Africa ID card free of cost using his species illustrations. This is a donation worth several thousand USD. Species Factsheets have also been provided by the International Whaling Commission. • Gill Braulik has offered the use of the cetacean ID cards produced for the IOTC for the species that occur in both the Indian Ocean and W Africa, and help to design additional cards for those species not occurring in the Indian Ocean. These can support Interviews, Capacity building and awareness raising. • Seafari and Siren apps are free to download and the information would be sent to country focal points free of charge

Capacity Building	
Data/resource gap - Priority rank 1: Need for government managers with knowledge of tools that can be used to effectively protect St and mitigate threats	
1. Please list (as numbered points) possible methods/approaches to addressing the data/resource gap and assess their achievability and likely constraints (Colour coding indicates WG 2s ranking of the activities' priority and feasibility as a high priority/short term activity , a medium priority/medium term activity , or a longer term/lower priority .)	<ul style="list-style-type: none"> Identify relevant individuals or gov't bodies in each St range state who could/should be implicated in St conservation management (use NGO, IGO, and fisheries contacts/networks to identify). <i>Cost estimate: Hopefully this can be achieved with support from CMS, IWC and IUCN and CCAHD partners without extra cost. Perhaps it does require some staff time for a CCAHD coordinator and/or range-state partners?</i> Engagement by in-country CCAHD members - in person meetings: Local NGO partners and scientists may be best placed to engage their relevant government agencies. They can use the power point presentation and infographics developed to support their engagement. Provide training at academies for park rangers and fisheries agencies. These individuals are likely to become the conservation managers of the future. Development and maintenance of the CCAHD website so that it is an effective resource for local government stakeholders, featuring a searchable database of scientific literature, infographics, and accessible information about the species and the threats it faces. This will include the CMS Concerted Action and past CMS and IWC reports on the species and conservation planning tools like: https://www.iucn.org/content/guidelines-species-conservation-planning-version-10. Engagement from IGOs (CMS, IWC, etc) to invite relevant government agencies in each range state to conservation planning discussions. <i>Cost estimate: Hopefully IGO representatives would be able to contribute their time at no extra cost. Staff/coordination time would be required to arrange meetings and ensure all the relevant partners are involved, and supporting presentations/materials are available.</i>
With regard to the activities (short/medium action), please provide a broad indication of: (i) likely budget requirement (ii) likely core resource/equipment requirements; (iii) potential co-funding and/or donations in kind and/or equipment donations	<ul style="list-style-type: none"> (i) See rough cost estimates in the compiled budget below. (ii) These actions require human resources rather than equipment. (iii) Please list any co-funding or donations in kind <p>• An IUCN SSC EDGE grant of 9,100 USD has been obtained to support engagement of relevant government agencies in a number of AHD range states. This will help to cover the costs of designing an infographic as well as some staff time for range-state partners who will be responsible for these engagements. CCAHD members affiliated with the CMS, IWC, IUCN and SMM have offered to help with the identification of relevant government agencies/contacts.</p>

that could support this activity	
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Capacity Building	
Data/resource gap - Priority rank 2a: Need for focal points to coordinate national or state/province-level sighting and reporting networks	
<p>1. Please list (as numbered points) possible methods/approaches to addressing the data/resource gap and assess their achievability and likely constraints (Colour coding indicates WG 2's ranking of the activities' priority and feasibility as a high priority/short term activity, a medium priority/medium term activity, or a longer term/lower priority.)</p>	<ul style="list-style-type: none"> • Provide training and support for individuals who agree to coordinate sightings or strandings networks. This could take place through virtual webinars, 1-1 virtual training from a CCAHD member, or regional support networks through which other scientists/focal points from the region share tips and tools for effective reporting networks. <i>Cost estimate:</i> • Posters and online content to promote reporting of sightings and strandings with hotlines or details on how to report sightings and strandings. • Create step-by step manuals and/or videos demonstrating how to collect basic data and samples from strandings (also translated into target languages) • Development and maintenance of the CCAHD Website to help make ID guides and reporting tools available to a wide audience, and to facilitate reports if reporting individuals find the website but not their country focal point. The website will have an interactive map that takes users to full country profiles for each range state that will include contact details for country focal points and a contact form.
<p>With regard to the activities (short/medium action), please provide a broad indication of:</p> <p>(i) likely budget requirement</p> <p>(ii) likely core resource/equipment requirements;</p> <p>(iii) potential co-funding and/or donations in kind and/or equipment donations that could support this activity</p>	<p>(i) See compiled budget estimate below.</p> <p>(ii) These actions require human resources rather than equipment: coordination/planning and leading meetings/virtual training, venue rental, creation of training videos, poster printing, follow up guidance for trainees, and website maintenance.</p> <p>(iii) Please list any co-funding or donations in kind.</p> <ul style="list-style-type: none"> • Uko Gorter has offered to design an A4 marine mammals of West Africa ID card free of cost using his species illustrations. The card will have space for national / local stranding coordinator contact information. • AACF can provide logistics for training workshops in Senegal. AACF is already the lead for reporting sightings and strandings in Senegal, and can take the lead in outreach workshops & training for govt staff, rangers, etc. which would also be included with training provided for manatees and sea turtles. We will video necropsy procedures next time we have a carcass in Senegal (standard measurements & photo views, tooth counts, sample collection, etc.) so that it can be used for training purposes.

Capacity Building

Data/resource gap - Priority rank 2b: Need for more scientists in St range states with experience in different elements of St conservation-based research

<p>1. Please list (as numbered points) possible methods/approaches to addressing the data/resource gap and assess their achievability and likely constraints (Colour coding indicates WG 2s ranking of the activities' priority and feasibility as a high priority/short term activity, a medium priority/medium term activity, or a longer term/lower priority.)</p>	<ul style="list-style-type: none"> • Identify local scientists in each St range state who have worked with, or would be willing to collect data on St. This process has already started, but needs to continue with help of CCAHD members, NGO, IGO, and fisheries contacts/networks. <i>Cost estimates: There may not be any costs associated with this activity, other than the time of a coordinator to help keep track of outreach efforts and identified scientists in each range state.</i> • Identify universities and labs where students and scientists could use facilities. AACF already works closely with Cheikh Anta Diop University (UCAD) in Senegal, and some of the CCAHD range state members are associated with universities themselves. Further outreach and discussions are required to determine whether these universities could help to identify students interested in marine mammal research, whether they could support students in this field, and whether they have labs where necropsies could be conducted, veterinary pathologists who could assist with necropsies, or other lab facilities where samples could be analysed (blood, tissue, genetics, etc.). <i>Cost estimates: There may not be any costs associated with this activity, other than the time of local range state partners and a coordinator to help keep track of outreach efforts and identified scientists in each range state.</i> • Where helpful, provide support and hands-on training in the field from external/international CCAHD scientists in different subject areas (genetics, health, distribution, abundance estimation, acoustics, etc.). This could take place through dedicated regional training workshops where trainee scientists are invited from different range states to participate in hands-on training, or by Including young/developing scientists in fieldwork - ranging from beach surveys to dedicated surveys for distribution, abundance, acoustics, etc. • Build regional network of scientists who can communicate informally and support each other. Scientists from <i>Sousa teuszii</i> range states who share the same working language, whether experienced or less experienced, may feel more at ease communicating with and supporting each other through a WhatsApp or email group. <i>Cost estimate. This may not have any costs associated with it, but would require one or two individuals to offer to set up and support the group.</i> • Develop a buddy/mentor scheme where a more experienced cetacean scientist either from the region or from outside the region conducts local fieldwork with a young developing scientist, or a scientists crossing over to cetacean work from another field, and then remains in close contact with that scientist through email, skype etc. to provide them regular support and encouragement. <i>Cost estimate. This might already be in place informally for some local scientists, and may require in person collaboration to initiate. It may be a natural follow on from a dedicated training workshop.</i>
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	<ul style="list-style-type: none"> • Ask university lecturers/scientists from CCAHD and beyond to offer in person or remote/virtual university lectures that could contribute to marine mammal courses in universities in St range states. • Development and maintenance of the CCAHD Website to support local scientists who are looking for scientific literature, research protocols or other resources to support their studies and research.
<p>With regard to the activities (short/medium action), please provide a broad indication of:</p> <p>(i) likely budget requirement</p> <p>(ii) likely core resource/equipment requirements;</p> <p>(iii) potential co-funding and/or donations in kind and/or equipment donations that could support this activity</p>	<p>(i) See rough cost estimates in compiled budget below.</p> <p>(ii) These actions require human resources rather than equipment: People to identify local scientists in range states, to mentor and train, website maintenance.</p> <p>(iii) Please list any co-funding or donations in kind.</p> <ul style="list-style-type: none"> • AACF can provide logistics for training workshops in Senegal, can help lead a local network of scientists in informal conversations (What's App, etc.), and liaise with UCAD in Dakar to recruit students and build local veterinary expertise. • Morigenos offers to host scientists from range states for fieldwork in Slovenia so that they can gain practical expertise with photo-ID and other field techniques, as well as data processing and analysis. Tilen also offers to assist with fieldwork and/or training of local scientists on site in <i>Sousa teuszii</i> range states. He can offer his time free of cost if his travel and accommodation can be covered. Relevant core skills include photo-ID, boat surveys, biopsy sampling, mark-recapture abundance estimates, line-transect sampling, social network analysis, statistical and spatial modelling. • Ketos Ecology offers to help with producing reporting and training materials, and with training people in the field potentially (though the latter would unfortunately have to be in English and I know it is better in French in most countries).

Consolidated rough budget estimates for outreach and capacity building activities:

Items listed here are those that were determined to be of the highest level of feasibility and priority by working group members. Those in orange were deemed slightly lower priority. Proposed activities could be implemented in multiple countries at the same time. For the sake of this estimation exercise, we have generally used 3 languages and 5 countries as our 'base case' for estimated costs over the next two years. However, this can obviously be adjusted depending on the funding opportunities that we are pursuing, and when we design funding proposals, we will consult more closely with partners on the ground to more accurately estimate costs for each proposed activity.

Item	Category	Target group(s)	Description of costs	cost per unit (USD)	Number of units/countries	Total estimated	Potential matching funds or in-kind donations
Community based workshops	Awareness-raising	coastal communities, fishers	meeting venue, refreshments, staff costs for coordination and organisation (does not include cost of posters or other materials to share with participants - see below)	\$1,500.00	5	\$7,500.00	AACF has offered to assist with community workshops
Posters emphasizing uniqueness of species, and value of reporting strandings, bycatch and live sightings	Awareness-raising	coastal communities, fishers	Professional design of posters that can be disseminated in electronic format via social media. Printing of posters for display in prominent place in coastal communities, fish landing sites, etc Translation into target languages.	\$5,000.00	1	\$5,000.00	
Design of lesson plans for schools on dolphin biology, marine and coastal ecology, threats and conservation	Awareness-raising	Coastal communities and school children	Adaptation of materials for other species in other countries to appropriate cultural context , as well as translation into main target languages (French/Portuguese/English) and tribal languages	\$2,000.00	3	\$6,000.00	
Design and production of re-usable carrier bags, (children's) T-shirts, exercise books, caps etc with St conservation messages and illustrations	Awareness-raising	Coastal communities, fishers and school children	For each target country/location, design and production of most environmentally friendly and likely to be used/worn set of items. Design likely to be free, but production costs need to be covered	\$2,000.00	5	\$10,000.00	AACF has offered to help with French translations.
Commission story books, colouring books or other materials to introduce St and St conservation needs to children	Awareness-raising	Coastal communities and school children	Costs of illustrators and authors (Cost estimate: 6,500 USD for the illustration and of a 20-page story book by a professional children's illustrator: https://howardgrayillustrations.com/)	\$6,500.00	1	\$6,500.00	

			Additional costs for printing and translation	\$3,000.00	5	\$15,000.00	Could be opportunity for sponsors to print and feature their logos?
Development and maintenance of the CCAHD Website	Awareness raising, capacity building	Coastal communities, educators, NGOs, scientists, government agencies responsible for management	Domain and hosting costs, professional website design, drafting and collecting of content, uploading of content,	\$5,000.00	1		Funded by Friends of Nuremberg Zoo in 2020 - domain and hosting covered for 5 years
			and ongoing maintenance and updates	\$500.00	5	\$2,500.00	minimal time required for someone to update and add new material
Social Media campaign using catchy slogans, posters and information on how to report sightings or strandings Could use local/national celebrities to help promote	awareness raising	Coastal communities, fishers and school children	Could require support from PR firms, filming or advertising agencies - difficult to estimate				
Design a (map-based) infographic conveying St range, knowledge gaps and threats	awareness raising	Government and Industry stakeholders	Costs of professional design and layout, plus translation into English/French/Portuguese	\$3,000.00	1	\$3,000.00	
Design power point presentations to engage government stakeholders	awareness raising, capacity building	Government and Industry stakeholders	design of power point and translation into target languages and addition of site/country specific content	\$1,000.00	5	\$5,000.00	Translations could be provided by CCAHD members
Local NGOs/st range state partners to engage government partners in in-person meetings where possible to lay groundwork	awareness raising, capacity building	government stakeholders	Logistics to set up a meeting, make the right contacts, send invitations (important in most African countries), venue & chair rental, coffee break & lunch (expected in Senegal, Cameroon & probably other countries), printed materials, etc.	\$2,000.00	5	\$10,000.00	

			For manatee meetings we also give out t-shirts & posters				
Provide training at academies for park rangers and fisheries agencies to include a unit/presentation on Sousa teuszii conservation status and threats.	awareness raising and capacity building	government stakeholders	Costs of adapting presentations for other stakeholders to this target group and language, local trainers to attend classroom sessions or external trainers to join remotely	\$1,000.00	5	\$5,000.00	
IGOs (CMS, IWC, etc.) to engage their range state focal points in conservation planning	awareness raising and capacity building	government stakeholders	per diems for government participants? Costs will vary depending on whether virtual or in-person meetings	\$2,000.00	3	\$6,000.00	IGOs to fund the costs of their preparation and attendance. IUCN SSC EDGE grant of 9,100 USD available to support this effort in 2021
Designate national focal points for data collection and establish reporting networks	awareness raising and capacity building	Coastal communities, educators, NGOs, scientists, government agencies responsible for management	Costs of identifying, training and supporting focal points, providing focal points, and possibly village/fishery based informants with phone credit or incentives to share reports	\$5,000.00	5	\$25,000.00	
			Consider use of reporting apps to support networks				Costs unknown. Would need to ensure that in each country reports from apps are sent to the appropriate country focal point to ensure timely response.
Design of ID cards and species fact sheets to support those collecting sighting or stranding data	awareness raising and capacity building	Coastal communities, educators, NGOs, scientists, government	Costs of professional illustrations, photos, layout and design				Uko Gorter has already offered to design an A4 marine mammals of West Africa ID card free of cost using his species illustrations. Gianna Minton has designed

		agencies responsible for management						an A4 factsheet on <i>Sousa teuszii</i> . These will be translated and distributed in electronic format through the website for free
Create step-by step manuals and/or videos demonstrating how to collect basic data and samples from strandings (also translated into target languages)	Capacity building	scientists, government stakeholders	cost of designing or adapting basic ppt file that can also be saved as PDF. Consider including hyperlinks to video files that demonstrate sample collection and basic necropsy/assessment of cause of mortality. Cost of translation.	\$7,000.00	1	\$7,000.00		
Online virtual webinars for potential reporting network members or leaders	Capacity building	coastal communities, NGOs, scientists	Costs of time for local partners to coordinate participants, and time for CCAHD members to tailor ppt presentation and present/ participate in seminar	\$1,500.00	5	\$7,500.00		
Organise hands-on field based training workshop to demonstrate boat survey techniques for documenting distribution, photo-identification, and/or interviews	Capacity building	Scientists	Cost estimate: A dedicated workshop, in Senegal, for example, would probably cost 10,000-20,000 USD if it were to include travel and accommodation costs for scientists from outside Senegal, equipment and boat rental fees, time for course coordinators, and meals and other consumables for all involved.	\$10,000.00	1	\$10,000.00	AACF could help to coordinate and host this kind of training workshop if funding were available	
Online/virtual lectures by CCAHD scientists for universities in St range states	Capacity building	Scientists	CCAHD scientists from outside the region would likely offer their time at no cost, but range state University staff may need support for time to set up the correct technology and admin support (e.g. 100 USD per day of prep and lecture time)	\$100.00	20	\$2,000.00		
Total								\$133,000.00

A5. Working Group 3 Full report: Field surveys in Senegal Gambia an Beyond

Background

What is already known/available for your WG Target with regard to *Sousa teuszii* (if possible, please include an appropriate reference list)?

Working Group Targets: WG3 is one of several WGs that are focused on data collection aimed at addressing Target Area 2 “*Fill Knowledge Gaps*” (Weir and Collins 2020). Specifically, WG3 aims to discuss and identify priorities for realizing the following two Targets:

- 2.1 *Conduct an abundance-distribution survey of the Senegal-Gambia population; and*
- 2.2 *Extend the Senegal-Gambia approach to other key range states*

Sousa teuszii survey work

The majority of available information on the occurrence and distribution of *Sousa teuszii* in most of its range states is based on anecdotal sightings, strandings, or bycatch reports (Van Waerebeek et al. 2004). While some opportunistic information has been used to generate subjective estimates of population size (e.g.(Maigret 1980)), little systematic or effort-related work needed to support scientific population assessments has been carried out to date. A brief summary of effort-related surveys carried out over the last two decades includes (by range state, north to south):

- **Senegal:** A targeted study of *S. teuszii* in the Saloum Delta was carried out in October and November 2015, comprising 1,618 km of boat-based survey coverage and producing 30 associated sightings (Weir 2016). Overall encounter rates were 0.018 sightings/km and 0.175 animals/km (Weir 2016).
- **Guinea:** A total of 817.6 km of boat-based effort was carried out in mangrove creeks, estuaries and open marine habitat around the Río Nuñez during October and November 2013 (Weir 2015). Six on-effort sightings of *S. teuszii* were recorded, generating a sighting rate of 0.006 sightings/km. Photo-identification work documented 47 animals.
- **Guinea-Bissau:** Effort-related boat surveys have been carried out in the Rio Gêba and Arquipélago dos Bijagós areas of Guinea-Bissau, comprising several days between 18 February and 29 April 2008 and a single day on 3 November 2012 (Fulling et al. 2008, Leeney et al. 2016). Those surveys produced six sightings of *S. teuszii*, but details of the survey effort are lacking and hinder interpretation.
- **Cameroon:** In 2011, 259.1 km of small boat survey effort in Cameroon resulted in a single *S. teuszii* observation and a sighting rate of 0.039 animals/km (Ayissi et al. 2014). Additionally, 30.5 km of shore-based surveys produced no sightings.
- **Gabon:** 38 days of dedicated small boat surveys were carried out along the coast of Gabon between 2003 and 2006, focussed on areas considered likely to be favourable for *S. teuszii* (Collins et al. 2010). The surveys resulted in six sightings, and annual sighting rates of 0.0013 to 0.0015 sightings/km. Beach patrol surveys using standardised methods were carried out in Mayumba National Park in Gabon during 2007, in an attempt to adapt the shore-based

methodology described by Karczmarski et al. (2000): no sightings were recorded. A total of 22 days of boat survey effort off Gamba between 2013 and 2015 resulted in nearly 2,500 km of survey effort and produced three *S. teuszii* sightings (Minton et al. 2017).

- **Republic of Congo:** Beach patrol surveys using standardised methods were conducted on a monthly basis in Conkouati-Douli National Park (CDNP) in Congo during 2009, resulting in 38 sightings of *S. teuszii* (Collins et al. 2010). Beach surveys in the CDNP between 2009 and 2014 yielded 29 associated on-effort sightings of humpback dolphins, facilitating initial assessments of population size in 2011-2014 of between 41 and 85 dolphins; however, the confidence intervals around these estimates were very wide (Collins et al., 2013, 2015).
- **Angola:** Small boat and shore surveys were carried out at Flamingos in southern Angola during January 2008 and June/July 2008, resulting in 1,626.8 km of effort, 52 associated *S. teuszii* sightings, and a combined season sighting rate of 0.038 sightings/km (Weir 2009). Photo-identification revealed the same nine individuals in both seasons (and a calf born in between the seasons), supporting high site fidelity and a small local population.

Most of these effort-related surveys are notable in having had short temporal timeframes (most occurred within single years, some were only ‘snapshots’ spanning a few weeks) and consisting of relatively small amounts of total effort. Additionally, the methods used have not been sufficiently robust to assess population sizes or trends.

Assessment of data gaps

WG3 is one of several WGs that are focused on data collection aimed at addressing Target Area 2 “*Fill Knowledge Gaps*” (Weir and Collins 2020). Specifically, WG3 aims to discuss and identify priorities for realizing the following two Targets:

2.3 *Conduct an abundance-distribution survey of the Senegal-Gambia population; and*

2.4 *Extend the Senegal-Gambia approach to other key range states*

Targets 2.1 and 2.2 were identified by Weir and Collins (2020) in recognition of the range-wide lack of population assessment data for *S. teuszii*, particularly:

1. The total absence of robust information on the global and national population sizes, which hinders understanding of species status and the scale of impacts from threats;
2. Lack of robust data on population trends for any range state, despite widespread concern about potential declines; and
3. Absence of systematic (effort-related) distribution data in almost all range states, with associated paucity of knowledge regarding habitat use and seasonal variation in distribution.

Conducting population assessments to address these core conservation-management data gaps is the focus of WG3. Targets 2.1 and 2.2 were identified by Weir and Collins (2020) as achievable short-medium term (i.e. <2 years) goals. The focus of Target 2.1 on the Senegal-Gambia region was in acknowledgement of: (1) the presence of a reasonably large contemporary population of *S. teuszii* in that region; (2) the occurrence of the species in a relatively pristine habitat in the Saloum Delta; (3) relatively good infrastructure in Senegal and the presence of an established local partner (the African Aquatic Conservation Fund, AACF) that could facilitate survey efforts; and (4) a relatively recent targeted survey in that region (Oct/Nov 2015: Weir, 2016) which demonstrated the feasibility of future surveys. These combined factors make the Senegal-Gambia population a good starting point for a species population assessment, with optimal achievability and providing high conservation value with regard to

securing this important population and its habitat over the longer-term. Additionally, this is a good candidate population from which relevant lessons can be learned and applied in other areas.

Target 2.2 was introduced in recognition of the lack of systematic population assessment in almost all other range states. Currently, there are 13 confirmed *S. teuszii* range states, and six additional countries where the species occurrence is uncertain. Weir and Collins (2020) highlighted Guinea, Guinea-Bissau and Gabon/Congo as three additional key areas that might support viable dolphin populations and where information on abundance and distribution is particularly needed. However, it was recognised that extending the Senegal-Gambia approach to other range states was likely to be a somewhat longer-term goal in practice, occurring over the medium to long term.

In this report we focus on identifying data gaps and priority recommendations for Target 2.1 (Table 1) and Target 2.2 (Table 2).

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Identifying priority conservation management data gaps

Please list and rank these in the Table according to their perceived importance for achieving conservation and management outcomes.

The WG identified six key data gaps that could potentially be addressed by boat-based population assessment surveys, and which have direct relevance to the conservation and management of *S. teuszii* (Table 1). The identified data gaps apply equally to Target 2.1 (Senegal-Gambia survey) and Target 2.2 (surveys in other range states); Table 1 is therefore applicable to both Targets.

Table 1. Key data gaps that could potentially be addressed through the implementation of boat-based population assessment surveys for *S. teuszii*. While Priorities 1–3 could potentially be addressed via either line transect surveys or mark-recapture, Priorities 4–6 are reliant on photo-identification work.

Priority rank*	Identified data gap	Relevance to achieving conservation/management outputs for <i>S. teuszii</i>
1	Spatial and temporal distribution	<p>Understanding when and where <i>S. teuszii</i> occurs will:</p> <ul style="list-style-type: none"> Allow assessment of overlap with human activities and inform environmental risk assessments as well as other assessment processes (e.g. IFC PF6); Identify areas and seasons of persistent high occurrence where threat mitigation should be focused, and that may also warrant marine protected area status if it does not already exist; Identify habitat use and preferences, and relevant environmental drivers of distribution, that may support predictive habitat modelling of <i>S. teuszii</i> occurrence in unsurveyed regions; Identify key areas where further research effort should be focused, and what research approaches might be most appropriate/productive.
2	Population trends	<p>Understanding whether a population is increasing, stable, or declining (via trends in either relative or absolute abundance) will:</p> <ul style="list-style-type: none"> Provide information on population status and potential declines, as a scientific basis to implement appropriate conservation actions; Establish respective rates of mortality and fecundity; Facilitate the allocation of resources and finances where they are most needed; Identify most vulnerable (i.e. declining) populations, where immediate conservation action may be appropriate or critical to prevent local extirpation; Help to identify and better understand the habitats that best support <i>S. teuszii</i> populations and the threats that cause population-level declines.
3	Population size	<p>Understanding how many animals (i.e. absolute abundance) are in a population will:</p> <ul style="list-style-type: none"> Identify the largest, and thus potentially most viable, populations on which to focus longer-term conservation efforts; Facilitate population-level assessment of mortalities and place threats in relevant context; Facilitate measures of reproductive rates, fecundity, and calf survival for assessments of population viability; Clarify species status, both nationally and globally (e.g. Red List assessments); Inform the potential need for ex situ conservation efforts.
4	Population connectivity and movements	<p>Understanding whether there is immigration or emigration of individuals among study populations will:</p> <ul style="list-style-type: none"> Provide information on the level of geographical or demographic isolation of particular populations, which (in support of genetic work) will also help to define population structure and relevant units to conserve; Help to identify meaningful management units;

		<ul style="list-style-type: none"> • Inform the development of robust population abundance and trend monitoring surveys.
5	Site fidelity	<p>Understanding the degree of site fidelity exhibited by particular individuals or groups of <i>S. teuszii</i> will:</p> <ul style="list-style-type: none"> • Be fundamental to the development of robust population abundance and trend monitoring surveys, e.g. ensuring that the size of the study area captures a representative proportion of the population; • Inform threat exposure and impact assessments; • Identify priority areas for conservation; • Help to inform the planning of any proposed future health assessments; • Facilitate community engagement, since people may be able to better relate to, and care about, local dolphins as their “neighbors.”
6	Social structure	<p>Understanding the social structure of <i>S. teuszii</i> will:</p> <ul style="list-style-type: none"> • Be fundamental to the development of robust population abundance and trend monitoring surveys and choice of analytical methodology, e.g. ensuring that the size of the study area captures a representative proportion of the population and proper estimation tools are used; • Be relevant to the assessment of interactions among social groups and thus heterogeneity of sighting probability within populations; • Enable the placement of certain threats into relevant conservation context; • Be relevant to understanding of potential unique behaviours or foraging specializations of different local populations; • Facilitate measures of reproductive success through determination of rearing patterns, including duration of mother-calf associations.

*Prioritized according to perceived importance for achieving conservation/management outcomes.

Addressing the priority data gaps for Target 2.1

For each of the priority data gaps identified in Table 1, please complete the table below (copy and paste more tables as needed).

Recommendations for approaches to address each of the priority data gaps relating to Target 2.1 '*Conduct an abundance-distribution survey of the Senegal-Gambia population*' are outlined below. This WG specifically considered boat-based field surveys for *S. teuszii*, and therefore primarily focused on data gaps that could be addressed by visual/photographic methods. However, it is recognized that there is high potential for inter-disciplinary approaches during boat fieldwork that could incorporate recommendations from other WGs, particularly acoustics, biopsy dart sampling (for genetics, sex and age determination, contaminant and hormone concentrations, nutritive condition assessment, and diet information), health assessments and interview surveys. Additionally, capacity-building has been highlighted as an important data/resource gap in the range-wide conservation of *S. teuszii*, and should be incorporated into all recommended activities.

Priority data gaps 1 to 3: Distribution, population trends, and population size

1. Please list (as numbered points) possible methods / approaches to addressing the data / resource gap:	1. Mark-recapture photo-identification and sighting surveys 2. Line transect abundance surveys 3. Combined line transect/mark-recapture surveys (under particular circumstances) 4. Biopsy dart sampling
2. For each of the methods / approaches listed above, please briefly consider and summarize achievability and likely constraints with regard to <i>Sousa teuszii</i> , its habitats and range state logistics:	Mark-recapture photo-identification and sighting surveys: Effort-related sighting surveys that produce estimates of relative abundance (e.g. sightings or individuals per km) can be carried out in situations where it is not possible to meet all of the conditions for DISTANCE sampling to produce absolute abundance estimates. For example, transect surveys with fewer or less experienced personnel, or surveys with a non-systematic effort distribution. Indices of relative abundance can be compared temporally (i.e. across seasons or years), or spatially (i.e. between habitats or study sites), providing a potentially useful metric for distribution and trend monitoring. They also help to standardize photo-identification surveys, since the long-term applicability of photo-identification for abundance and trend monitoring requires surveys to be designed in a manner that they systematically cover the area of habitat to be assessed and follow set protocols for comparability. The achievability of combined sighting and photo-identification surveys has already been demonstrated for <i>S. teuszii</i> in three range states, incorporating a range of habitat types. For longer-term photo-identification based monitoring, such surveys need to occur at sufficiently short intervals that individuals are still recognizable. Photo-ID is labor-intensive and dependent on high specification camera gear. The survey platform may be simpler than needed for a line transect survey, and less limited by habitats. Photo-identification data have a number of other applications, e.g. health and body condition assessments, assessment of individuals' movements, group composition, site fidelity, social structure, estimation of survival rates, and fecundity rates. The ability to identify origins of stranded dolphins based on individually distinctive

	<p>features first identified in field studies can be important for characterizing threats to specific populations.</p> <p>Line transect surveys using DISTANCE sampling methods: Typically, relatively expensive and requires significant staffing and suitable platform. Provides a snapshot of abundance across a short period, but can cover large survey areas relatively rapidly. May be challenging to implement in <i>S. teuszii</i> habitat, due to shallow water depths and complex physiography – sandbank systems, surf zones and mangrove channels are used by the species in the Saloum Delta, which limits this method's applicability. Additionally, the potentially low abundance of the species in some regions would hinder the robustness of the method. If carried out in strict passing mode, it provides little opportunity for inter-disciplinary work such as biopsy dart sampling or photo-identification. It typically works less well with rare species or in complicated habitats.</p> <p>Combined line transect/mark-recapture surveys: Robust line transect and photo-identification approaches may be combined under certain circumstances, to generate both a distance sampling abundance estimate and the collection of photographic data for mark-recapture analysis. While combining modified line transects for relative abundance with photo-ID is relatively straightforward, combining distance sampling with photo-ID is generally only effective in areas where animal densities are expected to be low such that sighting rates are unlikely to be negatively biased by closing and spending time on photo-identification. The feasibility and appropriateness of combining the methods would need to be assessed in each study area, to determine whether this approach represents a workable compromise, notwithstanding the limitations of each method described in the sections above.</p> <p>Biopsy sampling: In addition to a wide number of other applications (see above, and covered by other Working Groups), the collection of skin samples using standard biopsy equipment can potentially address the priority data gaps considered here. For example, by generating population size (using genetic mark-recapture of individuals), producing an estimate of effective population size, through stratification of population assessment by sex and age class, or defining population genetic structure over varying spatial scales. It is contingent on obtaining permits and thus affected by local regulatory limitations, and techniques need to be carefully assessed and implemented so as to minimize the risk of infection and of disturbance to individuals or social groups (a potential concern for this species). Collection of an adequate sample size is likely to take more time than, e.g. photographic identification for abundance estimation, so it is most appropriately considered as a longer-term goal.</p>
3. Focusing on conservation / management relevance and practical achievability,	(a) At this stage, it is not possible to assess how much survey effort would be required in order to generate robust population abundance or trend estimates, since this depends on several factors including population size and site fidelity. Consequently, the recommended priority short/medium term activity for Target 2.1 is to conduct two preliminary small boat surveys (effort-related sighting surveys and photo-identification work) of the Saloum Delta which will be intended to generate the

<p>what would you recommend as a single priority activity to address this data gap in:</p> <ul style="list-style-type: none"> (a) the short/medium-term (<2 years) (b) the longer-term (>2 years) 	<p>baseline information needed to inform the design of a more robust and longer-term abundance and population trend survey. The two surveys should be of several weeks durations and be planned for different times of year (with regard to wet and dry seasons), in order to evaluate potential seasonal changes in dolphin distribution or abundance and their potential implications for survey design. They should occur at sufficiently short intervals (i.e. within one year of one another) to avoid mark change between the surveys. It is recommended that the preliminary surveys aim to cover broadly the same area as covered by Weir (2016) in order to have good representative coverage of different habitats. If plausible within the timeframe, permits should be acquired that would allow at least one of the surveys to include the waters of The Gambia. Assuming the amount and distribution of effort is similar between the two preliminary surveys, provisional mark-recapture analysis may be possible.</p> <p>(b) Establishment of a long-term population monitoring programme in the Saloum Delta/Gambian region. The results from (a) should be used to design a survey suitable for robust population monitoring, i.e. a statistically sound, repeatable and systematic survey approach. The spatial scale and temporal frequency of the surveys will be determined by the results from (a), but might be expected to occur at least annually. The longer-term (>2 years) timeframe should facilitate permits to be obtained to include The Gambia in the survey work; this is strongly recommended by the WG in light of known transboundary movements of dolphins across the Senegalese-Gambian border. Following a full evaluation of the cost-benefit of invasive techniques and permitting requirements, the potential to include biopsy sampling in longer-term monitoring fieldwork should be assessed with regard to its application for meeting data gaps identified by this and other WGs.</p> <p>It is noted that the southernmost distribution limit of dolphins from the Senegambia ‘population’ is unknown, and the population may also range into the area of southern Senegal located south of The Gambia. An assessment of that entire area is recommended under Target 2.2 (Section 4).</p>																					
<p>With regard to 3a (short / medium action), please provide a broad indication of:</p> <ul style="list-style-type: none"> (i) likely budget requirement (ii) likely core resource / equipment requirements; (iii) potential co-funding and/or donations in kind and/or equipment 	<p>(i) The cost <u>per survey</u> to include the items in the table below is estimated at: moderate (~20-75K USD). A breakdown of the estimated costs <u>per survey</u> (each survey being 4 weeks in duration) includes:</p> <table border="1"> <thead> <tr> <th>Item</th><th>Approximate cost (USD)</th><th>Match funding (%)</th></tr> </thead> <tbody> <tr> <td>Fieldwork salary for two experienced cetacean researchers (4 weeks @ \$1200 per week)</td><td>9600</td><td></td></tr> <tr> <td>Analysis salary for two experienced cetacean researchers (4 weeks @ \$1200 per week)</td><td>9600</td><td></td></tr> <tr> <td>Fieldwork salary for local personnel for capacity and training (4 weeks @ \$500 per week)</td><td>2000</td><td></td></tr> <tr> <td>International flights/travel for 2 researchers (2 @ \$3000 each, to include local transfers, transit accommodations, baggage)</td><td>6000</td><td></td></tr> <tr> <td>Visas, insurance, anti-malarials etc for 2 researchers</td><td>700</td><td></td></tr> <tr> <td>Permit application costs*</td><td>150</td><td></td></tr> </tbody> </table>	Item	Approximate cost (USD)	Match funding (%)	Fieldwork salary for two experienced cetacean researchers (4 weeks @ \$1200 per week)	9600		Analysis salary for two experienced cetacean researchers (4 weeks @ \$1200 per week)	9600		Fieldwork salary for local personnel for capacity and training (4 weeks @ \$500 per week)	2000		International flights/travel for 2 researchers (2 @ \$3000 each, to include local transfers, transit accommodations, baggage)	6000		Visas, insurance, anti-malarials etc for 2 researchers	700		Permit application costs*	150	
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donations that could support this activity	Accommodation at study site (30 days @ \$75/day)	2250	
	Subsistence (30 days @ \$40/day/pp for 4 people)	4800	
	Boat charter including skipper salary (30 days @ \$100/day)	3000	
	Fuel for the boat (30 days @ \$50/day)	1500	
	Local transport (car hire, fuel)	4000	
	Binoculars x 3 (@ \$300 each) *	900	
	DSLR cameras and lenses x 3 to include memory cards (@ \$4200 each) *	12600	
	GPS x 1 (@ \$300 each) *	300	
	Environmental sampling equipment*	400	
	Pelicases x 2 (@ \$250 each) *	500	
	Phone/internet expenses for H&S/communications in the field	100	
	Data recording forms and laptop/tablet*	500	
	Portable hard drives for data backup	250	
	Translation of resulting report	750	
	Currency conversion/contingency	2000	
	Total per initial survey	61,900	
	Total for subsequent surveys without 'one off' costs (one-off costs are marked with*)	47,050	

Priority data gaps 4 to 6: Movements, site fidelity and social structure

1. Please list (as numbered points) possible methods / approaches to addressing the data / resource gap:	1. Photo-identification work to identify marked individuals; 2. Tagging of individual animals. With regard to the data gaps 4 to 6, this would primarily address movements and site fidelity, unless multiple animals were tagged concurrently to provide information on social structure. It can also provide data on habitat use which would feed into Priority data gap 1.
2. For each of the methods / approaches listed above, please briefly consider and summarize achievability and likely constraints with regard to <i>Sousa teuszii</i> , its habitats and range state logistics:	<p>Photo-identification: Achievability has already been demonstrated for <i>S. teuszii</i> in three range states, providing preliminary information on site fidelity, movement of individuals between areas, and social affiliations among individual dolphins. The method has also been demonstrated as applicable for other <i>Sousa</i> species, as well as other coastal delphinids. Long-term applicability requires surveys to occur at sufficiently short intervals that individuals are still recognizable. Labor-intensive and dependent on high specification camera gear. Image data potentially has other applications, e.g. health assessments, movements, group composition, site fidelity. The data gaps could be achieved using the same images collected during mark-recapture population assessment suggested for Priorities 1-3.</p> <p>Tagging: Has not been carried out on <i>S. teuszii</i> to date. Has animal welfare and ethical implications, and corresponding tighter permitting requirements both in the Senegambia region and elsewhere. Would require live capture/handling of animals in order to achieve optimal deployment of tags, and therefore would be considered</p>

	alongside the potential development of live capture programs to address recommendations by other Working Groups (particularly health assessments) which would include full evaluation of risk and the production of protocols to limit impacts on the animals. Could provide large amounts of detailed data on movements and site use, but for fewer individuals than photo-identification. Selective tagging and tag programming could provide detailed information on social associations.
3. Focusing on conservation / management relevance and practical achievability, what would you recommend as a single priority activity to address this data gap in: (a) the short/medium-term (<2 years) (b) the longer-term (>2 years)	<p>(a) It is recommended that photo-identification surveys are carried out in the Senegambia region to generate the photo-identification datasets needed to address the Priority 4-6 data gaps. This is compatible with the recommendation already made for Priorities 1-3, and further supports a mark-recapture approach rather than line transect approach for survey work in the Senegambia region. Alongside this core recommendation, it is further proposed that:</p> <ul style="list-style-type: none"> • If sufficient funding is available, it is recommended that a higher intensity of photo-identification surveys within a year would help to address these specific data gaps, for example one each in spring, summer, autumn, and winter. • Training of suitable boat drivers in methods to approach dolphins for photo-identification purposes without disturbing them is needed. The WG agreed that the success of photo-identification work is highly reliant on boat drivers being able to place photographers in good positions relative to dolphin groups, and <i>S. teuszii</i> is a sensitive species. Offers have been made by several parties to provide training to boat drivers (and potentially photographers), including: (1) by Randy Wells in conjunction with the long-term field project on bottlenose dolphins in Florida conducted by the Chicago Zoological Society's Sarasota Dolphin Research Program; (2) by Morigenos in Slovenia, also with bottlenose dolphins; and (3) by Els Vermeulen with <i>Sousa plumbea</i> in South Africa. The latter would provide the most realistic experience with regard to the specific traits of <i>Sousa</i> species. • Images of <i>S. teuszii</i> are obtained on an opportunistic basis whenever possible, for example during other boat surveys for marine fauna in the region or from shore. Local capacity should be built to facilitate this (i.e. training of local personnel in photo-identification techniques, provision of suitable camera equipment). • Every effort should be made to obtain dorsal fin identification photographs along with life history and genetic data and samples (total length, sex, skin for genetics, teeth for age determination, ovaries, testis) from stranded animals to enhance our knowledge of life history, population structure, and social structure. <p>(b) As for Priority 1, the establishment of a longer-term photo-identification survey in the Saloum Delta, that supports the use of mark-recapture rather than line transect surveys for population assessment purposes.</p>
With regard to 3a (short / medium action), please provide a broad indication of:	Since the photo-identification components are compatible with a mark-recapture sighting survey, the budget is the same as for Priorities 1-3. However, an increase in temporal survey resolution would result in concurrent increases in budgets. The budget for Priorities 1-3 is per survey, and can simply be multiplied to add in extra surveys across a year.

(i) likely budget requirement (ii) likely core resource / equipment requirements; (iii) potential co-funding and/or donations in kind and/or equipment donations that could support this activity	<p>The estimated costs for one month of training of a boat driver with the Chicago Zoological Society's Sarasota Dolphin Research Program in Florida are provided below. Costs would be doubled if a photographer was also trained.</p> <table border="1"> <thead> <tr> <th>Item</th><th>Approximate cost (USD)</th><th>Match funding by CZS-SDRP (%)</th></tr> </thead> <tbody> <tr> <td>International travel, visas, health insurance</td><td>3000</td><td>0</td></tr> <tr> <td>Salary for boat driver for one month</td><td>400</td><td>0</td></tr> <tr> <td>Accommodation</td><td>—</td><td>100</td></tr> <tr> <td>Food</td><td>—</td><td>100</td></tr> <tr> <td>CZS-SDRP staff time for training</td><td>—</td><td>100</td></tr> <tr> <td>Vessel provision for training</td><td>—</td><td>100</td></tr> <tr> <td>Local transportation in Sarasota, Florida</td><td>—</td><td>100</td></tr> <tr> <td>Total to find</td><td>3,400</td><td></td></tr> </tbody> </table>	Item	Approximate cost (USD)	Match funding by CZS-SDRP (%)	International travel, visas, health insurance	3000	0	Salary for boat driver for one month	400	0	Accommodation	—	100	Food	—	100	CZS-SDRP staff time for training	—	100	Vessel provision for training	—	100	Local transportation in Sarasota, Florida	—	100	Total to find	3,400	
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Addressing the priority data gaps for Target 2.2

For each of the priority data gaps identified in Table 1, please complete the table below (copy and paste more tables as needed).

Recommendations for approaches to address each of the priority data gaps relating to Target 2.2 '*Extend the Senegal-Gambia approach to other key range states*' are outlined below. By definition this is likely to be a longer-term target (>2 years), since it requires a successful approach to have been implemented in Senegal-Gambia beforehand. Consequently, the data gaps and methods summarized for Target 2.1 will all apply to other range states, although associated costs may differ.

With regard to the identification of key range states for implementing future surveys under Target 2.2, the WG recommends the following based on Table 4.1:

- Currently, the occurrence of *S. teuszii* in six potential range states is unconfirmed, and allocating limited resources to population assessments in those countries is *not recommended as a priority* until presence-absence surveys (e.g. interviews) or opportunistic records have confirmed that the species is present.
- Of the 13 confirmed range states, Western Sahara and Angola are both located at the latitudinal limits of the known distribution range, and there is evidence to suggest that the population size in both countries is likely to be low and limited to small areas. While it would be beneficial to conduct population assessments in those two range states, they are currently considered lower priority than countries within the core distribution range that potentially support larger populations. However, genetic work is needed in those areas to assess whether those edge 'populations' harbor important genetic diversity that should be maintained, in which case their priority status may increase. Additionally, should climate change result in changes in the current species range, these edge populations may be important indicators.
- Togo and Benin have very short coastlines and are therefore unlikely by themselves to support large *S. teuszii* populations, although there are likely to be transboundary movements of *S.*

teuszii between these and neighbouring countries. Additionally, available data suggest that both countries appear to have low numbers of *S. teuszii*. Consequently, those two countries are not currently considered priorities for population assessments (this may change if more evidence becomes available from e.g. interview surveys), but it would be useful to incorporate their coastlines into a wider northern Gulf of Guinea assessment that could also include Nigeria.

- The remaining nine confirmed range states are all high priorities for population assessments. Within those high priority areas, Guinea and Guinea-Bissau are identified as particularly high priority areas for survey effort based on: (1) having the largest amounts of potentially-suitable habitat (i.e. relatively wide shallow shelves and multiple estuaries); (2) their location within the core species range, (3) potentially supporting relatively large *S. teuszii* populations based on anecdotal data; and (4) lacking recent systematic survey effort:
- The WG emphasizes that the prioritization of countries/regions in Table 4.1 for implementing population assessment work is for the purposes of allocating limited funds and resources to areas where maximum conservation/management benefit may be most achievable. **It is strongly emphasized that work for *S. teuszii* is needed in all 19 countries.**

Table 4.1. Occurrence of *S. teuszii* in 19 confirmed and potential range states (north to south), with a priority assessment for implementing population assessment survey work.

Range state	<i>S. teuszii</i> confirmed	Status	Priority*
Western Sahara	Yes	Edge of range/remnant	Medium
Mauritania	Yes	Core range, suitable habitats	High
Senegal	Yes	Core range, suitable habitats	High
The Gambia	Yes	Core range, suitable habitats	High
Guinea-Bissau	Yes	Core range, suitable habitats	Highest
Guinea	Yes	Core range, suitable habitats	Highest
Sierra Leone	No	Presence requires confirmation	Low
Liberia	No	Presence requires confirmation	Low
Côte d'Ivoire	No	Presence requires confirmation	Low
Ghana	No	Presence requires confirmation	Low
Togo	Yes	Short coastline	Medium
Benin	Yes	Short coastline	Medium
Nigeria	Yes	Core range, suitable habitats	High
Cameroon	Yes	Core range, suitable habitats	High
Equatorial Guinea	No	Presence requires confirmation	Low
Gabon	Yes	Core range, suitable habitats	High
Republic of Congo	Yes	Core range, suitable habitats	High
Democratic Republic of Congo	No	Presence requires confirmation	Low
Angola	Yes	Edge of range/remnant	Medium

*Priority is assigned specifically with regard to implementing systematic population assessment surveys using the Senegambia model; the WG acknowledges that **survey work is needed in all 19 range states.**

A6. Working Group 4 Full Report: Conservation Genetics

Background

What is already known/available for your WG Target with regard to *Sousa teuszii* (if possible, please include an appropriate reference list)?

Working Group Target: Working Group 4 was tasked with assessing the following target identified by Weir et al. (2020):

- 2.3. *Assess genetic diversity and population structure*

Background

Conservation genetics is integral to an overall strategic plan for species recovery. To implement a conservation plan, we first must figure out what we are saving. Are there distinct populations that each deserve to be saved, or are Atlantic humpback dolphins (AHDs) so genetically similar, that it does not matter which population is targeted? Is one population more genetically diverse than another? Is *Sousa teuszii* even a distinct species? Is there gene flow between AHD and other members of *Sousa* that may affect its conservation and status as a species?

All of these questions are vital for success of a conservation program and all can be answered by genetic analysis (Frankham et al., 2007). Genetic studies can reveal the degree of diversity inherit within a species across its range, identify geographically significant management units, and describe the connectivity between distinct populations (Frankham, 1995; Supple and Shapiro, 2018). This lack of knowledge can affect captive breeding programs and translocations, in which animals from genetically distinct populations may not be interchangeable. In addition, the preservation of the widest possible genetic diversity, or "evolutionary potential", across distinct lineages can increase the chances of survival of a species due to changing and shifting threats across its range. (Moritz, 1994). Genetic analysis can also reveal populations under the greatest risk of decline due to low genetic diversity and effects due to inbreeding (Frankham et al., 2007). In contrast, focusing conservation on more diverse populations with more diversity has a potentially greater chance of success.

Little work has been done on the genetics of the Atlantic humpback dolphin (*Sousa teuszii*) and next to nothing is known regarding genetic diversity and geographic structuring across its range. Much of the genetic data collected for *S. teuszii* was generated to investigate the overall phylogenetic relationships within the genus *Sousa* and no study has focused solely on the Atlantic humpback dolphin. Earlier studies sequenced mitochondrial loci (control region, cytochrome b) from one sample of *S. teuszii* from Mauritania with the aim of investigating the phylogeny of the genus *Sousa* (Frère et. 2008, 2011). These studies placed *S. teuszii* in a group with *S. chinensis* (Indo-Pacific humpback dolphin) to the exclusion of an Australian form that would eventually be described as the new species *S. sahulensis* (Jefferson and Rosenbaum, 2014). Further studies by Mendez et al. (2013) sequenced more samples across the genus *Sousa* including samples of *S. teuszii* from Gabon and Congo. Mendez et al. (2013) showed that all *S. teuszii* formed a distinct grouping, however they were most closely related to individuals of *Sousa plumbea* from Southeastern Africa, calling into question the identity of currently recognized species of *Sousa*. This essentially means that we are not 100% clear that *Sousa teuszii* is a true species genetically distinguishable from the Indian Ocean humpback dolphin. Recently,

McGowen et al. (2019) sequenced the complete mitochondrial genome from a Senegalese individual, revealing a ~1.9% divergence from *Sousa chinensis* and setting the stage for further studies using many more samples.

Studies specifically focused on the Atlantic humpback dolphin using both mitochondrial and nuclear loci are sorely needed. Perhaps the biggest hurdle hindering a large-scale analysis of the Atlantic humpback dolphin is the availability of samples. New genetic techniques such as Illumina sequencing and target sequence capture allow for the sequencing of low-quality samples such as degraded tissue and bone, teeth, or dried tissue from museum specimens. Figure 1 (attached) shows the geographic range of known samples, both tissue samples as well as museum specimens. These will provide a starting point for analysis, but large gaps remain and further collection is needed, both in the form of biopsies and opportunistic sampling of stranded individuals and skeletal material. The rapid development of environmental DNA (eDNA) in population genetics studies is another avenue for generating genetic data (Parsons et al., 2018; Baker et al., 2018). Environmental DNA can be gathered from water near swimming dolphins and are currently not subject to CITES regulations, making it easier to both gather and transport internationally. Below we highlight five priorities for how to address "Target 2.3. Assess genetic diversity and population structure" and to a lesser extent "Target 2.4. Improve the sampling of dead animals.".

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Identifying priority conservation management data gaps

Please list and rank these in the Table according to their perceived importance for achieving conservation and management outcomes.

Priority rank	Identified data/resource gap	Relevance to achieving conservation/management outputs for <i>Sousa teuszii</i>
1	Status of <i>S. teuszii</i> as a species	At present it is not 100% clear <i>S. teuszii</i> is a true species, as its lineage is nested within <i>S. plumbea</i> .
2	Geographic structuring within <i>S. teuszii</i>	Understanding how <i>S. teuszii</i> is genetically structured will: 1. Identify geographically distinct subunits and "evolutionary significant units" for further conservation action 2. Identify the degree of gene flow and between populations for evaluating connectivity and movement between populations. For conservation, this will inform decisions on which populations to focus conservation efforts, as well as decisions regarding captive breeding and translocation.
3	Estimates of genetic diversity across and within populations	Understanding diversity across and within populations: 1. Help to identify populations at risk of low genetic diversity and inbreeding 2. Evaluate the overall genetic health of specific populations
4	New genetic samples across range	Obtaining new genetic samples will 1. Allow for the further success of Priorities 1 &2 2. Identify collaborators for further genetic monitoring in range countries
5	Capacity building for genetic research within Africa	Capacity building will: 1. Increased training for Africans to continue to conduct conservation genetics work in their home countries 2. Reduce reliance on international export structures

Data/resource gap - Priority Rank 1: Status of <i>Sousa teuszii</i> as a species	
1. Please list (as numbered points) possible methods/approaches to addressing the data/resource gap:	1. Generate nuclear single nucleotide polymorphisms (SNPs) using a combination of RAD-Seq and target sequence capture from new/existing samples from <i>S. teuszii</i> , <i>S. plumbea</i> , <i>S. chinensis</i> and <i>S. sahulensis</i> .
2. For each of the methods/approaches listed above, please briefly consider and summarize achievability and likely constraints with regard to <i>Sousa teuszii</i> , it's habitats and range state logistics:	<p>Generating genome wide SNPs requires good quality DNA. This may be the largest major constraint since many of the samples already available from <i>S. plumbea</i>, <i>S. chinensis</i> and <i>S. sahulensis</i> are poor quality samples from stranded animals. We also need to obtain additional samples from <i>S. teuszii</i> (see other priorities).</p> <p>We will use two techniques to generate nuclear SNP data. First, we will generate "RAD Tags" from high-quality tissue samples to identify SNPs. Then we will design RNA baits of those "RAD Tags" for target sequence capture. This will enable us to generate SNPs for the low-quality samples (poor quality tissue and museum samples). This could require some extra work in first in acquiring a few 'decent' samples from biopsies or fresh strandings. At present, it is unclear when this could be completed, but potentially 2 years from now.</p>
3. Focusing on conservation/management relevance and practical achievability, what would you recommend as a single priority activity to address this data gap in: (a) the short/medium-term (<2 years) (b) the longer-term (>2 years)	<p>Long term goals include the generation and analysis of the SNPs using RAD-seq from samples available for all <i>Sousa</i> species. The generation of SNPs will allow us to produce phylogenetic trees to establish the placement of <i>S. teuszii</i> within the context of the genus <i>Sousa</i>. This will establish that <i>S. teuszii</i> is indeed a species clearly separate from other members of the genus. The status of <i>S. teuszii</i> obviously has huge ramifications of conservation and it is essential that this question is the highest priority.</p>
With regard to 3a (short/medium action), please provide a broad indication of: (i) likely budget requirement	<p>(i) Moderate – around 20K USD including: Total \$14980 For a total of 96 samples: 2bRAD Sequencing CD Genomics (\$1500); Custom Arbor Biosci myBaits Custom 20-40K, 48 reactions kit (Cat#300248.v5) (\$8090); NEBNext Ultra II FS DNA Library Prep Kit for Illumina with Sample Purification Beads x 2: E6177S (\$695 x2: \$1390); Other lab supplies (\$1000); Two sequencing runs on HiSeq (\$3000)</p>

(ii) likely core resource/equipment requirements; (iii) potential co-funding and/or donations in kind and/or equipment donations that could support this activity	(ii and iii) All lab work can be performed at the genomic laboratories of the American Museum of Natural History or at the Smithsonian National Museum of Natural History. If needed the sequencing of genomic libraries can be outsourced.
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Data/resource gap - Priority Ranks 2 and 3: Degree of geographic structuring and estimation of genetic diversity within <i>Sousa teuszii</i>	
1. Please list (as numbered points) possible methods/approaches to addressing the data/resource gap:	<p>1. Generate complete mitochondrial genomes from new/existing samples</p> <p>2. Generate nuclear single nucleotide polymorphisms (SNPs) using RAD-Seq and/or target sequence capture from new/existing samples</p> <p>3. Whole genome sequencing from high-quality sample(s)</p> <p>4. Environmental DNA collection and analysis</p> <p>All existing specimens/samples of <i>Sousa teuszii</i> whether tissue, teeth, or bone are shown in Figure 1 on a map of West and Central Africa.</p>
2. For each of the methods/approaches listed above, please briefly consider and summarize achievability and likely constraints with regard to <i>Sousa teuszii</i> , it's habitats and range state logistics:	<p>Population genomics projects need to sample multiple parts of the genome in order to get a complete picture of diversity within populations and relationships between populations. While DNA data derived from the mitochondrion (control region, cytochrome b) is easier generate and can give a snapshot of population complexity, the mitochondrion is maternally inherited and represents a small portion of available data. Nuclear DNA data in the form of "single nucleotide polymorphisms" can be quickly generated using next-generation Illumina sequencing technology. These data can give a more detailed and complete picture of population structure. In addition, Illumina sequencing is better able to deal with degraded samples such as stranded and museum samples.</p> <p>1. We will generate whole mitochondrial genomes using target sequence capture/RNA baits built from the mitochondrial genome of McGowen et al. (2019). We will use both tissue samples as well as DNA extracted from bones and teeth. McGowen has recently sequenced complete mitochondrial genomes from multiple tissue and museum specimens of the Irrawaddy dolphin (unpublished), some of which were collected in the 1870s. Therefore, there is a high degree of success. After samples are transported to the Smithsonian, this has the opportunity to begin immediately. Analyses</p>

performed will be similar to Louis et al. (2020). For some additional future samples, we will generate control region and cytochrome b data within Africa using standard PCR and Sanger sequencing techniques (see Rank 3).

2. We will use two techniques to generate nuclear SNP data. First, we will generate "RAD Tags" from high-quality tissue samples to identify SNPs. Then we will design RNA baits of those "RAD Tags" for target sequence capture. This will enable us to generate SNPs for the low quality samples (poor quality tissue and museum samples). This could require some extra work in first in acquiring a few 'decent' samples from biopsies or fresh strandings. At present, it is unclear when this could be completed, but potentially 1-2 years from now.

3. We will generate a complete reference genome for the Atlantic humpback dolphin through the Vertebrate Genomes Project (VGP) at Rockefeller University (Morin et al., 2020a; Rhie et al., 2020). Morin et al. (2020b) sequenced the whole genome of the vaquita using this pipeline and determined that the species most likely had low population size and low genetic diversity long before its recent decline. The long persistence of low diversity means that the vaquita could potentially cope with its current population without severe genetic affects. This phase of the project cannot take place until we are able to obtain fresh blood or tissue and immediately freeze at low temperatures. Blood/tissue will be collected when future researchers are taking physiological measurements.

4. As noted above, it may prove difficult to export or obtain tissue samples from biopsies or stranded animals in some nations. eDNA has the benefit of CURRENTLY not needing export or CITES permits (although this may change). Therefore, collaborators and/or members of CCAHD conducting surveys can collect water from wakes of swimming dolphins. Within these water samples, very small pieces of AHD DNA potentially exist. Using methods in Baker et al. (2018) and Parsons et al., 2018 we will amplify a small segment of the mitochondrial control region and compare these AHD control regions already obtained in the studies above. Filters, pump equipment, and preservative will be provided to collectors and instructions given via taped video. Techniques on collecting eDNA and testing out protocols will first be attempted with the AHDs in Sine-Saloum Delta in Senegal. eDNA extraction and analysis will be performed either at Smithsonian or at an appropriate lab in Africa, if possible.

References:

Louis et al. (2020). Influence of past climate change on phylogeography and demographic history of narwhals, *Monodon monoceros*. *Proc R Soc B* 287: 20192964.

Morin et al. (2020a). Building genomic infrastructure: Sequencing platinum-standard reference-quality genomes of all cetacean species. *Marine Mammal Science* 36(4):1356-1366.

	<p>Morin et al. (2020b). Reference genome and demographic history of the most endangered marine mammal, the vaquita. <i>Molecular Ecology Resources</i> Online Early: https://doi.org/10.1111/1755-0998.13284</p> <p>Rhie et al. (2020). Towards complete and error-free genome assemblies of all vertebrate species. <i>biorxiv</i>.</p>
<p>3. Focusing on conservation/management relevance and practical achievability, what would you recommend as a single priority activity to address this data gap in:</p> <p>(a) the short/medium-term (<2 years)</p> <p>(b) the longer-term (>2 years)</p>	<p>A quick picture of general diversity within the species is needed to determine distinct lineages on which to focus conservation efforts. This can quickly be provided by the mitochondrial genomes with a more detailed picture following with SNP data. As we need more samples from gaps within the current range, we may need to process more samples as they come in.</p> <p>a) Short term goals include completion of generating mitochondrial genomes for all currently available samples (Figure 1); obtaining new samples for use in both mitochondrial and nuclear analyses (See Priority 3).</p> <p>b) Longer term goals will include the generation of SNP data, whole genome sequencing, and eDNA, as all will require acquiring new samples and/or higher quality tissues. If we are able to answer many of our questions with fresh tissue samples, then eDNA will prove redundant. However, if we are without options in some range countries, eDNA will be essential for providing some information regarding haplotypes and relationships with other populations. eDNA collection by survey teams will be a short to medium term goal as this can be done in tandem with these groups.</p>
<p>With regard to 3a (short/medium action), please provide a broad indication of:</p> <p>(i) likely budget requirement</p> <p>(ii) likely core resource/equipment requirements;</p> <p>(iii) potential co-funding and/or donations in kind and/or equipment donations that could support this activity</p>	<p>(i) Potential budget is moderate (~20-75K USD): \$53280.</p> <p>Goal 1: Total \$6300</p> <p>To process 48 samples, we will need to order myBaits MITO 48 reactions kit (Arbor Biosci Cat#303048) (\$2160), NEBNext Ultra II FS DNA Library Prep Kit for Illumina with Sample Purification Beads x 2: E6177S (\$695 x2: \$1390), Sequencing run on HiSeq (\$1500); Other lab supplies (\$1000); Shipping (\$250)</p> <p>Goal 2: Total \$14980</p> <p>2bRAD Sequencing CD Genomics (\$1500); Custom Arbor Biosci myBaits Custom 20-40K, 48 reactions kit (Cat#300248.v5) (\$8090); NEBNext Ultra II FS DNA Library Prep Kit for Illumina with Sample Purification Beads x 2: E6177S (\$695 x2: \$1390); Other lab supplies (\$1000); Two sequencing runs on HiSeq (\$3000)</p> <p>Goal 3: Total \$22000</p> <p>This is the cost of generating the highest quality genome using the Vertebrate Genomes Project (VGP) pipeline (\$15K); shipping/cost of liquid nitrogen (\$1K); cost of travel for McGowen and assistant for collection (\$6K).</p>

	<p>Goal 4: Total \$10000</p> <p>Investment is low (<\$20K), as eDNA activities will be performed while surveys and other activities are ongoing. Filters and preservative will be provided free of charge from a Smithsonian initiative.</p> <p>(ii)</p> <p>All lab work will be performed at the molecular lab of the Smithsonian National Museum of Natural History where consumables are free. Sequencing will be outsourced to various Smithsonian partners. For African laboratory work, see Priority 3. Assistance with export paperwork/costs may be needed. Travel and accommodation for McGowen and an assistant for collection of blood/tissue from live animals for genome sequencing. For eDNA, filters, preservatives, lab time, and analysis will be provided free at the Smithsonian; however, if we find capacity at an African institution, then we will have to pay for these resources. DNA sequencing will be a cost in either location.</p> <p>(iii) Please list any co-funding or donations in kind.</p> <p>Rebecca Gwin and James Glen Mead Endowment for Marine Mammal Research at the Smithsonian National Museum of Natural History: we can expect a contribution to these costs of at least \$5000 per year.</p>
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Data/resource gap - Priority Rank 4 & 5: New genetic samples across range and building capacity for genetic research in Africa	
1. Please list (as numbered points) possible methods/approaches to addressing the data/resource gap:	<ol style="list-style-type: none"> 1. Contacting local collaborators in range states who could collect samples from carcasses and report live strandings 2. Develop protocols for both dead and live animal sampling and provide specific guidance on the appropriate storage of samples so that they would meet the requirements for genetic work 3. Identify genetics laboratories in range states that could potentially analyze samples and create a list of their capabilities. 4. Provide training for African genetics laboratories personnel and graduate students to extract DNA, run PCRs, etc.
2. For each of the methods/approaches listed above, please briefly consider and summarize achievability and likely constraints with regard to <i>Sousa teuszii</i> , its habitats and range state logistics:	There is some overlap of priority 4 with WG 2 (Outreach and Capacity Building), WG 5 (Sampling of strandings and bycatch) and WG 7 (health assessments). As such, we believe securing partners in most range states to be highly achievable, since it is a priority action for several WGs. We will be constrained in countries where no local people (researchers, government agents, etc.) are able to help. We have already contacted potential local collaborators in several countries and received positive responses from

	<p>collaborators in The Gambia, Benin, Cameroon, Congo, Gabon, Ivory Coast, Mauritania, the Republic of Guinea, Guinea-Bissau, and Nigeria.</p> <p>Developing protocols for genetics sampling should be achievable in the short term, given the expertise that exists in this WG. Training will be needed for local collaborators, which may need to be done online in the short term, but in person training will likely be more effective in the longer term. We will work to identify genetics laboratories that could analyze samples in-country, which should be achievable in the short term if facilities exist. Training people in African genetics laboratories will take a longer-term effort and will mostly need to be achieved through in-person training, as well.</p>
<p>3. Focusing on conservation/management relevance and practical achievability, what would you recommend as a single priority activity to address this data gap in:</p> <p>(a) the short/medium-term (<2 years)</p> <p>(b) the longer-term (>2 years)</p>	<p>Methods 1 & 2 listed above should be able to be addressed in the short term, although some collaborators may not collect samples after training due to logistic constraints or lack of will, and samples may take long time frames to export. It is essential that we expand our network on the ground to collect opportunistic genetics samples at whenever they are available.</p> <p>In terms of Methods 3 & 4, several facilities have already been identified and should be approached: the former MetaBiota lab in Yaoundé, Cameroon which is now being run by the Cameroonian government (and where Aristide Kamla has already set up an MOU), the lab in Franceville, Gabon, and the IRD/INRA lab in Dakar, Senegal (Lucy has a contact with a researcher there). If any of these labs (and any others identified in the short term) are able to take <i>Sousa</i> samples for analyses, training can be arranged as soon as funding is available. Until training can be arranged, samples will likely need to be exported to laboratories in the USA (Smithsonian, AMNH) or Europe (U. of Lisbon). In the longer term it will be important for both the speed of analyses and building capacity to have genetics labs in at least several of the range countries.</p>
<p>With regard to 3a (short/medium action), please provide a broad indication of:</p> <p>(i) likely budget requirement</p> <p>(ii) likely core resource/equipment requirements;</p> <p>(iii) potential co-funding and/or donations in kind and/or equipment</p>	<p>(i) Moderate: \$25K (this is an estimate, as investigation of laboratories would need to happen first before we know what is possible)</p> <p>The budget will increase as the number of local collaborators in range states increases but should be fairly low overall to collect and export samples, assuming there are only a few per year (\$250/collaborator/year). However, if captures are planned or a die-off occurs, we should be prepared to collect and export samples and therefore would need a higher budget. Estimated total costs: \$5000</p>

donations that could support this activity	<p>Payment for use of laboratories and supplies is unknown at this moment. But future investigation will establish costs of use and training. Tentatively we would put this around \$20K.</p> <p>(ii) Access to boats and vehicles to get to carcasses, trained personnel to collect samples, sampling tools (scalpels, vials with preservative liquid, nitrile gloves, permanent markers, datasheets), appropriate storage (freezers, refrigeration or dry storage), export and import permits if samples are to be analyzed outside of the country where they are collected, laboratories to analyze samples, and personnel time to do bench work, analyses and publications of results. Also, Conservation genetics laboratories with capacity for DNA extraction, PCR, and Sanger sequencing. Next generation sequencing capabilities are desirable, if possible. Compensation of personnel for training, bench work, analysis and publication time.</p> <p>(iii) Please list any co-funding or donations in kind.</p> <p>Costs of transportation to field sites to collect samples (vehicle and boat fuel) could potentially be donated by some collaborators, AACF can provide logistics coordination for field site/ in person training.</p>
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A7. Working Group 5 Full Report: Documenting and Sampling Carcasses

Background

What is already known/available for your WG Target with regard to *Sousa teuszii* (if possible, please include an appropriate reference list)?

Working Group Target: The target for Working Group 5 from Weir et al. (2020) was:

- *Target 2.4 – Improve the Documentation* and Sampling of Dead Animals (*note that ‘documentation’ was added to the original target).*

* The original target for Working Group 5 from Weir & Collins (2020) was: '**assess the feasibility and urgency of dead animal sampling needs**'. Following discussion, the group decided that this should be slightly altered to '**to assess the feasibility and urgency of dead animal reporting and sampling needs**' in order to better reflect the value of documenting any level of information associated with carcass recovery from stranded or bycaught *Sousa teuszii*.

Background

A recent report published by the International Union for Conservation of Nature (IUCN), stressed the importance of the early completion of data gaps for at-risk populations of small cetaceans (Taylor et al., 2020). Doing so provides species experts and conservation managers with the necessary tools to act as efficiently and successfully as possible when planning urgent and long-term conservation actions. The IUCN document **highlights *Sousa teuszii* as one of the seven species of small cetaceans of greatest concern**, with an urgent recommendation for community-based research to fill knowledge gaps on geographic distribution, animal abundance, and threats to species survival.

Effective necropsy sampling and analysis is a proven tool to determine important baseline information on species-specific biology, ecology, genetics, and individual and population health (Geraci & Lounsbury, 1993; Lane et al., 2014; Norris, 1961; Pugliares et al., 2007; Rowles, Van Dolah, & Hohn, 2001). Since cetaceans are difficult to study due to their aquatic environment, information obtained from necropsies is a critical component of information gathering that can both help answer basic biology questions and aid in population health investigations (Plön et al., 2015).

To date, minimal carcass recovery efforts are in place in Africa for aquatic species (Plön et al., 2015). Carcass recovery and necropsies of cetaceans are challenging due to limited resources, lack of trained personnel, hot and/or humid weather conditions that cause rapid tissue necrosis, rapid butchering of carcasses for human consumption, scavenging by wild animals and birds, as well as a lack of accessibility to some of the remote locations under consideration (Plön et al., 2015). These challenges and constraints result in fewer necropsies being conducted, less overall identification of mortality causation and disease, and a lack of understanding of population level health threats than might be possible in geographic regions where stranding response efforts are better-established.

ASSESSMENT OF DATA GAPS

Target 2.4 was identified by Weir et al. (2020) in an effort to inform evaluation of whether it is feasible to:

1. *Identify what types of samples are most critical for life history, health assessments, and genetics.*
2. *Discuss the establishment of basic data reporting and sampling/necropsy protocols that can be followed with simple training and with the resources realistically available in range states.*
3. *Implement support through training and equipment.*
4. *Prioritize sample collection where dead animals are most easily accessed.*

To investigate Target 2.4, the group listed and prioritized data gaps that could be addressed by examining dead animals (Table 1). The more detailed methodologies for filling these data gaps were explored and scored as to their feasibility, either due to challenging range state logistics and/or funding constraints. Since methodologies were the same for all of the data gaps listed (1-8), they are discussed together in the following recommendations.

To fill as many data gaps as possible, the group recommends identifying a number of countries where enabling conditions are already in place to begin or expand data collection efforts. These places include (but are not limited to):

- Senegal (where the African Aquatic Conservation Fund does regular beach/stranding surveys and is building a stranding reporting network);
- Cameroon (where the African Marine Mammal Conservation Organisation conducts environmental education and uses a stranding reporting App);
- Gabon, where the National Parks Agency has a network of coastal and marine park wardens and rangers who report strandings; and
- The Republic of Congo (and specifically Conkouati-Douli National Park) where coastal park rangers have been trained in reporting of cetacean sightings and strandings.

Identification of necessary equipment, together with suitable laboratories and personnel to carry out sampling work within range states is imperative. Local capacity building for appropriate long-term sample storage and diagnostic testing assay development and validation is also needed (Plön et al., 2015). Standardization of data reporting and sampling protocols as well as prioritization of sample collection to establish baseline parameters is also needed in order to allow for comparable results across research groups and regions, and the execution of coordinated research efforts that allow for the recognition of regional conclusions (Plön et al., 2015).

Training of local personnel through the provision of appropriate manuals and ‘hands on’ training courses is essential. The group strongly recommends a community-based approach to all efforts as outlined below, with a focus on local capacity building through training in association with established stranding and veterinary organizations and facilities worldwide. WG5 recommends hands-on training and the adaptation and dissemination of suitable tiered necropsy and sampling protocols commence immediately where possible.

Carcasses obtained through bycatch or strandings are invaluable resources for data collection (Plön et al., 2015). Surveillance of individual animal and population health is an important tool for conservation management (Plön et al., 2015) and should be prioritized for *Sousa teuszii*.

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Identifying priority conservation management data gaps

Please list and rank these in the table according to their perceived importance for achieving conservation and management outcomes.

Table 1: Dead animal data gaps

Priority rank	Identified data/resource gap	Relevance to achieving conservation/management outputs for <i>Sousa teuszii</i>
1a	Information on distribution of <i>Sousa teuszii</i> throughout its range.	<p>Understanding the distribution of <i>Sousa teuszii</i> will:</p> <ul style="list-style-type: none"> Provide a valuable indication of the presence of <i>Sousa teuszii</i> (and other species), especially where targeted boat-based cetaceans surveys to document the distribution of cetaceans are not (yet) possible. Given the paucity of records (live or dead) of the species throughout its range, more coordinated efforts to document and confirm the species identification of stranded and bycaught

		carcasses may yield insight into the species presence in previously undocumented locations and/or highlight potential bycatch hotspots where conservation interventions are urgently required.
1b	Human-induced causes of mortality (e.g., poaching, entanglement, vessel strike)	Understanding the human-induced causes of mortality for <i>Sousa teuszii</i> will: <ul style="list-style-type: none">• Provide a better understanding of the type and scale of anthropogenic threats to the species, for which mitigating actions could then be implemented.
2	Reproduction	Understanding reproduction for <i>Sousa teuszii</i> will: <ul style="list-style-type: none">• Provide valuable baseline reproductive behavior, seasonality, and statistical data needed for population modelling and to make informed conservation management and field research decisions (e.g., age at first parturition, calving interval, etc.)
3	Common Diseases	Understanding diseases for <i>Sousa teuszii</i> will: <ul style="list-style-type: none">• Allow for an understanding of the health threats facing this species, to include the health consequences of individual and cumulative stressors on animals.• Provide insight into zoonotic disease risks associated with this species.
4	Toxin/Contaminant Exposure	Understanding the toxin and contaminant exposure for <i>Sousa teuszii</i> will: <ul style="list-style-type: none">• Allow for an understanding of how toxins and contaminants are impacting overall health (e.g., immune system impairments, increased susceptibility to infectious disease) of individual animals and populations.• Allow comparisons of population exposure to toxins/contaminants associated with differing socio-economic pressures on the marine environment, which could inform prioritization of conservation and mitigation actions.• Provide insight into potential health concerns for people living and working within the target region.
5	Nutrition (prey preference etc.)	Understanding nutrition for <i>Sousa teuszii</i> will: <ul style="list-style-type: none">• Provide an understanding of nutritional needs of the species;

		<ul style="list-style-type: none"> Identify key prey species that may better inform habitat and distribution modelling, and increase overall understanding of species occurrence and hotspots. Determine if evidence of nutritional disorders and/or malnutrition is present; Provide insight into the impacts of fisheries and depleted food sources on overall conservation efforts.
6	Biology & Natural History	<p>Understanding the basic biology and natural history of <i>Sousa teuszii</i> will:</p> <ul style="list-style-type: none"> Provide basic biological information (e.g., skeletal samples, age estimation, morphometrics, parasites, etc.)
7	Genetic Health of Individual Populations	<p>Understanding the genetic health for <i>Sousa teuszii</i> will (see also the outputs from WG4 on genetics):</p> <ul style="list-style-type: none"> Provide understanding of genetic diversity as it relates to population resilience and conservation management decisions. Help with assessing risks for specific populations to facilitate appropriate targeting for research.
8	Cell Preservation and Gamete Rescue	<p>Cell preservation and gamete rescue for <i>Sousa teuszii</i> will:</p> <ul style="list-style-type: none"> Assess cryopreservation options for the long-term safeguarding of <i>Sousa teuszii</i> cell lines, oocytes, and sperm in established frozen collections or ‘cryobanks’. These collections can serve as crucial resources for facilitating advances in genetic and reproductive technologies for population sustainability.

Data/resource gap - Priority rank 1: ALL

Since the available methods and approaches to addressing dead animal knowledge gaps are the same, the data gaps have been ranked together as Priority rank #1. The incorporated data gaps include:

- 1a. *Sousa teuszii* distribution
- 1b. Human-Induced Causes of Mortality
2. Reproduction
3. Common Diseases
4. Toxin/Contaminant Exposure
5. Nutrition
6. Biology and Natural History
7. Genetic Health of Individual Populations
8. Cell Preservation and Gamete Rescue

<p>1. Please list (as numbered points) possible methods/approaches to addressing the data/resource gap:</p>	<ol style="list-style-type: none"> 1. Retrospective data review. Review of previously collected data from all available sources, including photos and stranding data. A complete literature review should also be performed. 2. Establishment of reporting networks. Stranding network mobilization in the appropriate range states. Efforts should include: the identification of laboratories and storage facilities, community outreach, and establishing a network of local personnel on whom to focus training and capacity-building. 3. Production of training material and sampling protocols. Provision of in-country training and necropsy demonstrations, or attendance of local personnel on equivalent courses held by established organisations in other countries. Production of tiered sampling protocols to apply under a range of available resources and logistics, from a basic tissue/morphological sampling protocol to an advanced necropsy protocol. 4. Necropsy sample collection, storage and analysis. Provision of sampling kits containing the necessary equipment to collect and store samples to fill knowledge gaps, with prioritized sample lists for the most important data gaps. 5. Advanced imaging (e.g., x-ray, computed tomography, magnetic resonance imaging). Advanced imaging of carcasses to help fill data gaps (e.g., aging data from pectoral flipper x-ray, detailed health and trauma information from all modalities).
<p>2. For each of the methods/approaches listed above, please briefly consider and summarize achievability and likely constraints with regard to <i>Sousa teuszii</i>, its habitats and range state logistics:</p>	<ol style="list-style-type: none"> 1. Review of any available retrospective data. Available data are limited, so achievability is high if personnel are funded to aid with the task. The most likely constraint will be locating and centralizing any available data. 2. Establishment of reporting networks. Achievability is variable depending on range state and geographic region selected. Achievability is possible but this is a significant effort that will require extensive interdisciplinary and range state cooperation (the CCAHD is already progressing the identification of local contacts which may facilitate this). Possible constraints include range state logistics, centralized coordination, appropriate training, sustained funding, and response time in challenging locations. 3. Production of training material and sampling protocols. A shorter term, and highly feasible action that will support the establishment of effective reporting network is the development and dissemination of clear manuals and protocols for stranding response, necropsy and sample collection. These should be available in the target languages of the region (English, French and Portuguese at a minimum), and should include: data collection forms, equipment lists to include in stranding/sampling kits, clearly illustrated diagrams of how to measure and sample carcasses, label and store samples, etc. In many countries, wildlife rangers or veterinarians are highly experienced at conducting this kind of work with terrestrial wildlife, and in-country expertise could be used to help train those working in marine and coastal settings.

	<p>4. Necropsy sample collection and analysis. Achievability is variable depending on range state and geographic region selected. Other possible constraints include funding, equipment and training availability, laboratory storage challenges, and response time.</p> <p>5. Advanced imaging. Achievability is low due to extensive cost and likely inaccessibility of needed equipment. This is not an essential task so it is listed last, however still included as a potential method to fill data gaps.</p>
<p>3. Focusing on conservation/management relevance and practical achievability, what would you recommend as a single priority activity to address this data gap in:</p> <p>(a) the short/medium-term (<2 years)</p> <p>(b) the longer-term (>2 years)</p>	<p>(a) Short/medium-term (<2 years): 1) Review of any available retrospective data. 2) Additionally, it is recommended a stranding reporting network is established in the most accessible and appropriate range states, followed by additional locations as deemed appropriate by in-country experts and funding availability. 3) Development and dissemination of clear manuals and protocols for stranding response, necropsy and sample collection. Materials can draw from those being developed and disseminated through existing initiatives, such as the Global Stranding Network (GSN), the Global Marine Animal Stranding Toolkit (GMAST), and other stranding and necropsy initiatives in Africa and the Indian Ocean. Materials can be disseminated through the Sousateuszii.org website. All aspects as outlined above, should be included in this effort, to include significant in-country training. Once in place, prioritized sample collection can commence.</p> <p>(b) Longer-term (>2 years): Establishment of additional stranding networks, where feasible and continued collection, analysis, and storage of necessary samples to fill data gaps.</p>
<p>With regard to 3a (short/medium action), please provide a broad indication of:</p> <p>(i) likely budget requirement</p> <p>(ii) likely core resource/equipment requirements;</p> <p>(iii) potential co-funding and/or donations in kind and/or equipment donations that could support this activity</p>	<p>(i)</p> <p>1. The estimated cost to perform retrospective review of sample analysis is small to moderate.</p> <p>2. The development of suitable manuals and protocols should be possible at a small or moderate cost. Many materials are available in both English and French. CCAHD members could adapt existing materials so that they are appropriate for use in <i>Sousa teuszii</i> range states, and make them available through the sousateuszii.org website. Funding could be obtained to cover the personnel time to develop these manuals, and to have them professionally formatted and translated. Ideally they would also include embedded hyperlinks to videos demonstrating best practice.</p> <p>3. The cost to set up a reporting network will be moderate to high depending on how large of an area is selected, how much training is required, and the equipment and supplies that are needed. Basic set up could begin at a lower cost, and the effort could be built out once additional funding was provided.</p>

	<p>(ii) Key resources include experienced multi-lingual personnel for the review of available retrospective data. Incorporation of local participation is essential through engagement of local students, veterinarians, scientists, research assistants, fishers, government wildlife agents, and other community members. Core resources and equipment needed for the establishment of a reporting network include, but are not limited to: 1) experienced personnel with knowledge of in-country range state logistics to help aid in organization and coordination of such an effort; 2) health/necropsy experienced personnel to help guide sample protocol development, diagnostic assay development, equipment needs, and training; 3) response kits to include manuals, sampling equipment, sample storage needs, availability of transportation to field sites.</p> <p>(iii) Please list any co-funding or donations in kind.</p> <ul style="list-style-type: none"> (a) Species identification cards have been developed free of charge by Uko Gorter. Many CCHAD members have access to, or have helped to develop training materials and manuals that can be adapted for use in the region. (b) African Aquatic Conservation Fund can provide personnel and support logistics for dead animal response and sampling in Senegal.
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A8. Working Group 6 Full Report: Interview Surveys

Background

What is already known/available for your WG Target with regard to *Sousa teuszii* (if possible, please include an appropriate reference list)?

Working Group Targets: Working Group 4 was tasked with assessing the following target identified by Weir et al. (2020):

- 2.5. Assessments of occurrence in other potential range states via interview surveys
- 3.2. Conduct interview surveys to identify other populations for which specific population-level threats likely exist

*Note: The current information on the distribution, current areas of occurrence, knowledge gaps and areas with no confirmed records, as well as documented threats and areas where information on threats are lacking are all described in detail in the *Sousa teuszii* Red List assessment and references therein and this information is not replicated here (Collins et al. 2017). We focus on providing some targeted background on the use of local ecological knowledge to inform species conservation planning.*

Background

Local ecological knowledge (LEK), representing experiential knowledge derived from lived human interactions with local environments, can provide information about the status of species and ecological resources that is often unavailable from other sources. LEK is increasingly seen as an important source of data for conservation, especially for distinctive large-bodied vertebrates and/or species with socio-economic or cultural importance, and community interview surveys represent a relatively inexpensive approach for collecting comparative data across wide areas on species otherwise difficult to study (Turvey et al. 2015). Robust ecological data to make evidence-based management decisions is frequently prevented by limited data quantity or quality, and LEK can be an important source of information to fill these gaps (Turvey et al. 2015).

Interviews to gather information on LEK have been used to answer important conservation questions for a large number of species in many parts of the world, such as finding strongholds for the Critically Endangered saola *Pseudoryx nghetinhensis* in Laos (Turvey et al. 2015), local relative abundance of the Chinese giant pangolin *Manis pentadactyla* in China (Nash et al. 2015) (demonstrated as the proportion of people that recognise a species), and a comparative assessment of the relative status of Critically Endangered Chinese giant salamander *Andrias davidianus* in China (Pan et al. 2015). In Hainan, China, LEK was used to gather information on the Hainan gibbon (*Nomascus hainanus*) with results tested using relatively common macaques as a positive control to assess the effectiveness of using LEK to provide information on the regional status of primates (Turvey et al. 2017). Analysis of last-sighting histories can constitute an important conservation tool when robust data on a species decline are otherwise unavailable, and for example, on the Yangtze, last sighting dates were used very effectively to establish the temporal and spatial extinction dynamics of the baiji *Lipotes vexillifer* (Turvey et al. 2010) and to detect the drivers of that decline (Turvey

et al. 2013). In West Africa, the forest hingeback tortoises *Kinixys homeana* and *Kinixys erosa* are two of the most threatened African chelonians and LEK interviews showed that both species are declining and are targeted in the bush meat trade (Lusielli et al. 2018).

LEK for marine mammals has also been used in a number of cases and situations. LEK has been extensively utilised for gathering information on presence, hunting and bycatch of dugongs throughout their range (Hines et al. 2005, 2008, Ilangakoon et al. 2008, Pilcher et al. 2017). It was also used very effectively to evaluate artisanal hunting of dolphins in Madagascar (Cerchio et al. 2014, Cerchio et al. 2015) and also for exploring possible options and likely uptake for conservation measures at the community level (Teh et al. 2015). In West Africa, including in Cameron, Guinea, Ghana, Gambia, Senegal, Nigeria and Togo and Guinea-Bissau, interviews and monitoring of fish landing sites and ports have been used to document cetacean species presence and bycatch occurrence (Ayissi et al. 2014, Bamy et al. 2010, Debrah et al. 2010, Leeney et al. 2015, Ofori-Dansen et al. 2019, Uwagbae & Van Waerebeek 2010, Van Waerebeek et al. 2017).

Species identification can be problematic for marine mammals, especially cetaceans which are often not seen clearly, however Lin et al. (2019) found that fishers could identify cetacean species groups, and validated the accuracy of the respondent data reported by fishers with data from stranded cetaceans, indicating that LEK can provide useful, quantitative information on abundance rankings of different cetacean categories (Lin et al. 2019). In many cases in West Africa fishers consistently could not distinguish between *Sousa teuszii* or *Tursiops aduncus* in interviews (Ayissi et al 2014, Bamy et al 2010). In Hainan, China LEK was used to evaluate the number, species, seasons and geographic hotspots of cetacean bycatch by asking fishers to mark bycatch locations on a 0.50 by 0.50 grid square (Liu et al. 2016).

In conclusion, surveys of LEK generated through interviews can provide invaluable information on presence, relative abundance, declines and threats of common or uncommon species that cannot be easily generated using other methods, however, to be effective the interviews need to be very carefully developed to ensure that the conservation questions of interest can be answered by the data that are generated. To accomplish this a pilot survey needs to be conducted to test and refine the questionnaires, training provided to interviewees and comprehensive data analyses and reporting conducted on the outputs.

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Identified data gaps

Working Group 6 used a shared Google Sheet to prioritise and rank the importance to conservation of the specific metrics that local ecological knowledge interviews can generate. These metrics, shown below, cover both Targets 2.5 (presence and occurrence) and 3.2 (threats) and although these are prioritised in order of importance it is envisaged that with a well-designed survey, combined with a strategically implemented and reviewed pilot survey, all of the items on the list could be generated by a single comprehensive interview campaign in multiple range states. A second exercise was conducted to rank the priority geographic areas for local ecological knowledge interviews to be conducted.

Priority rank	Local Ecological Knowledge based data generated from interviews	Relevance to achieving conservation/management outputs for <i>Sousa teuszii</i>
1	<i>Sousa teuszii</i> presence /absence (Target 2.5)	Would fill knowledge gaps in confirmed range states with few records (e.g. Nigeria, Togo), those with no recent records (e.g. Ghana), and in countries that are unconfirmed potential range states (e.g. Sierra Leone), to establish presence and distribution. Confirming species presence in additional range states would encourage more direct buy-in to conservation measures from stakeholders within those countries.
2	Bycatch hotspots (Target 3.2)	This would generate vitally important information regarding which countries and locations in the range of <i>Sousa teuszii</i> have the highest levels of bycatch, as well as generating data on the types of gear, fishing method, or season that is most problematic for the species, thereby providing information that will help in formulating strategies to address the problem. An add-on to this would involve characterizing the fisheries involved in bycatch, including fishing effort, gear configuration, target catch, income from fisheries, and opportunities for switching to alternative gears or alternative livelihoods.
3	Relative abundance and distribution hotspots (Target 2.5)	This would fill an extremely important gap in knowledge regarding which places have concentrations of <i>Sousa teuszii</i> . Using standard interview methods in all countries will allow for a comparison at both national and regional levels and enable identification of the most important places for future population assessment fieldwork and potential interventions.
4	Prevalence of hunting / consumption (Target 3.2)	As for point 2, recognizing that this is a sensitive topic, by asking carefully formulated and indirect questions it should be possible to gain an understanding of the local perceptions towards <i>Sousa teuszii</i> and to what degree they are directly targeted and utilized, information that is critical to mitigating impacts, and to understanding trends in abundance and designing outreach activities.
5	Trends in relative abundance over time	Inferences about trends in relative abundance of <i>Sousa teuszii</i> over time can be made from

		evidence such as shifting baselines of knowledge and last sighting date generated from community interviews and this can help to understand population trajectories, areas for restoration and historical hotspots.
6	Evaluation of threats (Target 3.2)	In addition to hunting and bycatch covered above, community interviews can shed light on the relative importance and prevalence of a wide variety of different local and more ubiquitous threats (e.g. pollution, shipping, coastal development etc.) and their relative importance which is information vital to addressing those threats. Participatory mapping of fishing effort and threats with communities is a useful approach to include.

Recommended action for all data gaps combined	
1. Please list (as numbered points) possible methods/approaches to addressing the data/resource gap:	<p>The 6 Data Gaps identified above can be addressed using a single interview that is carefully designed to answer each question. There will be several phases to the work:</p> <ol style="list-style-type: none"> Identifying the questions that need to be answered and drafting the questionnaire Pilot the questionnaire in at least two places, at least one where <i>Sousa teuszii</i> are known to be relatively common and another where information is lacking. In light of information in the pilot refine the questionnaire. Analyse frame surveys to understand national fisheries and carefully identify the target group for interviews in terms of which fishery, fishing method, village and demographic should be the focus in each country that interviews will be conducted. Roll out the interview surveys in as many <i>Sousa teuszii</i> range states as possible, keeping in mind the geographic priorities identified by the working group.
2. For each of the methods/approaches listed above, please briefly consider and summarize achievability and likely constraints with regard to <i>Sousa teuszii</i> , its habitats and range state logistics:	<p><u>Achievability:</u> Collection of LEK on <i>Sousa teuszii</i> to fill the key datagaps (Target 2.5 & 3.2) is relatively easily achievable and low cost compared to many other interventions proposed in the conservation strategy. This work is quite achievable for the following reasons:</p> <ul style="list-style-type: none"> The amount of equipment required to conduct surveys of LEK is minimal. There are many west African people with experience in conducting interview surveys and it is possible to train local researchers and students to conduct them. Interview surveys, even over relatively large areas are not costly undertakings because the main cost is transport and the time of the interview team.

	<ul style="list-style-type: none"> There are many precedents of cases where LEK interviews have been used to generate the information that we are interested in to fill the same kinds of datagaps and therefore the methodology is tried and tested. <p><u>Constraints:</u></p> <ul style="list-style-type: none"> The range of <i>Sousa teuszii</i> is vast, covering numerous countries, and it will be challenging in terms of man power and finances to conduct interviews simultaneously everywhere. A phased approach is likely to be most practical Difficulty in distinguishing between <i>Sousa teuszii</i>, and <i>Tursiops truncatus</i> or other small delphinids means that it may be very challenging to generate species specific information from LEK. Interviews will need to be designed from the outset to specifically try to use creative methods to test the respondents ability to differentiate the two species, and to allow for the generation of meaningful and useful information if the majority cannot. It needs to be recognised that obtaining quantitative or factual data on hunting activities or consumption is likely to be very challenging from a single interview survey. To obtain information on illegal activities such as this may require a longer term approach using trusted informants. There may be challenges during analysis of comparing interviews conducted in different countries by different teams that make detecting regional differences in threats or relative abundance challenging. Some coastal regions have poor access and transport and some important fishing communities might be largely inaccessible by road. Security constraints in some insecure areas making access challenging or safety a concern. Potential challenges obtaining permits in some places
<p>3. Focusing on conservation/management relevance and practical achievability, what would you recommend as a single priority activity to address this data gap in:</p> <p>(a) the short/medium-term (<2 years)</p> <p>(b) the longer-term (>2 years)</p>	<p><u>Short/Medium Term Priority Activity <2 years</u></p> <p>Design and Initiate LEK surveys in priority locations</p> <p>LEK Interview surveys are an activity that can be conducted relatively quickly and can be started without a long time lag and may be one of the first activities conducted in a place for which there is little information on <i>Sousa teuszii</i>. In the short-term the following activities are recommended:</p> <p><u>Year 1</u></p> <ol style="list-style-type: none"> Produce a draft questionnaire and circulate for input from experts Identify three discrete locations (for example a single province in three countries) where the interviews can be piloted Conduct joint training of all three teams in use of the interview Conduct pilot survey Interview teams to reconvene together to discuss short-comings and improvements to the questionnaire Analysis of pilot survey data output to identify whether it is answering the important conservation questions Refinement of the questionnaire and finalization

	<p>Year 2</p> <p>8. Joint training of all interview teams in the refined questionnaire 9. Conduct of full interview survey across the entire coastline of above three countries 10. Data analysis of these surveys including national level analyses and comparative regional level analyses</p> <p><u>Longer Term Activity >2 years</u></p> <p>Roll-out LEK surveys in all range states</p> <p>Identify new range states to conduct interviews according to the geographic priorities identified by the Working Group and following the above Year 2 strategy of identifying implementing organisations, conducting training, conducting the survey, and conducting national level and regional level comparative analyses.</p>
<p>With regard to 3a (short/medium action), please provide a broad indication of:</p> <p>(i) likely budget requirement</p> <p>(ii) likely core resource/equipment requirements;</p> <p>(iii) potential co-funding and/or donations in kind and/or equipment donations that could support this activity</p>	<p><u>Short-term budget</u></p> <p>Interview surveys are generally not as costly as some other forms of survey including boat-based expeditions. For the Short/medium term actions described above in 3a the budget in each country is likely to be <10K USD to accomplish all the activities stated.</p> <p><u>Key resources/ equipment</u></p> <p>To accomplish this action the key resources include the following:</p> <ul style="list-style-type: none"> • Transport for interview team • Accommodation and food for interview team • Laptop for entering data • Camera • Clipboards, pencils and questionnaires • GPS to record interview locations • Recording device to record interviews for later transcription • Payment to interview team • Payment to analytical team • Production of identification material • Education and awareness material to gift to communities in return for their time completing interviews <p><u>Co-funding or donations</u></p> <p>Possibly assistance from ZSL in designing and analysing the questionnaire?</p> <p>Mapping of data assistance from Ellen Hines at San Francisco State University. Co-financing may be available from the International Whaling Commission bycatch initiative.</p>

A9. Working Group 7 Full Report: Preparing for Full Health Assessments

Background

What is already known/available for your WG Target with regard to *Sousa teuszii* (if possible, please include an appropriate reference list)?

Working Group Target: WG7 aimed to discuss and identify priorities for the following target (Weir & Collins, 2020):

- *Target 2.6 - Carry Out Preliminary Work that will Inform Future Health Assessments and Invasive Work*

Background

A recent report published by the International Union for Conservation of Nature (IUCN), sounds the alarm for a broader, more integrated approach to the conservation of at-risk small cetaceans (Taylor et al., 2020). This report highlights *Sousa teuszii* as one of the seven species of small cetaceans of greatest concern, with an urgent recommendation for community based research to fill knowledge gaps on geographic distribution, animal abundance, and threats to species survival (Taylor et al., 2020). The extinction of the Yangtze River dolphin in China, and the catastrophic decline of the vaquita porpoise in Mexico, were noted as examples of why waiting too long to consider all conservation options should be avoided (Taylor et al., 2020). An integrated approach includes consideration for all measures and strategies that might expedite the saving of a species. Successful execution of this approach has occurred historically with many terrestrial and avian species, as well as with the Yangtze Finless Porpoise in China (Taylor et al., 2020). This methodology, referred to as the “One Plan Approach”, provides a holistic consideration of all *in-situ* threats and efforts, as well as *ex-situ* options for species conservation (Taylor et al., 2020). *Ex-situ* options constitute a wide spectrum of activities, that can include rescue and rehabilitation of stranded individuals; research programs involving the temporary capture, satellite-linked tagging, release, and tracking of animals; veterinary health assessments; translocation efforts; and the use of *in-situ* reserves for the safeguarding of individuals.

The IUCN report stressed the importance of collecting the data that would be required to assess the feasibility and risks of different *ex-situ* activities, before population numbers are critically low (Taylor et al., 2020). Addressing identified data gaps will provide species experts and conservation managers with the necessary tools to act as efficiently as possible and will increase the chances of success.

To date, no hands-on health assessment work of any nature has been conducted with live *Sousa teuszii*, and only minimally with other *Sousa* species (Taylor et al., 2020). *Sousa teuszii* is the least studied of the four *Sousa* species, with limited natural history and ecological information available (Taylor et al., 2020). Additionally, very few individuals of any *Sousa* species have been maintained in managed care settings (Parra & Ross, 2009; Taylor et al., 2020), where baseline health data such as expected respiratory rates, heart rates, blood ranges, and response to handling and medications, are often collected. As such, very little is known about *Sousa* species, including their health and species-specific responses to human handling and treatment.

Live animal sampling methodologies include remote biopsy sampling; capture, tag, and release efforts; and capture-release health assessments. These are well documented methods used over decades for safe data

gathering for many small cetaceans, and although not without risk, these operations provide valuable information including critical data for species conservation. Ensuring extensive experience, well-trained teams and the use of established protocols that prioritize animal welfare, will effectively minimize and mitigate potential risks. Additionally, it is recommended these efforts take place in sites where long-term studies are occurring, making follow-up monitoring feasible. Although not expected, this will allow for detection of possible long-term effects of any efforts, as well as integration of data into larger datasets.

Small vessel-based, remote biopsy dart sampling is a safe, effective, and efficient tool to collect tissue samples from small cetaceans and can provide critical data on sex determination, population structure, genetic information, reproductive and stress hormone concentrations, environmental contaminant concentrations, percent lipids as an indication of nutritive condition, age determination, diet information from stable isotopes and fatty acids, and cell line preservation (e.g., Sellas et al., 2005; Kellar et al., 2006, 2009, 2015; Balmer et al. 2011; Beal et al. 2019; Bors et al. 2020). Following individuals to evaluate appropriate and expected skin healing post-biopsy, and to identify reproductive outcomes are also important outputs. Follow-up monitoring, post remote biopsy sampling, has been conducted across numerous species and study sites to evaluate short and long-term impacts to this minimally invasive sampling technique (e.g. Gorgone, Haase, Griffith, & Hohn, 2008; Noren & Mocklin, 2012; Tezanos-Pinto & Baker, 2012; Weller, Cockcroft, Würsig, Lynn, & Fertl, 1997). For the majority of sampling efforts, there has been no evidence for any chronic, long-term impacts associated with remote sampling. Potential complications include injuries from striking dolphins with the darts outside of the target zone, and secondary infections of the sampling site. There is one published case in the literature that identified remote biopsy as a factor in a sampled animal's mortality. Bearzi (2000) reported the mortality of a common dolphin (*Delphinus delphis*) shortly after (16 min) a remote sampling attempt. The cause of mortality was hypothesized to be in part a result of sampling an animal with poor body condition.

While complications were extremely rare in the many thousands of biopsy dart samplings that have occurred over decades of field efforts with small cetaceans around the world, this would be of greater potential concern in areas where the waters are contaminated. In an effort to reduce the potential for secondary infections, thorough water testing prior to sampling efforts is recommended. The most effective approach to minimizing risk however, is using well-trained teams with clean instruments and appropriate dart dimensions. Risks of physical injury from inaccurate darting or inadvertent strikes of unintended dolphins can be reduced through the use of a highly experienced team, appropriate equipment, and comprehensive sampling protocols that have been established over the past two decades. Although remote biopsy sampling is considered to be an extremely safe and effective tool for developing a better understanding of small cetacean health and population structure, researchers should have an in-depth discussion to determine if this tool is the appropriate fit to address a given research question. In addition, a standardized methodology should be developed, taking into account the target species' anatomy (e.g., blubber depth including possible seasonal variations) and behavior (e.g., level of vessel avoidance) as well as environmental factors (e.g., water clarity). These parameters are essential for determining dart velocity, cutterhead depth, and other factors to ensure that animal welfare is the highest priority and remote sampling is conducted as safely as possible for a given individual/population/species.

Techniques for safely catching small cetaceans, including for tagging and health assessments, have been used with a variety of species, and have been refined over decades of application (Asper, 1975; Loughlin et al., 2010). Species for which seine net encirclement catch-and-release techniques were used successfully include bottlenose dolphins (Barratclough et al., 2019; Schwacke et al., 2014), Yangtze finless porpoises (Hao et al., 2009; Nabi, Hao, McLaughlin, & Wang, 2018; Nabi, Hao, Zeng, Jinsong, et al., 2017; Nabi, Hao, Zeng, & Wang,

2017; Wang et al., 2020), Amazon river dolphins (Martin & Da Silva, 2018) and franciscana dolphins (Wells, Bordino, & Douglas, 2013). Potential risks and considerations include entanglement; capture myopathy (a stress response seen in some individuals or species resulting in physiological decompensation), and maintenance of overall animal stability and responsiveness once under human care. Mitigation strategies include staffing with experienced personnel for all catch and health assessment efforts, application of comprehensive, well-established protocols, analyzing relevant species-specific data prior to efforts where possible (e.g., use of habitats conducive to safe seine net encirclement, behavior around nets, normal respiratory rates, etc.), and moving forward in a stepwise, incremental fashion where feasible (e.g., starting with remote biopsy darting prior to catching animals). In general, larger species of small cetaceans tend to be more tractable for catch-and-release work – *Sousa* would fall into this category.

Potential data outputs from capture, tag, and release efforts include ascertaining animal response to physical restraint and handling, including changes to respiratory rate and heart rate, both of which help veterinarians determine animal stability. This methodology also provides the possibility of tracking an animal's movement post-handling through satellite telemetry, providing valuable information on the individual's range, 3-dimensional habitat use, and daily patterns of movements, as well as survival post-release. Short-term acoustic recording tags (DTAGs) can also be applied, allowing assessment of call rates and vocal behaviour that would better inform acoustic monitoring work (Nowacek et al., 1998; see WG8). Health assessments are an extended version of these capture-release efforts, and include a standard suite of veterinary examination, diagnostics, measurements, and sampling. Potential data outputs from these efforts are extensive, including comprehensive individual and population health evaluations through full physical exams and associated diagnostics (Barratclough et al., 2019; Schwacke et al., 2014). Sampling during these efforts can be targeted to answer species-specific research questions. Although not the focus of this document, should more extensive hands-on operations such as translocations in relation to *ex situ* operations be deemed necessary in the future, catch-and-release live animal sampling experiences provide veterinarians and scientists with invaluable knowledge regarding species-specific responses to strandings, incidental captures, handling, transport, and care.

Assessment of data gaps

Target 2.6 was identified by Weir and Collins (2020) in an effort to inform evaluation of whether it is justifiable to:

1. Sample from live *Sousa teuszii* using remote biopsy techniques
2. Capture *Sousa teuszii* for satellite-linked tagging, veterinary health assessment, and/or translocation efforts

Although the goal of the group was to identify knowledge gaps that could help to inform future live animal sampling, there was first a need to identify the general health and veterinary data gaps that exist for *Sousa teuszii*. In order to apply an integrated approach to conservation management, where all strategies are considered, as much baseline, background data as possible is needed. These data are important for the general understanding of the health and well-being of individuals and the population as a whole, as well as for any potential live animal sampling or handling experiences. As a starting point, WG7 identified health data gaps and ranked them (Table 1). Potential methodologies for filling these data gaps were also explored at length.

Following this exercise, it was necessary to refine this ranking in order to satisfy *Target 2.6 - Carry Out Preliminary Work that will Inform Future Health Assessments and Invasive Work*. Gomez, Smith, and Wells

convened as live animal sampling and veterinary health assessment experts, to rank this list more specifically for preparation for this type of work (Table 2). Relevance for each data gap was also reexamined with Target 2.6 as the focus and listed in Table 2. Since preparation rather than implementation was the goal of WG7, our focus for the remainder of the document is on the data gaps as prioritized in Table 2. Short-term and long-term goals are outlined below.

In an effort to start to fill the many data gaps for *Sousa teuszii* with regards to this working group target, we recommend data collection in a stepwise approach when possible, from least invasive to more hands on. Although a stepwise approach to data collection is ideal, with the pressure of imminent species decline, we caution against attempting to fill all data gaps before moving forward with urgent, necessary actions. Filling all data gaps will take decades and with increasing anthropogenic threats, *Sousa teuszii* may not have this kind of time. If deemed appropriate by species and conservation specialists, moving rapidly from retrospective and opportunistic data gathering, to more active data collection is recommended before population numbers are critically low. Monitoring of population trends can potentially be achieved via methods including interview surveys (WG6) and scientific field studies (WG3), and would be important for informing this process.

The group also strongly recommends a community-based approach to all efforts as outlined below, with a focus on local capacity building through training in association with ongoing field programs. All activities requiring non-local expertise, should be paired with the training of local scientists, veterinarians, and research assistants so knowledge is actively passed on and in-country capacity building occurs real-time.

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Identifying priority conservation management data gaps

Please list and rank these in the Table according to their perceived importance for achieving conservation and management outcomes.

Table 1: General health and veterinary data gaps

Filling these knowledge gaps is a broad effort that will aid in the general conservation of *Sousa teuszii*.

Priority rank	Identified data/resource gap	Relevance to achieving conservation/management outputs for <i>Sousa teuszii</i>
1	Biology and Natural History (e.g. species-specific behavior, ranging patterns, habitat use, activity patterns, group dynamics, communication, morphometrics, etc.)	<p>Understanding the basic biology and natural history for <i>Sousa teuszii</i> will:</p> <ul style="list-style-type: none"> Provide basic biological, ecological, and behavioral information needed to make informed conservation management decisions; Provide basic biological, ecological, and behavioral information needed to care for individual animals during short-term (e.g., animal stranding, veterinary health assessments) and long-term care situations (e.g., translocations).
2	Reproduction	<p>Understanding reproduction for <i>Sousa teuszii</i> will:</p> <ul style="list-style-type: none"> Provide valuable baseline reproductive behavior, seasonality, and statistical data needed to make informed conservation management decisions.
3	Environmental Conditions (e.g., water quality, substrate, salinity, currents, depth, seasonal and tidal fluctuations, etc.)	<p>Understanding environmental conditions for <i>Sousa teuszii</i> will:</p> <ul style="list-style-type: none"> Allow for an understanding of water quality in target areas, providing insight into health concerns for animals and people involved in any future live animal sampling or health assessment efforts, and potential impacts on skin healing following remote or in-hand biopsy; Allow for a better understanding of the natural environmental requirements for the species; Provide an understanding of the environmental conditions in relation to any future tagging and capture efforts.
4	Nutrition (e. g., prey preference, etc.)	<p>Understanding prey preferences and availability for <i>Sousa teuszii</i> will:</p> <ul style="list-style-type: none"> Allow for an understanding of nutritional needs for the species; Provide insight into the impacts of fisheries and depleted food sources on conservation efforts.
5	Anthropogenic Sources of Scarring/Injury	<p>Understanding the anthropogenic sources of scarring for <i>Sousa teuszii</i> will:</p> <ul style="list-style-type: none"> Provide a better understanding of anthropogenic threats to the species; Provide insight into behavior around nets, boats, etc.
6	Common Diseases	<p>Understanding common diseases for <i>Sousa teuszii</i> will:</p> <ul style="list-style-type: none"> Allow for an understanding of the health threats facing this species;

		<ul style="list-style-type: none"> Allow for identification of infectious threats that could result in epizootic outbreaks and loss of larger numbers of animals; Provide insight into zoonotic concerns for people potentially handling this species in the future.
7	Toxin/Contaminant Exposure	<p>Understanding the toxin and contaminant exposure for <i>Sousa teuszii</i> will:</p> <ul style="list-style-type: none"> Allow for an understanding of how toxins and contaminants may impact this species; Provide insight into potential health concerns for people handling this species in the future.
8	Genetic Health of Individual Populations	<p>Understanding the genetic health for <i>Sousa teuszii</i> will:</p> <ul style="list-style-type: none"> Provide understanding of genetic diversity as it relates to population resilience and conservation management decisions. Help with assessing risks for specific populations to facilitate appropriate targeting for research.
9	Response to Boats, Nets, Capture, and External Stimuli	<p>Understanding response to boats, nets, capture, and external stimuli for <i>Sousa teuszii</i> will:</p> <ul style="list-style-type: none"> Provide further understanding of the impact of boats and nets on species survival; Allow for improved planning for any potential remote biopsy and/or temporary capture efforts. Improved understanding of vessel avoidance behavior etc.
10	Vital Physiological Statistics (respiratory rates, heart rates, etc.)	<p>Understanding the vital physiological statistics for <i>Sousa teuszii</i> will:</p> <ul style="list-style-type: none"> Allow for improved planning for any potential hands-on efforts; Provide veterinarians with baseline information to help inform animal stability in real-time.
11	Medication and Drug Use (e.g., appropriate doses and documented responses)	<p>Understanding any previous medication and drug use for <i>Sousa teuszii</i> will:</p> <ul style="list-style-type: none"> Provide veterinarians with baseline medication information prior to any future animal care situations. If available, this can provide insight into species-specific responses to different medications and drugs and appropriate species-specific dosing in case veterinarians need to use medications in an animal handling or <i>ex-situ</i> scenario.
12	Cell Preservation and Gamete Rescue	<p>Cell preservation and gamete rescue for <i>Sousa teuszii</i> will:</p> <ul style="list-style-type: none"> Assess cryopreservation options for the long-term safeguarding of <i>Sousa teuszii</i> cell lines, oocytes, and sperm in established frozen collections or 'cryobanks'. These collections can

		serve as crucial resources for facilitating advances in genetic and reproductive technologies for population sustainability.
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Table 2: Live animal sampling and health assessment preparation data gaps (Target 2.6)

This represents a more focused effort to rank knowledge gaps that are important for preparation for live animal sampling and veterinary health assessments. Priority 1-9 as listed here are described throughout the remainder of the document.

Priority rank	Identified data/resource gap	Relevance to achieving conservation/management outputs for <i>Sousa teuszii</i>
1	Biology and Natural History (e.g. species-specific behavior, ranging patterns, habitat use, activity patterns, group dynamics, communication, morphometrics etc.)	<p>Understanding the basic biology and natural history for <i>Sousa teuszii</i> will:</p> <ul style="list-style-type: none"> Provide basic information to aid in remote biopsy efforts; Provide basic biological, ecological, and behavioral information needed to catch and care for individuals during short-term veterinary health assessments.
2	Environmental Conditions (e.g., water quality, substrate, salinity, currents, depth, seasonal and tidal fluctuations, etc.)	<p>Understanding the environmental conditions needed for <i>Sousa teuszii</i> will:</p> <ul style="list-style-type: none"> Allow for an understanding of water quality in target areas, providing insight into health concerns for animals and people involved in any future live animal sampling or health assessment efforts, and potential impacts on skin healing following remote or in-hand biopsy; Provide an understanding of the environmental conditions as they relate to any future tagging and capture efforts; Knowledge of specific range state salinity levels, which can affect tag functionality; Provide insight into health concerns for people involved in health assessment efforts.
3	Reproduction	<p>Understanding reproduction for <i>Sousa teuszii</i> will:</p> <ul style="list-style-type: none"> Provide important information on mother/calf relationships prior to any future catch efforts; Allow for improved planning for health assessment efforts through a better understanding of reproductive seasonality.
4	Response to Boats, Nets, Capture, External Stimuli	<p>Understanding the response to boats, nets, capture, and external stimuli for <i>Sousa teuszii</i> will:</p> <ul style="list-style-type: none"> Allow for improved planning for any potential remote biopsy and/or temporary capture efforts. Improved understanding of vessel avoidance behavior etc.

5	Vital Physiological Statistics (e.g., respiratory rates, heart rates, etc.)	<p>Understanding the vital physiological statistics for <i>Sousa teuszii</i> will:</p> <ul style="list-style-type: none"> Allow for improved planning for remote biopsy and live animal health assessments; Provide veterinarians with baseline information to help inform animal stability real-time.
6	Anthropogenic Sources of Scarring/Injury	<p>Understanding the anthropogenic sources of scarring for <i>Sousa teuszii</i> will:</p> <ul style="list-style-type: none"> Provide insight into behavior around boats and nets prior to any sampling or catch efforts.
7	Toxin/Contaminant Exposure	<p>Understanding the toxin and contaminant exposure for <i>Sousa teuszii</i> will:</p> <ul style="list-style-type: none"> Aid in site selection for any future live animal sampling or handling efforts; Aid sampling protocol design; Aid veterinary efforts by providing background health information that may affect animal stability during handling situations; Provide insight into potential health concerns for personnel involved in health assessments. Provide information for potential toxin and contaminant mitigation efforts
8	Common Diseases	<p>Understanding common diseases for <i>Sousa teuszii</i> will:</p> <ul style="list-style-type: none"> Aid sampling protocol design; Aid veterinary efforts by providing background health information that may affect animal stability during handling situations; Provide insight into potential zoonotic diseases of concern for personnel involved in health assessments (or stranding response).
9	Medication and Drug Use (e.g., appropriate doses and documented responses)	<p>Understanding any previous medication and drug use for <i>Sousa teuszii</i> will:</p> <ul style="list-style-type: none"> Provide veterinarians with baseline medication information prior to any future animal care situations. If available, this can provide insight into species-specific responses to different medications and drugs and appropriate species-specific dosing in case veterinarians need to use medications in an animal handling or <i>ex-situ</i> scenario.

Data/resource gap - Priority rank 1: Baseline Biological Information (Biology, Natural History, and Reproduction)

The first and third data gaps were combined under “*Baseline Biological Information*” and ranked as #1. These general knowledge gaps represent components of valuable species specific biological information. Although important, the data gaps are so broad, WG7 does not have targeted activities to recommend for this ranking. Rather, relevant information gathered from other working groups should be shared with WG7 in preparation for remote biopsy and/or health assessment efforts. The incorporated data gaps include:

- 1) Biology and Natural History (e.g. species-specific behavior, ranging patterns, habitat use, activity patterns, group dynamics, communication, morphometrics etc.)
- 3) Reproduction

1. Please list (as numbered points) possible methods/approaches to addressing the data/resource gap:	<p>Data on biology, natural history and reproduction is best collected through field studies that include photo-identification of individually recognizable animals whose morphology, behaviour, movements, and reproductive status (in the case of mothers with calves) can be monitored over time. Assessment of the feasibility, logistics and costs of photo-identification field surveys was dealt with in-depth by CCAHD Working Group 3.</p> <p>Data on reproduction and life history parameters can also be collected through assessment of carcasses that have stranded or been bycaught in fishing gears. For example, necropsies and post-necropsy sample analysis can yield information on age (e.g., through examination of growth layer groups on teeth), reproductive status (through examination of the corpora lutea on females). Assessment of the feasibility, logistics and costs of conducting necropsies on <i>Sousa teuszii</i> carcasses is covered in detail by Working Group 5.</p> <p>Data on habitat and ranging patterns can be collected through opportunistic tagging, with satellite-linked transmitters or other tags, of live-stranded or live by-caught dolphins. This activity is not assessed by other working groups, and as such is assessed in more detail below.</p>
2. For each of the methods/approaches listed above, please briefly consider and summarize achievability and likely constraints with regard to <i>Sousa teuszii</i> , its habitats and range state logistics:	<p>Small-boat-based field surveys incorporating photo-identification to document distribution, behaviour, movements and, to a limited extent, reproductive status (in the case of the presence of calves) are feasible and already planned for the Senegal Gambia region.</p> <p>Data collection from strandings is also considered feasible, although considerable efforts will be required to strengthen stranding networks and increase local capacity to collect samples from strandings. While teeth are relatively easy to collect, examination of corpora lutea and other more sophisticated analyses require a greater level of experience and expertise that likely can only be achieved through hands-on training or video tutorials. Veterinary pathologists with experience in land-mammals may be the best candidates for training on detailed necropsy protocols that would yield valuable information on health and reproduction.</p>

	Opportunistic tagging will require timely access to tags and trained personnel and the acquisition of appropriate permits, and will be challenging. Tags could be held at centralized sites in a few key range states, and attachment training provided.
3. Focusing on conservation/management relevance and practical achievability, what would you recommend as a single priority activity to address this data gap in: (a) the short/medium-term (<2 years) (b) the longer-term (>2 years)	<p>(a) Short/medium-term (<2 years): 1) Conduct boat-based field surveys in areas where healthy populations of <i>Sousa teuszii</i> are known to be present. 2) Conduct necropsies on opportunistic <i>Sousa teuszii</i> carcasses .</p> <p>(b) Longer-term (>2 years): Provide satellite-linked tags to be held at centralized sites, and provide attachment training in those countries where healthy <i>Sousa teuszii</i> populations are known to exist, and where tags could be opportunistically deployed during a live stranding or disentanglement.</p>
With regard to 3a (short/medium action), please provide a broad indication of: (i) likely budget requirement (ii) likely core resource/equipment requirements; (iii) potential co-funding and/or donations in kind and/or equipment donations that could support this activity	<p>See the templates for Working Groups 3 and 5 for assessments of the costs of field surveys and assessing strandings. African Aquatic Conservation Fund can provide logistics and personnel for strandings, sampling and rescues in Senegal.</p> <p>A small number of satellite-linked tags, tagging supplies, and tracking services have been offered by the Chicago Zoological Society's Sarasota Dolphin Research Program at no cost.</p>

Data/resource gap - Priority rank 2: *Environmental Conditions*

Environmental conditions such as water quality, depth, currents, seasonal and tidal fluctuations, and substrate are all important for preparation for live animal remote sampling and health assessments. It is recommended that basic information is gathered prior to live animal work, followed by more extensive site surveys once a target region or field site is selected.

1. Please list (as numbered points) possible methods/approaches to addressing the data/resource gap:	<ol style="list-style-type: none"> 1. Environmental data collection. Prospective collection of environmental data during field surveys in known <i>Sousa teuszii</i> habitats: collect data on depth, salinity, turbidity, acidity, and pollutants during the course of planned surveys that will also incorporate photo-identification and other research techniques. 2. Retrospective data. Review of previously collected data from all available sources. Possible sources include peer reviewed literature on harmful algal blooms or coastal development projects, reports and data on local water quality held by government agencies and oceanographic laboratories, and any archived data. 3. Local Ecological Knowledge (LEK) interviews. Interviews with fishers and local community members, as well as scientists familiar with the area to assess their perception of environmental conditions where <i>Sousa teuszii</i> are seen.
2. For each of the methods/approaches listed above, please briefly consider and summarize achievability and likely constraints with regard to <i>Sousa teuszii</i> , its habitats and range state logistics:	<ol style="list-style-type: none"> 1. Environmental data collection. Achievability is high if coordinated with planned field surveys, provided funding can be found for the necessary sampling equipment and it can be imported to field sites without unforeseen difficulties. 2. Retrospective data. Achievability is high depending on acquisition of data. Will require partners on the ground in range states with appropriate contacts with relevant government agencies and laboratories that may have archival data on water quality parameters; 3. Local Ecological Knowledge (LEK) interviews. Working Group 6 assessed the feasibility and logistics of conducting interviews with a range of stakeholders in areas where <i>Sousa teuszii</i> are thought to occur. Topics of interviews initially focus on presence/absence of the species mapping fisheries and assessing threats from bycatch and hunting. Although it will be important not to make interviews so long that they are an inconvenience or annoyance to those being interviewed, a few questions could be crafted to capture data useful to assessing <i>Sousa teuszii</i> environmental parameters.
3. Focusing on conservation/management relevance and practical achievability, what would you recommend as a single priority activity to address this data gap in: (a) the short/medium-term (<2 years) (b) the longer-term (>2 years)	<p>(a) Short/medium-term (<2 years): Incorporation of water sampling and data collection on other habitat parameters during field surveys in <i>Sousa teuszii</i> habitats. If retrospective environmental data is available, this should be reviewed as well.</p> <p>(b) Longer-term (>2 years): In an effort to make recommendations on site and season choice for any remote sampling or live captures, compile and analyze water sample data collected across multiple <i>Sousa teuszii</i> sites and over time to assess differences in pollutants, contaminants, and disease organisms.</p>

<p>With regard to 3a (short/medium action), please provide a broad indication of:</p> <ul style="list-style-type: none"> (i) likely budget requirement (ii) likely core resource/equipment requirements; (iii) potential co-funding and/or donations in kind and/or equipment donations that could support this activity 	<p>(i) Cost is variable depending on how much prospective data is collected and/or reviewed and in how many target regions. The cost could range from moderate to large.</p> <p>(ii) Key resources include experienced personnel for the review of available data. Incorporation of local participation is essential through engagement of local students, veterinarians, scientists, and research assistants.</p> <p>For LEK interviewing, as noted by Working Group 6, appropriate personnel and training are essential.</p> <p>Water sampling could be conducted alongside planned field surveys that will employ small boats to document <i>Sousa teuszii</i> distribution and habitat use in areas where populations are known to persist. This activity will need include trained personnel for collection of environmental samples in cooperation with local communities.</p> <p>(iii) Please list any co-funding or donations in kind.</p> <p>Funding has already been secured for 3-4 weeks of field surveys in the Saloum Delta, Senegal. If appropriate sampling equipment can be secured in time, measuring of habitat parameters and collection of water samples can be included in this survey, which will be hosted by the African Aquatic Conservation Fund, and will involve both international and local scientists, as well as local trainees.</p>
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Data/resource gap - Priority rank 3: *Response to External Stimuli*

All species respond differently to external stimuli. Understanding how a species reacts can help teams prepare for any future hands-on work where approaching, catching and/or animal handling is needed. To best capture this knowledge gap and associated recommendations, data gaps 4, 5, and 6 were combined under priority rank #3. The incorporated data gaps include:

4. Response to boats, nets, capture, and external stimuli

5. Vital physiological statistics

6. Anthropogenic sources of scarring/injury

<p>1. Please list (as numbered points) possible methods/approaches to addressing the data/resource gap:</p>	<p>1. Retrospective data. Review of previously collected data from all available sources, including from other <i>Sousa</i> species. Baseline physiological information such as respiratory rate and/or heart rate are valuable for any future hands-on efforts. All available stranding and photo data should be reviewed, as well as any data available from capture, rehabilitation, and health assessment efforts with other <i>Sousa</i> species, as well as those that have lived in managed care (e.g., <i>S. plumbea</i> in Bahrain). Full literature reviews should also be conducted. Review of photos taken of <i>Sousa teuszii</i> could also include a review of all evidence of anthropogenic scarring - including evidence of interaction with fishing gear, propeller scars or other injuries that could have been incurred from close interaction with human activity</p>
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	<p>2. LEK and expert interviews. Interviews with fishers and local community members, as well as scientists that have worked around <i>Sousa teuszii</i> or other <i>Sousa</i> species;</p> <p>3. Opportunistic collection of data on animal response during live strandings or entanglements: Prospective, coordinated data collection from opportunistic situations, such as animal strandings should be utilized.</p> <p>4. Focused field studies on animal responses to human stimuli: This would entail carefully designed studies to determine how animals respond to vessel approaches and other elements that would be involved with, or lead up to full capture and release health assessments.</p>
2. For each of the methods/approaches listed above, please briefly consider and summarize achievability and likely constraints with regard to <i>Sousa teuszii</i> , it's habitats and range state logistics:	<p>1. Retrospective data. Achievability is high if personnel are obtained to aid with the acquisition of archived data and associated tasking required for proper review. Constraints include accessing data, otherwise this task should be achievable;</p> <p>2. LEK and expert interviews. Working Group 6 has assessed the feasibility and logistics that would be required to conduct interview surveys in <i>Sousa teuszii</i> range states. Topics of interviews will initially focus on presence/absence of the species mapping fisheries and assessing threats from bycatch and hunting. Although it will be important not to make interviews so long that they are an inconvenience to those being interviewed, a few additional questions might be added to interviews with fishers in areas of known <i>Sousa teuszii</i> distribution to determine whether they have any information on animal response to entrapment, entanglement, or other situations that could inform reactions to capture and handling for health assessments. Achievability is variable depending on range state logistics and securing appropriate personnel.</p> <p>3. Opportunistic collection of data on animal response during live strandings or entanglements: As the CCAHD network grows, and awareness of <i>Sousa teuszii</i> conservation needs increases, it is possible that a live stranding or entanglement will be reported in time for individuals working with the CCAHD to attend the event with qualified veterinarians, and collect valuable data on respirations, heart rate, and other indicators of the animal's response to captivity and handling (see for example a document recently submitted for publication by Kema Kema et al describing the handling and release of a Risso's dolphin entrapped in a marina in Gabon). The preparation of clear protocols that can be shared with practitioners in range states will ensure that the most can be made of these opportunities and useful data is collected.</p> <p>4. Focused field studies on animal response. Achievability is variable. Appropriate personnel, study design, and implementation are needed. Standardization of data collection protocols is recommended. Success depends on range state logistics and access to animal strandings and observational situations.</p>
3. Focusing on conservation/management relevance and practical	<p>(a) Short/medium-term (<2 years): Conduct a retrospective data review of all peer-reviewed literature, reports, and photos that can inform understanding of <i>Sousa teuszii</i> response to external stimuli. This is</p>

<p>achievability, what would you recommend as a single priority activity to address this data gap in:</p> <ul style="list-style-type: none"> (a) the short/medium-term (<2 years) (b) the longer-term (>2 years) 	<p>considered the most appropriate task to accomplish this goal in the short-term. Review of what is already available is the logical first step, with no risk to individual animals and minimal-moderate logistical challenges. A focus should be placed on review of photos, stranding data, and information available from other <i>Sousa</i> species. 2) Inclusion of appropriate questions to assess local knowledge of animal's reactions to entrapment, entanglement, or other stimuli, in interviews that are conducted in areas of <i>Sousa teuszii</i> distribution. 3) Opportunistic collection of data with stranded animals such as respiratory rates and response to boats/nets should be collected if appropriate personnel are present. The development of recommended protocols and standardization of data collection forms is recommended.</p> <p>(b) Longer-term (>2 years): Focused field studies could be conducted in the long term.</p>
<p>With regard to 3a (short/medium action), please provide a broad indication of:</p> <ul style="list-style-type: none"> (i) likely budget requirement (ii) likely core resource/equipment requirements; (iii) potential co-funding and/or donations in kind and/or equipment donations that could support this activity 	<ul style="list-style-type: none"> (i) Cost is variable depending on how much retrospective data is available and how many prospective interviews and/or data collection are conducted. Cost would vary from moderate-large. (ii) Key resources include experienced personnel for the review of available data, interviewing, and protocol development for opportunistic data collection and/or field studies. International travel and visas may be required. (iii) Please list any co-funding or donations in kind. <ul style="list-style-type: none"> (a) African Aquatic Conservation Fund- logistics and personnel for interviews and live animal standings.

Data/resource gap - Priority rank 4: *Health Threats*

In an effort to best understand the toxin, contaminant, and disease concerns surrounding *Sousa teuszii*, relevant data should be reviewed and/or collected. To best capture this knowledge gap and associated recommendations, data gaps 7 and 8 were combined under priority rank #4. The incorporated data gaps include:

7. Toxins/contaminant exposure

8. Common diseases

1. Please list (as numbered points) possible methods/approaches to addressing the data/resource gap:	<ul style="list-style-type: none"> 1. Retrospective data. Review of previously collected data from all available sources, including photos and stranding information. Review of existing photos would include assessment of skin lesions and scars, as well as body condition scoring (if possible from available photos). Complete literature review should be performed as well; 2. Collection of samples from stranded carcasses: Collection of blubber and organ and tissue samples from carcasses of stranded or bycaught <i>Sousa teuszii</i> will allow the assessment of the contaminant load that may be carried by other individuals in the population. Guidance should be provided via protocols, on the amount of tissue required and its appropriate storage for this purpose. 3. Prospective opportunistic data collection. Coordinated data collection from opportunistic situations, such as animal strandings, should be utilized.
2. For each of the methods/approaches listed above, please briefly consider and summarize achievability and likely constraints with regard to <i>Sousa teuszii</i> , its habitats and range state logistics:	<ul style="list-style-type: none"> 1. Retrospective data. Available data is limited so achievability is high if personnel is obtained to aid with the literature and photo review; 2. Sampling of carcasses: Data collection from strandings is also considered feasible, although considerable efforts will be required to strengthen stranding networks and increase local capacity to collect samples from strandings. Collection of samples suitable for histopathological analysis and/or contaminant analysis requires a greater level of experience and expertise that likely can only be achieved through hands-on training or video tutorials, and very clear protocols for sample storage. Lab facilities to analyze the samples would ideally be found in country to avoid the need for export permits. Facilities that deal with animal livestock, pandemics (e.g. Ebola) and/or terrestrial wildlife may be adequately equipped for these analyses. 3. Opportunistic data collection. Achievability is high, especially in certain range states, but requires organization and training of staff and standardization of protocols. The lack of coordinated response capacity is a limiting factor, depending on the range state in question. Constraints include funding for these activities, challenging range state logistics, and feasibility of timely response.
3. Focusing on conservation/management relevance and practical achievability, what would you recommend as a single priority activity to address this data gap in:	<p>(a) Short/medium-term (<2 years): 1) Conduct a retrospective review of available literature and photographic data that can provide insight into contaminant exposure and disease. 2) Collect organ and tissue samples from carcasses for histopathological and contaminant analyses (and provide clear protocols for how these should be collected and stored). 3) Collect samples opportunistically during live strandings or entanglements where applicable. Training of in-country personnel should commence immediately.</p>

<p>(a) the short/medium-term (<2 years)</p> <p>(b) the longer-term (>2 years)</p>	<p>(b) Longer-term (>2 years): A longer term goal should be the coordination of stranding response in range states that are amendable to these activities and where there is a chance of recovering animals alive and dead. Protocols for sampling should be implemented along with personnel training. Sample storage should be determined.</p>
<p>With regard to 3a (short/medium action), please provide a broad indication of:</p> <ul style="list-style-type: none"> (i) likely budget requirement (ii) likely core resource/equipment requirements; (iii) potential co-funding and/or donations in kind and/or equipment donations that could support this activity 	<p>(i) Cost is variable depending on how much retrospective data is reviewed. Opportunistic live animal sampling of stranded animals would raise costs if a coordinated effort and international training is implemented. A moderate to large budget is expected.</p> <p>(ii) Key resources include experienced personnel for the review of available data. If live animal sampling protocols are drafted, this will take coordinated effort and experienced personnel as well as training of local staff. International travel and visas will be required.</p> <p>(iii) Please list any co-funding or donations in kind.</p> <p>(a) African Aquatic Conservation Fund-logistics and personnel for live animal standings/sample collection. AACF is in the process of developing a relationship with the veterinary school at the University Cheikh Anta Diop, Dakar. We hope this will provide a location for sample analyses.</p>

Data/resource gap - Priority rank 5: Baseline data on medication and drug use

Any previous medication, sedation, and other drug use data should be reviewed in preparation for live animal health assessments. Since *Sousa teuszii* have not been kept in aquariums or zoos or handled for rescue, rehabilitation, or health assessments, this information will come from other *Sousa* species.

9. Medication and Drug Use

<p>1. Please list (as numbered points) possible methods/approaches to addressing the data/resource gap:</p>	<ol style="list-style-type: none"> 1. Retrospective data. Review of previously collected data from all available sources, including other <i>Sousa</i> species – especially those in captivity - to understand what medications have been used to treat various conditions and how animals have responded; 2. Prospective field work and opportunistic live animal data gathering. Coordination with other <i>Sousa</i> efforts worldwide should occur to maximize relevant data collection. If health assessments are occurring and/or stranded animals are being treated in any other countries, applicable data should be gathered and reviewed for application to <i>Sousa teuszii</i>. Potentially important data includes any use of sedatives, emergency drugs, and/or antibiotics. Appropriate communication with other <i>Sousa</i> experts should occur to ensure relevant information is being shared.
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<p>2. For each of the methods/approaches listed above, please briefly consider and summarize achievability and likely constraints with regard to <i>Sousa teuszii</i>, its habitats and range state logistics:</p>	<p>1. Retrospective data. Available data are limited so achievability is high if personnel are obtained to aid with the tasking. Limited data exist from other <i>Sousa</i> species from previous captures, health assessments, and previous animals living in managed care settings. These data should be accessible through various contacts and literature review;</p> <p>2. Prospective field work and opportunistic live animal data gathering. Achievability is high depending on relationships with other <i>Sousa</i> working groups. Constraints include limited opportunities.</p>
<p>3. Focusing on conservation/management relevance and practical achievability, what would you recommend as a single priority activity to address this data gap in:</p> <p>(a) the short/medium-term (<2 years)</p> <p>(b) the longer-term (>2 years)</p>	<p>(a) Short/medium-term (<2 years): Retrospective data review and opportunistic data collection should occur in the short-term. Data available for review are limited so the effort should be small. Constraints include limited opportunities for prospective data collection with other species.</p> <p>(b) Longer-term (>2 years): If prospective data collection has not occurred with other <i>Sousa</i> species, this coordination and effort should continue into the longer-term.</p>
<p>With regard to 3a (short/medium action), please provide a broad indication of:</p> <p>(i) likely budget requirement</p> <p>(ii) likely core resource/equipment requirements;</p> <p>(iii) potential co-funding and/or donations in kind and/or equipment donations that could support this activity</p>	<p>(i) You may either provide an exact costing if you have that information available, or else indicate whether the potential budget would be: small (<20K USD), moderate (~20-75K USD), large (75-150K USD) or high (>150K USD):</p> <p>Cost is variable depending on how much retrospective data is reviewed. Opportunistic live animal applications either through stranded animals or work with other <i>Sousa</i> species could raise the cost. A moderate cost is expected.</p> <p>(ii) Please provide a list of key resources/equipment that would need to be considered to accomplish the action. That may variously include boat charter (with drivers), international travel/visas, accommodation, meeting room hire, equipment, laboratory time, analysis time. ALL actions should include facilitation of local participation:</p> <p>Key resources include experienced personnel for the review of available data and for participation in any prospective efforts with other <i>Sousa</i> species. International travel and visas may be required.</p> <p>(iii) Please list any co-funding or donations in kind that could potentially be made by WG members or associates to support this activity in a funding bid (e.g. equipment, services, technical support, staff time, lab time, etc.).</p> <p>(c) Stephanie Plon – advice for available data for <i>Sousa plumbea</i>.</p>

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A10. Working Group 8 Full Report: Acoustic Studies

Background

What is already known/available for your WG Target with regard to *Sousa teuszii* (if possible, please include an appropriate reference list)?

Working Group Targets: Working Group 8 was tasked with assessing the following target identified by Weir et al. (2020):

- 2.7. Investigate the potential for *Sousa teuszii* acoustic monitoring

Background to acoustic work on *Sousa teuszii*

There has been minimal acoustic information collected to date on *Sousa teuszii*. The only published data available on its vocalisation characteristics is an evaluation of whistles and some basic click (and burst-pulse) parameters described for *S. teuszii* in southern Angola, using a drop hydrophone deployed opportunistically during small boat surveys (Weir, 2010, 2011). There are similar, currently unpublished data, available for Guinea (Weir, unpublished data). Both studies were limited by the recording equipment used in the field with an upper frequency limit of 46 kHz. Attempts to carry out similar deployments in the vicinity of *S. teuszii* in the Conkouati Douli National Park (CDNP) in the Republic of the Congo were unsuccessful, due to dolphin evasiveness and possibly due to cessation of vocal activity in proximity to the survey boat (Collins et al., 2013).

At least with regard to whistles, *S. teuszii* produces broadly-similar vocalisations to other members of the *Sousa* genus. However, there is variation between *Sousa* species, and between populations within some *Sousa* species (Weir, 2011; Wang et al., 2013; Dong et al., 2019).

During 2012 and 2013, some work with C-PODs (Chelonia Ltd) was carried out on *S. teuszii* in Gabon, and in the Republic of the Congo, with the aim of characterising patterns of habitat use at the deployment sites (Collins et al., 2013). Data from five of the sites has been analysed, providing comparative information on dolphin presence (species unconfirmed) between the sites, and some data on diel activity. Differences in deployment durations and times of year hindered any conclusions on spatial or seasonal patterns of dolphin occurrence. Subsequent work in the CDNP included the employment of two trained local observers to monitor two of the C-POD deployment sites in order to correlate acoustic data with visually-confirmed species (Collins et al., 2013); those data have not yet been analysed². No further C-POD deployments have occurred since 2013.

Acoustics as a potential monitoring option for *Sousa teuszii*

While there has been limited effort to monitor dolphin occurrence using C-PODs, and to opportunistically record basic data on call parameters, no consistent longer-term acoustic monitoring programmes exist for *S. teuszii*. However, there are precedents for the success of static passive acoustic monitoring (static-PAM) for the long-term monitoring of other vulnerable coastal odontocete species (including *Sousa* species), for example:

- A robust acoustic monitoring program was carried out in the northern Gulf of California between 2011 and 2015, using a systematic array of 46 C-POD sampling sites distributed across the core range

² The WG indicated that the collection of a new F-POD dataset with concurrent visual observations was far more likely to inform species differentiation than the analysis of this existing C-POD dataset.

of the Critically Endangered vaquita (*Phocoena sinus*). The study was able to demonstrate a ‘catastrophic decline’ of the vaquita population, with an annual rate of decline of 34% per year (Jaramillo-Legorreta et al., 2017).

- The ‘*Static Acoustic Monitoring of the Baltic Sea Harbour Porpoise (SAMBAH)*’ project deployed over 300 C-PODs across the Baltic Sea over a two-year period (SAMBAH, 2016), to collect data on the Critically Endangered subpopulation of Baltic Sea harbour porpoise (*Phocoena phocoena*). That study produced density and seasonal abundance estimates, and valuable information on distribution.
- An array of seven SoundTraps deployed for several months along a 100 km stretch of coastline to the south-west of Hainan Island in China, generated information on the distribution and habitat use of a newly discovered Indo-Pacific humpback dolphin (*Sousa chinensis*) population (Caruso et al., 2020).
- Static acoustic monitoring using C-PODs and F-PODs has been successfully applied to monitoring other *Sousa* species, for example C-PODs have been used during studies of the Indian Ocean humpback dolphin (*Sousa plumbea*) in India (Temple et al., 2016), and F-PODs in Hong Kong monitoring *S. chinensis* (Nick Tregenza, pers. comm).

These examples indicate some of the potential uses of acoustic techniques for monitoring threatened and poorly-known cetacean species.

Assessment of data gaps

WG8 is one of several WGs that are focused on data collection aimed at addressing Target Area 2 “*Fill Knowledge Gaps*” (Weir and Collins, 2020). The specific short to medium term (<2 years) target listed by Weir and Collins (2020) and intended for discussion by WG8 was:

Target 2.7. Investigate the potential for acoustic monitoring (medium term)

Acoustic devices can provide good information on cetacean occurrence, but previously it hasn’t been possible to distinguish between *Sousa* and *Tursiops* using C-PODs. Newer technologies (e.g. F-PODs, SoundTraps) may be able to accomplish this. A preliminary feasibility study would aid in assessing whether or not acoustic methods could specifically identify *S. teuszii* and thus be incorporated into cost-effective long-term monitoring plans.

It was since noted that ‘*An initial acoustic study may be a cheap and easily implemented addition to a funded field survey in Senegal-Gambia and it is recommended that this possibility is discussed with the WG. Otherwise, this [acoustic monitoring] is currently considered to be a longer-term Target*’ (Weir et al., 2020).

In this short report we focus on identifying data gaps and priority recommendations for achieving Target 2.7.

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Identifying priority conservation management data gaps

Please list and rank these in the Table according to their perceived importance for achieving conservation and management outcomes.

Much of the information required in order to provide informed conservation-management advice for *S. teuszii* is currently lacking, including (at least) distribution, abundance, population trends, movements, population structure, life history, threats, and mortality rates. Components that could potentially be addressed over the longer-term using acoustic monitoring techniques are summarised in Appendix 1.

However, it is recognised that the immediate application of any acoustic monitoring techniques to *S. teuszii* is limited by a paucity of data on their vocalisations, detection ranges and, importantly, the ability to consistently differentiate the species from the common bottlenose dolphin (*Tursiops truncatus*). The latter is a significant issue, since *Tursiops* is sympatric with *S. teuszii* throughout the latter's range (the two have

been documented in mixed-species groups in several countries), and detailed information on the relative occurrence of each at particular sites over different seasons is lacking.

Consequently, the identified data gaps and recommendations identified by WG8 primarily relate to carrying out a range of feasibility studies that would inform the applicability of acoustic methods to monitoring *S. teuszii*. These feasibility studies align well with the short-to-medium term scope of Target 2.7. In this context, the identified priority data gaps are listed in Table 1.

Table 1. Priority data gaps that need to be addressed ahead of the development of a long-term acoustic monitoring programme for *Sousa teuszii*.

Priority rank*	Identified data gap	Relevance to achieving conservation/management outputs for <i>Sousa teuszii</i>
1	Species differentiation Can <i>S. teuszii</i> be reliably distinguished from other odontocetes (especially <i>Tursiops truncatus</i>) based on click and/or whistle parameters?	Inability to reliably detect and distinguish the target species would restrict analysis to ‘dolphin species’ level, and inherently limit the scope for long-term monitoring of <i>S. teuszii</i> using acoustic methods. This may be less important at sites shown to be dominated by <i>S. teuszii</i> , but would be problematic in many of the 19 range states where both species occur along open coastlines.
2	Knowledge of effectiveness of acoustic monitoring in <i>S. teuszii</i> habitats	There is a lack of knowledge regarding the feasibility of deploying static acoustic devices for long-term monitoring of <i>S. teuszii</i> populations in most range states, with regard to selection of deployment methods, loss of devices (to theft or fishing activity), selection of sites, influence of habitat type on click parameters and detection, options for involvement of local communities etc. The lack of experience renders it difficult to assess the potential for wide-scale application of the method in the <i>S. teuszii</i> range states.
3	Availability for detection	Understanding how much of the time <i>S. teuszii</i> is vocalizing for, and thus available for detection by acoustic devices, is necessary for any attempt to derive absolute estimates of density in an area (also requiring information on detection ranges from the device), but for trends over time it is sufficient to know, or be able to reasonably assume, that availability has not substantially changed. The species may be present but not vocalizing (resulting in an under-estimate in occurrence). It needs to be clarified (separately for whistles and clicks) for what proportion of time the species is detected acoustically when present.

Addressing the priority data gaps

For each of the priority data gaps identified in Table 1, please complete the table below (copy and paste more tables as needed).

Recommendations for approaches to address each of the priority data gaps identified in Table 1 are outlined below. The WG notes that there is potential for some of these feasibility studies to occur concurrently with the activities recommended by other WGs, for example with WG3 which is assessing boat-based field surveys. Additionally, capacity-building has been highlighted as an important data/resource gap in the range-wide conservation of *S. teuszii*, and should be factored in to all of the recommended activities.

Priority data gap 1: Species differentiation

1. Please list (as numbered points) possible methods/approaches to addressing the data/resource gap:	Potential field methods for investigating species differentiation include: <ol style="list-style-type: none">1. Deploy devices at sites where both species occur or where relative occurrence is unknown, and conduct simultaneous visual observations for ground-truthing;2. Deploy acoustic devices during boat-based work while in the presence of <i>Sousa</i> and <i>Tursiops</i>.
2. For each of the methods/approaches listed above, please briefly consider and summarize achievability and likely constraints with regard to <i>Sousa teuszii</i> , its habitats and range state logistics:	<p>See Appendix 2 for a brief overview of available equipment for <i>S. teuszii</i> acoustic monitoring. The WG concluded that species differentiation would need to assess <i>both</i> click parameters <i>and</i> whistle parameters. The optimal recording equipment for assessing each of these call types is different and comprises:</p> <ul style="list-style-type: none">• Clicks: F-PODs (Chelonia, UK), which are static devices that detect and log echolocation click trains and implement selective full waveform capture;• Whistles: SoundTraps (STs; Ocean Instruments, NZ), which are static devices that can record in full bandwidth at frequencies up to 150 kHz and sample rate of 576 kHz, and includes a click detector that detects and logs echolocation clicks as waveform snippets when recording full bandwidth at lower frequencies. <p>Use of either type of recording equipment would need to take into account the analysis time required to assess whether call or acoustic encounter parameters differed sufficiently to facilitate confident discrimination. Automation exists for click analysis with either F-PODs or SoundTraps, but the data analysis will be more challenging and lengthier (and potentially more subjective) for whistles. Assessment of the time costs and subjectivity of analysis of all approaches is essential to establish what could be a workable monitoring method as opposed to a research demonstration.</p> <p>1. Deploy in multi-species (or unknown) sites and conduct visual observations:</p> <p>There are two options for achieving this: (1) deploy a device in the area of planned boat surveys, and use the visual dataset from the boat to cross-reference species identifications with acoustic recordings; and (2) establish a targeted study that uses shore-based observers monitoring a static device close to shore. While option 1 should be carried out whenever possible during forthcoming <i>S. teuszii</i> field studies,</p>

	<p>the WG recommends the second option as a preferred option to: (1) maximize visual monitoring time of recorder and thus increase likelihood of simultaneous visual and acoustic data gathering; (2) maximize community participation; and (3) minimize boat disturbance to both dolphins and recordings. Achievability for option 2 has already been demonstrated in the Republic of Congo, where local observers were trained to carry out shore-based observations to identify species at a C-POD site. The use of this approach is potentially limited in some countries by availability of suitable deployment sites located sufficiently close to shore, but is likely to be viable in several range states.</p> <p>2. Deploy devices from boat in proximity to each species during targeted focal studies: Achievability has already been demonstrated during opportunistic deployments in Angola in the presence of <i>S. teuszii</i>. This method should be straightforward to accomplish and has the significant advantage over other methods of having good species verification and potentially close proximity to animals to facilitate good signal-to-noise ratio recordings. However, this may be a disadvantage for F-POD studies as it does not correspond to the data collected in long term static deployments which largely comprises longer-range detections with valuable collateral data on each encounter. Additionally, it may only be feasible to stop a boat and turn off the engine in some sheltered habitats, and is unlikely to be an option when animals are in the surf or over sandbanks along exposed coastlines (and thus site choice will be important). The WG would encourage the collection of opportunistic data from both species whenever possible, but also recommends at least one targeted boat study aimed specifically at collecting these recordings. The latter should deploy an F-POD and a SoundTrap 300HF or 600HF simultaneously, with the SoundTrap recording at a sample rate of 576 kHz in order to record click trains at a bandwidth of 150 kHz and optimize both click and whistle analysis.</p> <p>For both Method 1 and Method 2, an exploratory analysis period would be required after the fieldwork to measure the distinctiveness of vocalizations between the two species and assess whether species discrimination is possible and how best to achieve it. Part of this will involve determining whether species discrimination is possible with clicks alone, thus allowing the use of only F-PODs for long term monitoring, or whether a combination of click and whistle discrimination is necessary, thus requiring the use of SoundTraps. In either case methods will need to be developed for auto-classification of vocalizations allowing rapid analysis of large datasets downstream. This will require collaboration with experts in the field of detection and classification, particularly for combined whistle and click techniques.</p>
3. Focusing on conservation/management relevance and practical achievability,	(a) In the short/medium term, the WG assigned high importance to both of the approaches identified to potentially address the species discrimination issue. The two priority recommended activities are therefore:

<p>what would you recommend as a single priority activity to address this data gap in:</p> <p>(a) the short/medium-term (<2 years)</p> <p>(b) the longer-term (>2 years)</p>	<ul style="list-style-type: none"> • To adopt the approach of Collins et al. (2013) by deploying F-PODs and STs at suitable nearshore sites and employing/training community members and/or park rangers to conduct concurrent visual observations. It is considered that the Republic of Congo or Gabon would be ideal choices for this study, but suitable sites likely exist in a number of range states. The use of incentives in the form of payments for acoustic devices retrieved or data collected, have been shown to be effective and would provide valuable experience. • To carry out targeted focal group acoustic deployments with both F-PODs and STs from boat with both <i>Tursiops</i> and <i>Sousa</i> in at least one site where both species are known to occur (regular sightings of both species do occur in some countries, for example Angola, Congo and Guinea-Bissau). <p>(b) There is potential for <i>Sousa</i> and <i>Tursiops</i> vocal characteristics to vary across habitats and between geographic regions (the species range comprises 19 countries). Assuming that the short/medium term study into species differentiation produces positive results, longer-term studies to investigate species differentiation should then be carried out in a variety of habitats <i>within</i> range states, and in several different countries. This would permit a better assessment of the applicability of using acoustic methods for <i>S. teuszii</i> assessment surveys, for example presence-absence surveys in unconfirmed range states, and preliminary assessments of where to implement longer-term monitoring programmes in poorly-studied areas.</p>																																	
<p>With regard to 3a (short/medium action), please provide a broad indication of:</p> <p>(i) likely budget requirement</p> <p>(ii) likely core resource/equipment requirements;</p> <p>(iii) potential co-funding and/or donations in kind and/or equipment donations that could support this activity</p>	<p><i>Recommended activity 1: shore-based observations</i></p> <p>Assuming two sites, and several months of data collection at each (i.e. a single deployment at each site), an <u>example</u> ballpark budget is:</p> <table border="1"> <thead> <tr> <th>Item</th> <th>Approximate cost (USD)</th> <th>Match funding (%)</th> </tr> </thead> <tbody> <tr> <td>F-PODs x 2 (@ \$1,800 each)</td> <td>3600</td> <td>100 (Chelonia)</td> </tr> <tr> <td>SoundTrap ST600HF x 2 (@ \$5,200 each)</td> <td>10400</td> <td>0</td> </tr> <tr> <td>Batteries</td> <td>150</td> <td>0</td> </tr> <tr> <td>512 Gb Soundcards for ST x 4</td> <td>480</td> <td>0</td> </tr> <tr> <td>Shipping of devices to country of use</td> <td>400</td> <td>0</td> </tr> <tr> <td>Moorings x 2</td> <td>400</td> <td>0</td> </tr> <tr> <td>Deployment/recovery boat charter x 2 (4 days @ \$100 per day)</td> <td>400</td> <td>0</td> </tr> <tr> <td>Vessel fuel (4 days @ \$50 per day)</td> <td>200</td> <td>0</td> </tr> <tr> <td>Travel to sites</td> <td>2000</td> <td>0</td> </tr> <tr> <td>Training of shore observer team (assumes remotely, or by local personnel, or during</td> <td>2000</td> <td>0</td> </tr> </tbody> </table>	Item	Approximate cost (USD)	Match funding (%)	F-PODs x 2 (@ \$1,800 each)	3600	100 (Chelonia)	SoundTrap ST600HF x 2 (@ \$5,200 each)	10400	0	Batteries	150	0	512 Gb Soundcards for ST x 4	480	0	Shipping of devices to country of use	400	0	Moorings x 2	400	0	Deployment/recovery boat charter x 2 (4 days @ \$100 per day)	400	0	Vessel fuel (4 days @ \$50 per day)	200	0	Travel to sites	2000	0	Training of shore observer team (assumes remotely, or by local personnel, or during	2000	0
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Vessel fuel (4 days @ \$50 per day)	200	0																																
Travel to sites	2000	0																																
Training of shore observer team (assumes remotely, or by local personnel, or during	2000	0																																

	field visit by experienced personnel budgeted to another project)		
	Salary for shore observer team (4 months salary for two people, @ \$1,000/month)	8000	100 (Chelonia)
	Binoculars for shore observers (2 x \$300)	600	0
	GPS (2 x \$300)	600	0
	Basic cameras (2 x \$750)	1500	0
	Permit costs	150	0
	Analysis of F-POD data by Chelonia	2500	100
	Analysis of ST data by acoustician (preferably French-speaking)	5000	0
	Training of locally-based student acoustician and salary to help with analysis	2000	100 (Chelonia)
	Portable hard drives for data backup (F-POD – SD cards max 80GB/yr/POD)	250	0
	Expert review of results with regard to informing long-term monitoring potential*	2000	0
	Currency exchange / contingency	1000	0
	Translation of resulting report	750	0
	Total	44,380	

*Within a year of the end of the field work any results of acoustic analysis should ideally be reviewed by a person with experience of the whole process of deriving a trend in a small cetacean population from acoustic data.

Recommended activity 2: boat-based deployments

Assuming one site and a single targeted boat survey of 10 days duration requiring a field visit by an international acoustician, an example ballpark budget is:

Item	Approximate cost (USD)	Match funding (%)
F-POD x 1	1800	100 (Chelonia)
SoundTrap x 1	5200	100 (Ocean Instruments)
Shipping of devices to country of use	400	0
Batteries	150	0
512 Gb Soundcards for ST x 2	240	0
Boat charter for 10 days incl. skipper (10 days @ \$100 per day)	1000	0

	Vessel fuel (10 days @ \$50 per day)	500	0	
	Travel to site	1500	0	
	International flight and local transport for acoustician	3000	0	
	Accommodation and food for acoustician and local team member (12 days @ \$130 per day per person)	3120	0	
	Salary for acoustician (2 weeks @ \$1200 per week)	2400	0	
	Visa cost for acoustician	250	0	
	Salary for local team member (2 weeks @ \$400 per week)	800	100 (Chelonia)	
	GPS x 1	300	0	
	Permit costs	150	0	
	Analysis of F-POD and ST data by Chelonia	2500	100 (Chelonia)	
	Analysis of ST data by acoustician (preferably French-speaking) (2 weeks @ \$1200 per week)	2400	0	
	Training of locally-based student acoustician and salary to help with analysis (4 weeks @ \$500 per week)	2000	100 (Chelonia)	
	Portable hard drives for data backup	250	0	
	Translation of resulting report	750	0	
	Currency exchange / contingency	1000	0	
	Total	29,710		

Priority data gap 2: Knowledge of effectiveness of acoustic monitoring in <i>S. teuszii</i> habitats	
1. Please list (as numbered points) possible methods/approaches to addressing the data/resource gap:	1. Conduct a pilot study in a region known to be of importance for <i>S. teuszii</i> , to incorporate static acoustic devices deployed across different habitat types that would facilitate comparisons of environmental noise and deployment challenges across sites while also providing initial data on dolphin occurrence (not necessarily distinguished to species level) and potential changes in click parameters in different habitat types. Ideally for a full year, so that seasonal changes in noise (i.e. wet versus dry seasons) and dolphin occurrence can be assessed.
2. For each of the methods/approaches listed above, please	1. The achievability of this approach is likely to be optimal in the Saloum Delta in Senegal, given the presence of a local partner (AACF) and a diverse range of habitat types occupied by a <i>S. teuszii</i> population. Non-invasive work such as acoustic

<p>briefly consider and summarize achievability and likely constraints with regard to <i>Sousa teuszii</i>, its habitats and range state logistics:</p>	<p>monitoring already falls within current AACF permits. Possible constraints relate to deployment methods and loss of devices, but assessing those risks is part of the pilot study. A major constraint is the lack of understanding regarding occurrence of <i>Tursiops</i> within the Saloum Delta and ability to differentiate between species (as per Priority 1). However, if the latter proves not to be possible then the pilot study would still inform the feasibility of monitoring for dolphins in different habitat types, and provide a useful seasonal dataset on the occurrence of 'dolphin species.'</p>																											
<p>3. Focusing on conservation/management relevance and practical achievability, what would you recommend as a single priority activity to address this data gap in:</p> <ul style="list-style-type: none"> (a) the short/medium-term (<2 years) (b) the longer-term (>2 years) 	<p>(a) The priority recommended activity is for three acoustic deployments (F-PODs, and perhaps also simultaneous SoundTraps if budget allows) to occur in three different habitats (e.g. narrow mangrove channel, semi-enclosed estuarine habitat, and open marine coast) within the Saloum Delta in Senegal for a full year. The results would be analyzed to determine achievable performance in detecting <i>S. teuszii</i> and rejecting other acoustic sources across a range of habitats, and will provide data on dolphin seasonal occurrence at the sites.</p> <p>(b) Together with the species discrimination work (Priority 1), the results from (a) will form the basis for producing recommendations for implementing longer-term and wider-region acoustic monitoring for <i>S. teuszii</i> (also applicable to <i>Tursiops</i>), with regard to site choice, deployment methods and optimizing detection.</p>																											
<p>With regard to 3a (short/medium action), please provide a broad indication of:</p> <ul style="list-style-type: none"> (i) likely budget requirement (ii) likely core resource/equipment requirements; (iii) potential co-funding and/or donations in kind and/or equipment donations that could support this activity 	<p>The following example ballpark budget assumes the following: (1) three separate sites; (2) one full year of monitoring, comprising three deployments each of four months duration at each site; and (3) a single field visit from a deployment expert at the start of the project who would then train up local personnel to recover and deploy for the remainder of the project:</p> <table border="1"> <thead> <tr> <th>Item</th> <th>Approximate cost (USD)</th> <th>Match funding (%)</th> </tr> </thead> <tbody> <tr> <td>F-PODs x 3 (@ \$1,800 each)</td> <td>5400</td> <td>100 (Chelonia)</td> </tr> <tr> <td>Device mooring costs (@ \$400 per site)</td> <td>1200</td> <td>0</td> </tr> <tr> <td>Batteries</td> <td>300</td> <td>0</td> </tr> <tr> <td>Shipping of devices to Senegal</td> <td>400</td> <td>0</td> </tr> <tr> <td>Deployment/recovery boat charter x 2 (4 days @ \$100 per day per site)</td> <td>1200</td> <td>0</td> </tr> <tr> <td>Vessel fuel (4 days @ \$50 per day per site)</td> <td>600</td> <td>0</td> </tr> <tr> <td>Travel to sites</td> <td>2000</td> <td>0</td> </tr> <tr> <td>International flight and local transport for field worker for one week to guide initial deployment and train local personnel</td> <td>3000</td> <td>0</td> </tr> </tbody> </table>	Item	Approximate cost (USD)	Match funding (%)	F-PODs x 3 (@ \$1,800 each)	5400	100 (Chelonia)	Device mooring costs (@ \$400 per site)	1200	0	Batteries	300	0	Shipping of devices to Senegal	400	0	Deployment/recovery boat charter x 2 (4 days @ \$100 per day per site)	1200	0	Vessel fuel (4 days @ \$50 per day per site)	600	0	Travel to sites	2000	0	International flight and local transport for field worker for one week to guide initial deployment and train local personnel	3000	0
Item	Approximate cost (USD)	Match funding (%)																										
F-PODs x 3 (@ \$1,800 each)	5400	100 (Chelonia)																										
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International flight and local transport for field worker for one week to guide initial deployment and train local personnel	3000	0																										

	Accommodation and food for international field worker for one week (12 days @ \$130 per day per person)	1560	0	
	Salary for international field worker for one week (@ \$1200 per week)	1200	0	
	Visa cost for international field worker	250	0	
	Salary for two local personnel for the training week and for carrying out the five subsequent deployments and recoveries	2000	100 (Chelonia)	
	GPS x 1	300	0	
	Permit costs (covered under AACF permit)	150	0	
	Analysis of F-POD data by Chelonia	5000	100 (Chelonia)	
	Training of locally-based student acoustician and salary to help with analysis (6 weeks @ \$500 per week)	3000	100 (Chelonia)	
	Portable hard drives for data backup	250	0	
	Translation of resulting report	750	0	
	SoundTraps x 3 (if dual deployments funded, @ \$5,200 each)	15600	33 (Ocean Instruments)	
	Analysis of ST data by acoustician (preferably French-speaking) (if dual deployments funded) (5 weeks @ \$1200 per week)	6000	0	
	Currency exchange / contingency	1000	0	
	Total F-PODs only	29,560		
	Total F-PODs and SoundTraps	51,160		

<u>Priority data gap 3: Availability for detection</u>	
1. Please list (as numbered points) possible methods/approaches to addressing the data/resource gap:	<p>Understanding of the availability of dolphins for detection requires knowledge of the detection radius around the monitoring device, when dolphins are present/absent within that range, and the total proportion of time that individuals/groups are vocally active versus silent. Availability may be expected to differ for clicks versus whistles, and therefore requires simultaneous deployment of an F-POD and ST, and separate analysis of each.</p> <p>Potential field methods for investigating availability rely on closely-correlating the locations of dolphin groups relative to the deployment location. This could be potentially achieved in two ways:</p> <ol style="list-style-type: none"> 1. Train a shore-based visual observation team to collect data on dolphin movements relative to a nearshore static acoustic device. A simple

	<p>presence-absence approach could be carried out in conjunction with the method proposed for Priority Data Gap 1, or a more precise approach to measure the distance of dolphins from an acoustic device could use a purpose-built raised platform and theodolite;</p> <ol style="list-style-type: none"> 2. Anchor a boat close to a static device with a visual observer onboard who would follow standard protocols to track and measure distances to dolphin groups relative to the device. <p>Assessing the availability of <i>S. teuszii</i> for acoustic detection could also potentially be informed by an additional method which we do not specifically recommend as a standalone approach but could be implemented if opportunity arose during other (e.g. health assessment) studies:</p> <ol style="list-style-type: none"> 3. Take the opportunity to deploy suction cup acoustic tags on <i>S. teuszii</i> during any proposed live captures in order to assess vocalization rate and potentially distance range.
2. For each of the methods/approaches listed above, please briefly consider and summarize achievability and likely constraints with regard to <i>Sousa teuszii</i> , its habitats and range state logistics:	<p>1. Shore-based theodolite tracking:</p> <p>This approach has been used for many other cetacean species and should be applicable to <i>S. teuszii</i> at suitable sites where dolphin presence is daily and sufficiently close to shore. Requires training of personnel and development of standardized protocols in order to produce a robust dataset. May be challenging where dolphin groups are dispersed and uncoordinated, e.g. in sites used for foraging.</p> <p>2. Tracking from anchored boat:</p> <p>Less optimal than Option 1, since it would be more costly (involving boat charters), offers less eye height to observers, since <i>S. teuszii</i> may avoid boats, and because there is potential for increased noise from sloshing and the boat anchor.</p> <p>3. Tagging:</p> <p>Live captures for various research goals may be recommended by other WGs (see the outputs of those WGs for considerations regarding welfare, permitting etc.). If approved, these could potentially provide an opportunity to attach minimally-invasive suction cup acoustic tags to individuals in order to generate short (probably up to ~20 hr) but valuable datasets on the acoustic behaviour of the species. Logistical constraints and welfare concerns would be primarily addressed by the live capture operation, but in the case of acoustic tags would also include potential challenges with tag recovery.</p>
3. Focusing on conservation/management relevance and practical achievability, what would you	(a) The priority recommended short/medium term activity is to carry out shore-based observations of <i>S. teuszii</i> individuals/groups in the vicinity of static devices, following standardized protocols, which could be carried out simultaneously with the recommended activity for Priority 1. That activity could be greatly enhanced by theodolite tracking; however, that would require considerably more training and

<p>recommend as a single priority activity to address this data gap in:</p> <ul style="list-style-type: none"> (a) the short/medium-term (<2 years) (b) the longer-term (>2 years) 	<p>would necessitate in situ input from an international expert at the onset, and so the associated costs would be higher.</p> <p>(b) Over the longer-term, we recommend that any live capture operations developed for <i>S. teuszii</i> (assuming related welfare protocols are evaluated by those associated WGs) should consider the deployment of acoustic tags to provide data on vocalization types and rate of vocalization by individuals and groups of animals. It is unlikely that these tags could be deployed on this species via boat due to their elusive behaviour, so live captures likely present the only viable opportunity.</p>																								
<p>With regard to 3a (short/medium action), please provide a broad indication of:</p> <ul style="list-style-type: none"> (i) likely budget requirement (ii) likely core resource/equipment requirements; (iii) potential co-funding and/or donations in kind and/or equipment donations that could support this activity 	<p>The costs for implementing shore-based monitoring would be identical to Priority 1. Implementation of a theodolite component would additionally require:</p> <table border="1"> <thead> <tr> <th>Item</th><th>Approximate cost (USD)</th><th>Match funding (%)</th></tr> </thead> <tbody> <tr> <td>Theodolite</td><td>5000</td><td>0</td></tr> <tr> <td>Construction of raised observation platform (e.g. from eucalyptus telephone poles)</td><td>3000</td><td>0</td></tr> <tr> <td>International flight and local transport for field worker for two weeks to train local personnel</td><td>3000</td><td>0</td></tr> <tr> <td>Accommodation and food for international field worker for two weeks (16 days @ \$130 per day per person)</td><td>2080</td><td>0</td></tr> <tr> <td>Salary for international field worker for two weeks (@ \$1,200/week)</td><td>2400</td><td>0</td></tr> <tr> <td>Visa cost for international field worker</td><td>250</td><td>0</td></tr> <tr> <td>Total</td><td>15,730</td><td></td></tr> </tbody> </table>	Item	Approximate cost (USD)	Match funding (%)	Theodolite	5000	0	Construction of raised observation platform (e.g. from eucalyptus telephone poles)	3000	0	International flight and local transport for field worker for two weeks to train local personnel	3000	0	Accommodation and food for international field worker for two weeks (16 days @ \$130 per day per person)	2080	0	Salary for international field worker for two weeks (@ \$1,200/week)	2400	0	Visa cost for international field worker	250	0	Total	15,730	
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WG8 report APPENDIX 1

Key conservation-management gaps for *Sousa teuszii* that acoustic monitoring could potentially help to address

Noting that the conservation-management relevance of all of these data gaps is dependent on the ability to reliably distinguish *Sousa teuszii* from other delphinids, which is currently uncertain. Data gaps are color-coded according to their likely applicability to the species as determined by WG8.

Identified data gap	Relevance to conservation/management outputs for <i>S. teuszii</i>
Spatio-temporal distribution and identifying persistent hotspots	<ul style="list-style-type: none"> Understanding where and when the species occurs, especially given strong variation (e.g. wet and dry seasons) in some countries that may influence seasonal changes in distribution; Understanding which areas are of key importance (i.e. ‘hotspots’) versus more transitory habitat; Identifying spatio-temporal overlap with potential threats and also identifying appropriate sites for protected area designation; Monitoring occurrence at night (strong advantage over visual methods).
Density / abundance estimates	<ul style="list-style-type: none"> Currently there are no scientifically-robust estimates of abundance available for any <i>S. teuszii</i> range state or ‘population,’ which is needed to assess global and regional status, and mortality rates; However, it is likely to be challenging to translate acoustic detections of <i>S. teuszii</i> into density or abundance estimates given the larger school sizes (compared with porpoises) and the lack of quantitative data from captive studies or tagged animals to assess variation in vocal behaviour and help to correlate click rate with abundance. Additionally, alternative methods available for <i>S. teuszii</i> (e.g. mark-recapture) may be more optimal.
Population trends	<ul style="list-style-type: none"> Monitoring trends (increasing/stable/decreasing) may be more relevant to conservation management than an absolute estimate of abundance in a given area. Acoustic methods have been developed for this purpose for porpoise species. However, it is unclear whether they would work for <i>S. teuszii</i>, and how trends in detections would relate to trends in population size. More work is needed.
Initial presence-absence assessments	<ul style="list-style-type: none"> Acoustic methods may provide a good option for initial presence-absence assessments of <i>S. teuszii</i> in areas of unsurveyed coast, requiring relatively few resources and helping to target future boat surveys.
Population structure	<ul style="list-style-type: none"> Acoustic data (i.e. call parameters) can potentially support morphological and genetic data in identifying distinct populations / stocks / management units. However, genetic work is the best option.

	Feasible
	Perhaps feasible for <i>S. teuszii</i> , but needing further consideration
	Not feasible (for now)
	Feasible, but better methods available

APPENDIX 2

Available passive acoustic monitoring techniques for a *Sousa teuszii* long-term monitoring programme

Technique	Deployment	Data type	Pros and cons
Hydrophone array in cable	Towed by boat	Real-time acoustic files, with full bandwidth analysis potential	<ul style="list-style-type: none"> Usually simultaneous with visual survey, so good species verification available; Provides data on all call type parameters (clicks, tonal calls etc); Covers large spatial areas; Logistically complicated with multiple components and potentially sophisticated set up; Boat presence means (1) noise; and (2) potential avoidance by species; Limited applicability in shallow or complex habitats; Costly; Significant analysis time required.
C-POD	Fixed, static	Echolocation click detection	<ul style="list-style-type: none"> Cost-effective; Monitor 24/7 throughout deployment; Requires minimal maintenance or logistics (simple, fast service visits, long battery life of 4+ months); Suitable for challenging, shallow, complex habitats; Deployment challenges (with marker buoy=vulnerable to being stolen or lost to fishing/weather; without marker buoy=need diver or remote release or other solution); Small monitoring radius; No species verification unless simultaneous visual obs (e.g. from nearby shore); Rapid analysis and results available via Chelonia software; Validation of auto-classification results possible?
F-POD	Fixed, static	Echolocation click detection with full waveform capture	<ul style="list-style-type: none"> Cost-effective; Monitor 24/7 throughout deployment; Requires minimal maintenance or logistics (simple, fast service visits, long battery life of 4+ months); Suitable for challenging, shallow, complex habitats; Deployment challenges (with marker buoy=vulnerable to being stolen or lost to fishing/weather; without marker buoy=need diver or remote release or other solution); Small monitoring radius; No species verification unless simultaneous visual obs (e.g. from nearby shore); Rapid analysis and results available via Chelonia software; Validation of auto-classification results possible?
SoundTrap	Static (but also deployable from drifting boat)	Real-time acoustic files, with full bandwidth analysis potential	<ul style="list-style-type: none"> Provides data on all call type parameters (clicks, tonal calls etc); Simultaneously records full bandwidth at lower sample rate (e.g., 48 kHz or 96 kHz) while applying a click detector/logger and saving click snippets at higher sample rate (e.g., 288 kHz or 576 kHz); Longevity is dependent on sampling parameters – HF units can be several months; Monitor 24/7 throughout deployment; Small monitoring radius; No species verification unless close to shore; Deployment challenges (with marker buoy=vulnerable to being stolen or lost to fishing/weather; without marker buoy=need diver or remote release or other solution); Suitable for challenging, shallow, complex habitats; More costly than F-PODs; Significant analysis time required for some uses (i.e. whistle analysis, dolphin presence from clicks).
Gliders	Autonomous. Some types	Real-time acoustic files,	<ul style="list-style-type: none"> Operate irrelevant of weather and are 24/7; Cover large spatial areas;

	can be programmed to travel specific routes, while others move with currents	with full bandwidth analysis potential	<ul style="list-style-type: none"> • Low noise as independent from vessels; • No concurrent visual observations to confirm species; • Limited applicability in shallow or complex habitats; • Logistically complicated (deployment/retrieval requires suitable sized boat); • Significant analysis time required; • Very costly.
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A11. Working Group 9 Full Report: Bycatch Monitoring and Mitigation in the Republic of Congo

Background

What is already known/available for your WG Target with regard to *Sousa teuszii* (if possible, please include an appropriate reference list)?

Working Group Target: Working Group 9 was tasked with assessing the following target identified by Weir et al. (2020):

- 3.1. *Conduct bycatch mitigation work in Congo in partnership with the International Whaling Commission's Bycatch Mitigation Initiative*

Background

Over the past decade significant effort has been applied to researching the small-scale fishing (SSF) fleet in the Republic of Congo. This has included work to determine the composition and scale of fish catches, work to assess fisheries effort and distribution as well as assessment of socio-economic factors that are associated with fishing and fishing communities. Work has also included assessments of the bycatch of the Atlantic humpback dolphin (AHD, *Sousa teuszii*) other coastal cetaceans, turtles and sharks, much of it conducted in partnership with fishing communities. This work provides an excellent baseline for future work on mitigating cetacean bycatch in the country.

Artisanal Small-scale fishing effort in the Republic of Congo

The Congolese coast (~170km in length) has an active small-scale fishing (SSF) fleet, made up of ~237 motorized vessels ('Popo' boats/pirogues) and 448 motorized/non-motorized smaller, traditional Congolese vessels ('Vili' boats/pirogues), totaling ~685 vessels in 2017 (689 recorded in Metcalfe et al. 2017). Popo boats are typically 9–14 m in length and 1.5–2.5 m in width and are propelled by 25–40 HP outboard engine, with fishing crews of 4–8 fishers, generally operated by Beninese settlers from the Popo tribe. The Vili boats are typically 6–11 m long by 0.7–0.9 m wide with an average crew of three fishermen (Momballa, 2020; Metcalfe et al. 2017). Across both types of vessel, five gear types are used to catch small pelagic fish: gillnet for flat sardinella, gillnet for round sardinella, gillnet for bonga (*Ethmalosa fimbriata*), beach seine, and the "plateau" net, which catches sardinella juveniles (*Sardinella* spp.) and anchovy (*Engraulidae*). Vili boats typically target bonga, sardinella and anchovies, whilst Popo vessels target mainly target Sardinella, and increasingly pelagic and demersal shark species (Momballa, 2020; FAO, 2019). When targeting shark, Popo vessels use both set gillnets (for demersal sharks) and driftnets (for pelagic sharks) with gillnets measuring 100–450 m long by 15–25 m deep and have a mesh size ranging from 100–240 mm when stretched (Girard et al., 2014, Momballa, 2020). Fishers on Vili vessels do not directly target shark species, although incidental captures occur and are either sold or consumed (Momballa, 2020). Girard et al. 2014 provides an in-depth classification of gillnet mesh-sizes and targeted species.

All waters within 6nm of the coast are reserved exclusively for small-scale fisheries, including within Conkouati-Douli National Park (CDNP - see figure 1 for MPA boundary) (Metcalfe et al. 2017, Momballa, 2020). Fishing within Conkouati is generally limited to communities that fall within the CDNP boundaries, unless specific licenses issued by the Ministry of Fisheries grant access; this system is open to considerable abuse. Popo vessels fish in both the coastal zone and in the Exclusive Economic Zone (up to 45nm) and also fish routinely and illegally within CDNP. Illegal fisheries (e.g. trawlers) frequently operate within this coastal SSF fisheries zone, causing conflict with the

SSF fleet (competition for space, over-fishing pressure, gear loss) and pushing the SSF fleet to set nets in the same near shore areas as those used by the Atlantic humpback dolphin (Metcalfe et al. 2017). Illegal trawlers frequently target inshore waters at night to limit detection, although this pattern varies dependent on the frequency of fisheries patrols.

Fishing is open all year round with a quota system for both artisanal and industrial fishers. Quotas can be extended if fishers meet all the criteria and pay the appropriate tax, and if the total catch stays within the overall precautionary catch level for the year (Momballa, 2020).

Fisheries enforcement within the Congo is poorly implemented (Metcalfe et al. 2017). In 2020 the Ministry of Fisheries established a new fisheries monitoring center for fisheries surveillance and enforcement of industrial fisheries (see <https://fisheries.groupcls.com/the-congo-sets-up-a-new-fisheries-monitoring-center/>). The artisanal fishing community limits the number of fishing expeditions by organising themselves into batches of boats allowed to fish during different months of the year. Shark fishing trips by Popo vessels last from 1-7 days.

Metcalfe et al. (2017) recorded 28 SSF landing sites, of which 12-13 landing sites are within the boundaries of CDNP (used by ~26 vessels), 11 landing sites outside of the boundaries and outside of the area of Pointe Noire (used by ~126 vessels), and 5 sites within Pointe Noire (used by ~537 vessels) (Metcalfe et al. 2017). More recently, (e.g. from 2018) the ‘CAPAP’ (Pointe-Noire Artisanal Fishery Support Centre, a joint Japan-Congolese bilateral development co-operation) has offered a platform with fish landing and handling facilities open to all artisanal fishermen, fishmongers, and processors in Pointe-Noire, which has concentrated Pointe-Noire landings at Songolo (Momballa, 2020).

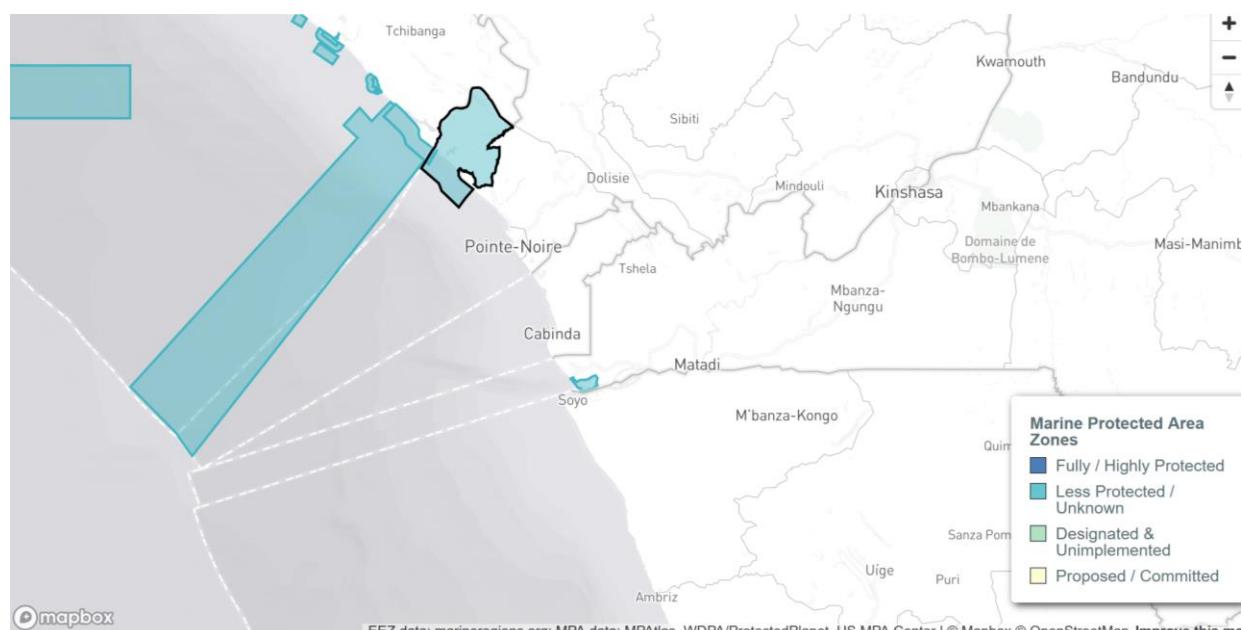


Figure 1. Map derived from Marine Protection Atlas (mpatlas.org) showing Conkouati-Douli National Park (CDNP – blue with black outline), and the Exclusive Economic Zone of the Republic of the Congo, and other marine protected areas in neighbouring Gabon.

Atlantic humpback dolphin bycatch in Conkouati Douli National Park

Extensive work has been undertaken through a project led by the Wildlife Conservation Society (WCS) to assess bycatch (and species distribution and abundance) in the coastal waters of Congo, with most effort occurring within CDNP although work did include a pair of landing sites outside of the park, between the boundary and Pointe

Noire where Atlantic humpback dolphins were occasionally reported (see Figure 1) (Collins et al, 2013). This work was undertaken between 2011 and 2016, after which point it stopped due to a local insurrection. The work included quantitative fisher surveys to describe effort and bycatch (see Metcalfe et al. 2017), the creation of a committee that represented the interests of CDNP fishing communities, (fishermen, village elders and traders) in partnership with the local NGO COGEREN (Comité de Gestion des Ressources Naturelles de Conkouati) and the establishment of a system of ‘pickets’ – comprising a network of fishermen drawn from each landing site - who worked to record sightings and to report bycatch. The WCS-led project also funded boat-based patrols to intercept trawlers and other illegal vessels within the national park in partnership with CNDP rangers, and did reduce the incidence of illegal trawler activity. However maintaining a routine system of patrols proved complicated (operational logistics were a significant issue), limiting operations to less than a dozen patrols per year. Moreover even once illegal vessels had been intercepted, a lack of follow through by officials (and complicity) meant that trawler companies rarely faced significant censure for their infractions.

CDNP appears to represent the species core range within Congo, and within CDNP the section of coast between the embouchure of the Conkouati Lagoon and the Gabonese border appears to represent the area of greatest occurrence, although the bulk of reported bycatches occurred in the Baie de Kounda, involving the landing sites of Noumbi, Kondi, Bondi and Longobondi, indicating routine passage by the animals in this area. Dolphins have been reported from outside of the park, and although these records are few, their rarity likely reflects a lack of effort and/or reporting from these areas. Sightings in 2019 included the passage of at least two Atlantic humpback dolphins near the beach at Songolo, the site of the new CAPAP facility. The links between CDNP and Mayumba National Park (MNP) in Gabon are also significant (boundaries indicated in Figure 1 as the adjoining marine protected area to CDNP). MNP is much larger, and was initially established to protect the world's most significant nesting beaches for leatherback turtles. The park was expanded in [2014](#) to include the approaches to the beach that extends to the EEZ limits following a years-long marine spatial planning effort led by WCS. MNP is also an area of significant importance for Atlantic humpback dolphins, and routine movements of dolphins across the border has been recorded by teams from each park. Bycatches of Atlantic humpback dolphins in Mayumba are likely to be very rare, given an almost complete absence of fisheries effort within the park, and so efforts to control bycatches within CDNP are likely to be beneficial across a much wider area.

Inshore bottom set nets were found to cause all known bycatch (3-6 animals per year, typically involving Atlantic humpback dolphins and bottlenose dolphins) in CDNP. An agreement was reached with the CDNP fishing community in May 2015 to trial different gears at a limited number of sites within CDNP. Funding was secured from the US MMC for this purpose, but due to the local political situation in 2015-2016 and then the departure of WCS in 2017, the work was never initiated. The conservation of the local Atlantic humpback dolphins population in CDNP will require a renewed engagement with the local fishing community, and a revised evaluation of the most suitable bycatch reduction programme in partnership between local stakeholders and international experts.

Socio-economic information on artisanal fisheries

The Congolese SSF sector employs 2,600 fishers, which supports ~35,300 dependents and 26,900 workers not directly engaged in fishing (e.g. processing and marketing), supporting around 9% of the coastal population (Metcalfe et al. 2017; Belhabib et al. 2015). Momballa (2020) reported on some socio-economic aspects of the Congolese artisanal fishing fleet, particularly in relation to the shark fishery. Fishers are exclusively men, however both men and women are boat owners (fishing patrons/sponsors). Processing is mostly done by women, often related to the fishers and employed by the wholesale fishmongers. The joint Japan-Congolese project PECHVAL (Fisheries Value Chain Improvement Study Project) was carried out and completed in 2015, and looked to improve the value chain for artisanal fisheries (improving quality, preserving the product, transport, sale, and consumption).

As with all other parks in Congo, the CDNP has always been cooperatively managed. The initial partnership was with IUCN who established the management framework and negotiated the terms of cooperation with local communities (that the park absorbed) and in 2000 management was passed to WCS. Following the departure of WCS from CDNP in 2017, co-management will fall to Noe Conservation which has experience in the long-term management and rehabilitation of protected areas. The terms of this partnership remain to be settled, with delays caused by the COVID 19 pandemic. One this goes ahead there will be opportunities to develop collaborative projects within the park boundaries relating to bycatch management and fisheries enforcement. WCS remains an active partner in national park management elsewhere in Congo (and in neighbouring Gabon) and maintains a small marine programme based in Pointe Noire. WCS also works cooperatively with the local NGO Renatura that focuses principally on the conservation of marine turtles and marine education, and this work recently included working in partnership with WCS to oversee the monitoring of the annual sea turtle nesting season in CDNP.

International Whaling Commission (IWC) – Bycatch Mitigation Initiative (BMI)

The IWC's Bycatch Mitigation Initiative is focused on raising awareness of the issue of cetacean bycatch and the available approaches and solutions to assessing, monitoring, and reducing bycatch. The initiative's focus is currently on bycatch in gillnets, particularly in SSF. The BMI is planning to work on a series of collaborative, locally-led pilot projects, where different assessment, monitoring and mitigation approaches can be implemented. These projects bring together national governments, conservation groups, researchers, fishing communities to work towards effective and viable solutions. Effective approaches will then be scaled-up (e.g. sub/national scale) or exported to other fisheries where appropriate. The Republic of Congo has been identified as a priority location for the development of a pilot project, given the conservation need, the relatively small coastal area, and the existing work that has already been carried out.

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Data/resource Gaps and how to address them:		
Project steps	Identified data/resource gap	Relevance to achieving conservation/management outputs for <i>Sousa teuszii</i>
1	<p>Stakeholder and decision maker engagement. Mapping and coordination with other relevant initiatives.</p> <p>This includes: re-engagement of local fishing community, NGOs, park and fisheries managers and national policy makers to address cetacean bycatch</p> <p>And Coordination with other initiatives and programmes operating in Congo.</p>	<p>The project will not be possible without the buy-in of both decision makers and the fishing community and local conservation organisations. Good relationships with fishers and Government were built during previous work, but there is a need to re-engage with the fishing community in relation to cetacean bycatch, and to raise awareness with current government officials etc. of the need for this work now and how the CCAHD, local organisations and others and the IWC BMI can assist.</p> <p>There is also a vital need to map out existing projects, programmes and initiatives (international, regional, national gov, IGO and NGO led) in the country in relation to SSF and bycatch (incl. sharks, turtles etc) and discuss potential collaboration with these groups, including possible synergies with BMI pilot projects, or opportunities to use information collected for pilot project implementation, or to ensure that work is not counter-productive. This will ensure that the bycatch project does not repeat work unnecessarily, or lead to local stakeholder saturation on fisheries work.</p>
2	Updated understanding of bycatch risk (fishing effort/ <i>Sousa</i> distribution/interaction with fishing gear) within and outside CDNP and collection of socio-economic information from fishers and supply chain to inform bycatch reduction approaches.	Existing information published in 2017 is available characterizing the SSF fleet and mapping effort (Metcalfe et al. 2017), and information is available on bycatch occurring within the boundaries of the CDNP (Collins et al. 2016). All the information used by these publications is now a few years out of date, so it will be necessary to check whether there have been any changes to the fishing fleet, effort, or bycatch rates (or species distribution/abundance). It would also be important to collect data from fishers operating outside of the CDNP boundaries. This data can be collected using interviews to assess local ecological knowledge (LEK) (e.g. Turvey et al. 2015). Socio-economic data will need to be

		collected (or collated if previously collected) and analyzed in relation to SSF fishers and the supply chain in order to identify the most effective bycatch reduction strategies to trial (e.g. could alternative gears or livelihoods be possible; could a premium be paid for fish that is not associated with bycatch etc).
3	Define mitigation/management solutions and develop draft national bycatch strategy	This collaborative step is essential for developing a single or series of mitigation approaches in collaboration with (and so hopefully the buy-in of) stakeholders and decision makers.
4a and 4b	Implement BMI pilot project using the identified strategies & evaluate effectiveness	This is a critical part of the work to evaluate whether the proposed bycatch management programme will effectively reduce bycatch and allow the artisanal SSF fleet to continue to make their livelihood. Ideally the pilot project will involve fishers both within and outside the CDNP.
	Capacity building in relation to bycatch assessment, monitoring, mitigation, enforcement	Vital step to ensure that capacity is developed in government departments, agencies and other relevant organisations involved in fisheries management, and that this capacity is sustained beyond the life of the pilot project.
5	Scale up from pilot project to national implementation of successful bycatch reduction strategy and long-term monitoring programme.	This is vital in order to successfully address the threat of bycatch to Atlantic humpback dolphins in the Congo, but is likely to be beyond the immediate scope of this work and will require longer term implementation.

Data/resource gap - Step 1 Stakeholder and decision maker engagement. Mapping and coordination with other relevant initiatives.	
1. Please list (as numbered points) possible methods/approaches to addressing the data/resource gap:	<p>1. Engagement via letters/meetings/workshops with national government (including IWC Commissioner, CMS representatives, fisheries departments etc.) in relation to collaborative IWC/CCAHD project.</p> <p>2. Hire local coordinator(s).</p> <p>3. Map out existing initiatives underway or planned in Congo relevant to SSF and bycatch work and discuss synergies and collaboration (including World Bank, FAO, CECAF, UNEP, other UN/development aid programmes, environmental projects run by national gov and NGOs).</p> <p>4. Local coordinators engage with fishing community (fishers and supply chain representatives) to be part of local monitoring and mitigation scheme.</p>

	5. Hold meetings with communities and all stakeholders.
2. For each of the methods/approaches listed above, please briefly consider and summarize achievability and likely constraints with regard to <i>Sousa teuszii</i> , its habitats and range state logistics:	<p>1. Engagement is highly achievable, but requires willingness and capacity on national government's behalf.</p> <p>2. Highly achievable. Possible candidates those who were involved in previous work.</p> <p>3. Achievable but time consuming and requiring intensive scoping work and collaboration from decision makers, researchers, NGOs etc.</p> <p>4. Assumed to be achievable given that this work has been done before with a similar model. Possible challenges exist if fishers already engaged in other research or no longer keen to collaborate.</p> <p>5) Achievable, possibly challenging to get international participants to in-person meetings during 2021 due to pandemic and this may also apply to local participants.</p>
3. Focusing on conservation/management relevance and practical achievability, what would you recommend as a single priority activity to address this data gap in: (a) the short/medium-term (<2 years) (b) the longer-term (>2 years)	<p>All steps needed in short/medium term and all high priority for establishing project.</p> <p>Work to re-engage the fishing communities in the project</p> <p>Identify local researchers/project representatives to lead the work and engagement on the ground. Former WCS project staff would be ideal for this role.</p> <p>Work to promote engagement in the project by local NGOs, recognizing that there will be some lags associated with capacity building, but will be necessary for longer term success.</p>
With regard to 3a (short/medium action), please provide a broad indication of: (i) likely budget requirement (ii) likely core resource/equipment requirements; (iii) potential co-funding and/or donations in kind and/or equipment donations that could support this activity (ii) Please provide a list of key resources/equipment that would need to be considered to accomplish the action. That may variously include boat charter,	<p>Budget</p> <p>Budget is expected to be medium (20-30k) to set this activity up in the short term.</p> <p>Key resources</p> <p>Salary costs for local coordinators</p> <p>Per Diems for meeting participants, as well as local transport costs</p> <p>Meeting room hire (NB. potential no-cost options are available)</p> <p>Travel for local and international experts (flights, visas, accommodation)</p> <p>Time for scoping of relevant projects and outreach (salary)</p> <p>Possible co-funding</p>

international travel/visas, accommodation, meeting room hire, equipment, laboratory time, analysis time. ALL actions should include contingency for local participation:	<ul style="list-style-type: none"> - Noe may have funding and staff to support the marine and coastal component of their park management. - IWC BMI seed funding - WCS/US MMC funds
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Data/resource gap - Step 2; Updated understanding of bycatch risk (fishing effort/ Sousa distribution/interaction with fishing gear) within and outside CNDP and collection of socio-economic information from fishers and supply chain to inform bycatch reduction approaches.	
1. Please list (as numbered points) possible methods/approaches to addressing the data/resource gap:	<ol style="list-style-type: none"> 1. Collation of existing spatial data (fishing effort, bycatch, Sousa distribution) within and beyond CNDP boundaries, including a search for updated information. Collation of existing socio-economic information on artisanal fisheries (net income, expenses, catch, fishing trip information). 2. Collection of any necessary additional data on Sousa (updated distribution/abundance info) artisanal fishery information, socio-economics, bycatch rates (questionnaires to assess local fisher knowledge (LEK – e.g. Turvey et al. 2015)/community participatory approaches, cetacean survey information, self-reporting of bycatch). Mapping of local and export supply chain of fish products. 3. Updated rapid assessment to characterize bycatch risk (e.g. using Hines et al 2020) across the whole Congolese coast.
2. For each of the methods/approaches listed above, please briefly consider and summarize achievability and likely constraints with regard to <i>Sousa teuszii</i> , its habitats and range state logistics:	<ol style="list-style-type: none"> 1. Collation of existing spatial, biological and fishery data (e.g. Metcalfe et al. 2017, Momballa, 2020, Collins et al. 2013) Highly feasible to achieve, constrained by what data has been collected and its availability/suitability for risk assessment. 2. Collection of additional data on fishery, Sousa, socio-economics, community perceptions to bycatch and mitigation, mapping of fishery supply chain across local and international markets. Feasible to achieve over the short-medium term (Covid-19 situation dependent). Will rely on local teams carrying out work. This may also be combined with the Local Ecological Knowledge interviews being assessed and recommended by CCAHD Working Group 6. 3. Rapid bycatch risk assessment (using Hines et al. 2020 methodology, or other relevant approach) Achievable, provided steps 1 and 2 are able to happen.
3. Focusing on conservation/management relevance and practical	The listed activities/approaches are steps towards conducting a risk assessment, therefore all are necessary and probably achievable in the short term <2 years. Actually carrying out the risk assessment, whether using just existing data, or

<p>achievability, what would you recommend as a single priority activity to address this data gap in:</p> <p>(a) the short/medium-term (<2 years)</p> <p>(b) the longer-term (>2 years)</p>	<p>incorporating new data, is the priority activity in both the short and long term. The risk assessment could be repeated in the medium-long term to help with monitoring bycatch and the mitigation measures.</p>
<p>With regard to 3a (short/medium action), please provide a broad indication of:</p> <p>(i) likely budget requirement</p> <p>(ii) likely core resource/equipment requirements;</p> <p>(iii) potential co-funding and/or donations in kind and/or equipment donations that could support this activity</p>	<p>Budget</p> <p>Risk assessment and data collation/collection: <20-30k USD</p> <p>Key resources</p> <ul style="list-style-type: none"> • Existing data on Sousa, fisheries • Staff time for experts in bycatch risk assessment to carry out analysis of existing data and again for any new updated information. • International travel and accommodation for experts (Covid dependent) • IT and GIS tools, <p><i>For additional data collection:</i></p> <ul style="list-style-type: none"> • Field equipment (drones, binoculars, digital cameras, GPS) • [Possibly] small boat charter • Payment for fishers involved in data collection • Local workshop [meeting room hire] • Local staff to coordinate and collect new data on fisheries, Sousa, socio-economics. • Local travel budget <p>Possible co-funding</p> <p>IWC Bycatch Mitigation Initiative co-funding for risk assessment work [amount to be confirmed], and pilot project seed funding [to be determined]</p>

Data/resource gap - Step 3 Define mitigation/management solutions and develop draft national bycatch strategy	
<p>1. Please list (as numbered points) possible methods/approaches to addressing the data/resource gap:</p>	<p>1. Using information collected/collated under Priority Rank 2, conduct a series of virtual (or if possible, in-person) workshops (local coordinators, managers, fishers, experts and IWC Expert Panel members & other bycatch and social and community engagement experts) to discuss risk assessment, and possible mitigation and management solutions (including technical mitigation, spatial measures, alternative gears, market approaches) (meetings in French/with translation).</p>

	<p>2. Identify if any market-based methods available in local fishery supply chain to fund up-take and use of technical mitigation/alternative gears.</p> <p>3. Final evaluation and selection of options (technical mitigation, alternative gears, alternative livelihoods) and design of mitigation/management (gear switching/closed areas/alternative livelihood) trials.</p> <p>4. Produce a draft national bycatch strategy</p>
2. For each of the methods/approaches listed above, please briefly consider and summarize achievability and likely constraints with regard to <i>Sousa teuszii</i> , it's habitats and range state logistics:	<p>1. Achievable if existing information can be collated to inform the possible mitigation/management approaches. Will depend on local engagement and input.</p> <p>2. Achievable with the right partners, but may not indicate any methods to incentivize change for bycatch reduction.</p> <p>3. Achievable, but success will depend on local fishers willingness to test different approaches (and willingness of decision makers to facilitate process).</p> <p>4. Achievable to draft, but will require buy-in and willingness to implement from decision makers.</p>
3. Focusing on conservation/management relevance and practical achievability, what would you recommend as a single priority activity to address this data gap in: (a) the short/medium-term (<2 years) (b) the longer-term (>2 years)	<p>a) Evaluation of most appropriate management approach to trials and implementation of mitigation/management trials</p> <p>b) Evaluate success of mitigation/management trials and make recommendations for management.</p> <p>c) evaluate or predict Gov and community's involvement</p>
With regard to 3a (short/medium action), please provide a broad indication of: (i) likely budget requirement (ii) likely core resource/equipment requirements; (iii) potential co-funding and/or donations in kind and/or equipment donations that could support this activity	<p>Budget Small</p> <p>Key resources</p> <ul style="list-style-type: none"> • International travel/visas/accommodation • Meeting room hire • Local travel costs <p>Possible co-funding</p> <ul style="list-style-type: none"> • IWC BMI seed funding • WCS – Marine Mammal Commission funding

Data/resource gap - Step 4 <p>Implement BMI pilot project using the identified strategies & evaluate effectiveness Capacity building in relation to bycatch assessment, monitoring, mitigation, enforcement</p>	
1. Please list (as numbered points) possible methods/approaches to addressing the data/resource gap:	<p>1. Implement bycatch mitigation trials or management approach identified under Step 3 in collaboration with fishing community, park managers and government agencies.</p> <p>2. Evaluate success (BMI Expert Panel, CCAHD, IWC SC), economic and logistical feasibility of mitigation/management trials and make recommendations (IWC SC, CC) to managers/fishing communities.</p> <p>3. Develop capacity of government agencies, in collaboration with park managers, fisheries enforcement external organisations in relation to monitoring, mitigation and enforcement of cetacean bycatch .This is either through workshops, apprenticeship programmes or other appropriate methods to be determined with stakeholders.</p>
2. For each of the methods/approaches listed above, please briefly consider and summarize achievability and likely constraints with regard to <i>Sousa teuszii</i> , it's habitats and range state logistics:	These activities are likely to be feasible to achieve over the medium term, but will require the existing steps to be successfully achieved, including government and fisher community engagement and buy-in to the work.
3. Focusing on conservation/management relevance and practical achievability, what would you recommend as a single priority activity to address this data gap in: (a) the short/medium-term (<2 years) (b) the longer-term (>2 years)	a) implementation of pilot project and capacity building b) ongoing monitoring and management
With regard to 3a (short/medium action), please provide a broad indication of: (i) likely budget requirement (ii) likely core resource/equipment requirements; (iii) potential co-funding and/or donations in kind	<p>Budget Large</p> <p>Key resources</p> <ul style="list-style-type: none"> • Fisher compensation/payment for participation • Fuel/boat hire • Mitigation gear (if applicable) • Alternative gear (if appropriate) • Vessel monitoring (logbook/electronic/observers/GPS) • At sea safety gear/insurance etc. • IT (laptops etc)

and/or equipment donations that could support this activity	<ul style="list-style-type: none"> • Binoculars/field equipment. • Monitoring equipment (electronic/log books/GPS) • Observers (if appropriate) • Fisher compensation/participation as observers • Analysis time/costs <p>Possible co-funding</p> <ul style="list-style-type: none"> • IWC BMI Pilot project seed funding • WCS Funding
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Data/resource gap - Step 5 Scale up from pilot project to national implementation of successful bycatch reduction strategy and long-term monitoring and enforcement programme.	
1. Please list (as numbered points) possible methods/approaches to addressing the data/resource gap:	<ol style="list-style-type: none"> 1. Hold workshop/meetings on sustainable financing opportunities with international experts, fishing community and government officials in relation to effective management solution(s). 2. Government adoption of bycatch strategy 3. Funds secured for implementation of mitigation/management approach at national scale 4. All of SSF fleet adopts mitigation/management 5. Long-term monitoring and enforcement programmes implemented
2. For each of the methods/approaches listed above, please briefly consider and summarize achievability and likely constraints with regard to <i>Sousa teuszii</i> , its habitats and range state logistics:	All of these activities require government leadership, and sustainable funding to support their implementation. These are major constraints to this being successful long term.
3. Focusing on conservation/management relevance and practical achievability, what would you recommend as a single priority activity to address this data gap in: (a) the short/medium-term (<2 years) (b) the longer-term (>2 years)	All activities are a priority, but will only be implementable over the longer-term.
With regard to 3a (short/medium action),	Budget

<p>please provide a broad indication of:</p> <ul style="list-style-type: none"> (i) likely budget requirement (ii) likely core resource/equipment requirements; (iii) potential co-funding and/or donations in kind and/or equipment donations that could support this activity 	<p>Large (and probably beyond the scope of a project)</p> <p>Key resources</p> <p>Possible co-funding</p> <p>Unknown- potentially market-based sources</p>
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A12. Working Group 10 Full Report: Mitigating Impacts of Costal Developments

Data gaps and conservation management needs

Background. What is already known/available for your WG Target with regard to *Sousa teuszii* (if possible, please include an appropriate reference list)?

Working Group Target: Working Group 10 addressed the following target from Weir et al. 2020:

- *Target 3.3. Address threat level from commercial coastal development (short to medium term)*

Background

Threat from coastal development –The threat of coastal development in Atlantic humpback dolphin (*Sousa teuszii*, hereafter referred to as AHD) habitat is likely to be highly significant, although is currently poorly documented throughout the species' range. Expanding coastal settlements, port developments (often involving land reclamation, dredging and dumping of sand and other sediments), gold and other mineral mining, and oil and gas exploration and extraction, are occurring in various parts of the species' range, and have been recognized as potential threats of significance, throughout the species' range. In general, the severity of the threat from coastal development and its cumulative impacts has been under-appreciated and under-quantified (Weir et al. 2011). Data are lacking, both regarding the number of such developments occurring in range states each year, the mitigation being implemented (if any), and the resulting impacts on dolphins. However, it may be reasonably assumed that the latter are similar to those documented for other small cetaceans occupying nearshore habitats globally.

Coastal development has the potential to cause behavioural disturbance, disruption of movements, and shifts of dolphin distribution into sub-optimal habitat areas (Collins 2015). Such "short-term" and often localized effects, can in turn sometimes lead to long-term population fragmentation and other consequences, especially for a species such as the AHD, with a distribution limited by suitable habitat, potentially low population size, and other sources of mortality (e.g. bycatch). The continued urban expansion that often follows port development can make these issues even more serious. Environmental impact assessments (EIAs) are woefully inadequate in most African countries and rarely consider the cumulative and synergistic effects of multiple developments within the broader range.

References

Collins, T. 2015. Re-Assessment of the Conservation Status of the Atlantic Humpback Dolphin, *Sousa teuszii* (Kükenthal, 1892) Using the IUCN Red List Criteria. Pages 47-78 in T. A. Jefferson and B. E. Curry eds. *Humpback Dolphins (Sousa spp.): Current Status and Conservation, Part 1: Advances in Marine Biology*. Elsevier.

- Weir, C. R., K. Van Waerebeek, T. A. Jefferson and T. Collins. 2011. West Africa's Atlantic humpback dolphin (*Sousa teuszii*): Endemic, enigmatic, and soon Endangered? African Zoology 46:1-17.
- Weir, C., Leeney, R. and Collins, T. (2020). Reinvigorating conservation efforts for the Atlantic humpback dolphin (*Sousa teuszii*): A brief progress report. Paper SC/68B/SM07 presented to the International Whaling Commission, Cambridge, UK.
- Weir, C. R. and T. Collins. 2015. A Review of the Geographical Distribution and Habitat of the Atlantic Humpback Dolphin (*Sousa teuszii*). Pages 79-118 in T. A. Jefferson and B. E. Curry eds. Humpback Dolphins (*Sousa spp.*): Current Status and Conservation, Part 1: Advances in Marine Biology. Elsevier.

Identifying priority conservation management data gaps

Please list and rank these in the Table according to their perceived importance for achieving conservation and management outcomes.

Data/resource Gaps and how to address them: Please list and rank these according to perceived importance for achieving conservation/management outcomes, and then please complete the table below for each identified gap.

Priority rank	Identified data/resource gap	Relevance to achieving conservation/management outputs for <i>Sousa teuszii</i>
1	Lack of information on developments occurring in marine coastal habitats and potentially overlapping with the species (the latter requiring improved knowledge of species distribution – see WG3 – but acknowledging that a default ‘precautionary principle’ should be to expect the species to occur)	Understanding the scale of coastal development is critical to managing potential impacts on <i>Sousa teuszii</i> . Currently, it is problematic to assess this threat due to lack of transparent data on when and where coastal development is occurring.
2	Lack of adequate baseline surveys for AHD in proposed development areas, with subsequent lack of informed decision-making in EIAs.	Given the lack of information on the occurrence of AHDs throughout their range, baseline surveys are important to establish the level of use of proposed development sites, identify threats, and inform the use of appropriate mitigation measures
3	Lack of information and awareness of the potential impacts of coastal development on AHD, and inadequate consideration of AHD in EIAs .	Knowledge of the type and scale of threats is integral to implementing effective mitigation and management of <i>Sousa teuszii</i> in all range states.
4	Potential lack of awareness of mitigation protocols and biodiversity offsets that can be implemented during and after development	It is unclear whether coastal developments in <i>Sousa teuszii</i> range states are including contingency for the mitigation of threats and conservation management of this critically endangered species. Wide-scale and unchecked development in coastal habitats could

		potentially have significant impacts on localized populations.
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<u>Priority data gap 1: Acquiring information on coastal developments</u>		
1. Please list (as numbered points) possible methods/approaches to addressing the data/resource gap:	1. Engage with World Bank and other lenders, governments, in-country consultant agencies and NGOs, and the commercial companies carrying out the projects, to generate an inventory of current and planned coastal development projects and their potential impact on the species. This should include explicit consideration of the progressive loss of AHD habitats to coastal development, the role that lenders play in this loss, and the inadequacy of current EIA standards.	
2. For each of the methods/approaches listed above, please briefly consider and summarize achievability and likely constraints with regard to <i>Sousa teuszii</i> , its habitats and range state logistics:	This should be feasible. A first phase of the inventory could involve a questionnaire the CCAHD network of range-state partners and use of IUCN, CMS and IWC contacts to identify appropriate government contacts. A funded consultancy might yield a higher quality inventory more quickly. Ideally data on current and planned developments would be stored in a central online database accessible by CCAHD members. Supporting documents for different developments (development plans, EIAs etc, could be stored in a shared online drive).	
3. Focusing on conservation/management relevance and practical achievability, what would you recommend as a single priority activity to address this data gap in: (a) the short/medium-term (<2 years) (b) the longer-term (>2 years)	Generate an inventory of current and planned coastal development projects throughout <i>Sousa teuszii</i> range, and their potential impact on the species. This should include all large-scale coastal developments, such as ports, oil & gas operations, infrastructure development (including coastal roads and bridges), fish processing plants, etc.	
With regard to 3a (short/medium action), please provide a broad indication of:	This would likely require a small to moderate budget of 20,000 USD or more – ideally involving a consultancy and/or compensation for the time that range -state partners would invest in data gathering and contribution to the central database.	

<ul style="list-style-type: none"> (i) likely budget requirement (ii) likely core resource/equipment requirements; (iii) potential co-funding and/or donations in kind and/or equipment donations that could support this activity 	
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<u>Priority data gap 2: Lack of adequate baseline surveys and subsequent assessment in EIAs ahead of coastal construction projects</u>	
1. Please list (as numbered points) possible methods/approaches to addressing the data/resource gap:	<ol style="list-style-type: none"> 1. Produce a CCAHD protocol document that outlines minimum recommended approaches for the baseline surveys associated with construction project EIAs. Distribute to key stakeholders and raise awareness. 2. Conduct (regional) hand-on training workshops to increase the capacity of local scientists to carry out baseline surveys. 3. Collect and analyze data to obtain ‘baseline’ density estimates and habitat use parameters for known population ranges (e.g., distribution and photo-identification surveys, as being evaluated by Working Group 3). Where it is not possible to calculate absolute abundance/density, relative abundance/density measures can still be used to identify important habitat. Surveys should also include collection of at least basic environmental /habitat data, such as depth, salinity, turbidity, etc.
2. For each of the methods/approaches listed above, please briefly consider and summarize achievability and likely constraints with regard to <i>Sousa teuszii</i> , its habitats and range state logistics:	<ol style="list-style-type: none"> 1. Achievable, but written manuals, even if illustrated may not be sufficient to truly empower local scientists/EIA agencies to collect data to the appropriate standard, and may perpetuate the need for external experts to conduct surveys. Manuals should be supported by hands-on training for local scientists. 2. Regional hands-on training workshops are also recommended by WG2, with a recommendation that they be conducted in Senegal, where local partners and logistics are in place to conduct hands-on work in a known <i>Sousa teuszii</i> hotspot. The recommended activity is highly feasible, and constrained only by budget and availability of experienced personnel to conduct the training. 3. Achievable, in many cases, but there are often challenges in terms of funding, availability of trained local personnel, vessel and equipment availability, etc. In some cases, it may be advantageous to collaborate with national parks and/or fisheries agencies that are involved in regular coastal/marine patrols. Use of SMART or simplified line-transect methodology may provide insight into relative abundance where funding and expertise for dedicated cetacean surveys is not available.

<p>3. Focusing on conservation/management relevance and practical achievability, what would you recommend as a single priority activity to address this data gap in:</p> <p>(a) the short/medium-term (<2 years)</p> <p>(b) the longer-term (>2 years)</p>	<p>Regional hands-on training workshops for local scientists to be supported by clear manuals or protocols for approaches to baseline surveys, so that government and industry stakeholders are aware of the minimum standard of data required to adequately assess the potential impact of a development on <i>Sousa teuszii</i> (and/or other cetacean species).</p> <p>Baseline surveys themselves are also recommended - but are dealt with more thoroughly in the template for WG3.</p>
<p>With regard to 3a (short/medium action), please provide a broad indication of:</p> <p>(i) likely budget requirement</p> <p>(ii) likely core resource/equipment requirements;</p> <p>(iii) potential co-funding and/or donations in kind and/or equipment donations that could support this activity</p>	<p>See WG2 for budget estimates for hands-on training workshops.</p> <p>Development of a CCAHD protocol document that outlines minimum recommended approaches for the baseline surveys associated with construction project EIAs. This is likely to require a small budget (<20,000 USD).</p> <p>African Aquatic Conservation Fund in Senegal and AMMCO in Cameroon can assist with logistics for surveys and training workshops, and provide local personnel to be trained in survey techniques. There is potential for NGOs in other range states to also help in this way.</p>

<u>Priority data gap 3: Lack of information and awareness of the potential impacts of coastal development on AHD, and inadequate consideration of AHD in EIAs .</u>	
<p>1. Please list (as numbered points) possible methods/approaches to addressing the data/resource gap:</p>	<p>1. Produce a document outlining potential impacts on <i>Sousa teuszii</i> from construction projects that could guide EIA assessments. Distribute to key stakeholders to make these relevant stakeholders aware of the species, its habitats (which are shared with other threatened taxa) and conservation status, the potential impacts of developments, and how to mitigate them.</p> <p>2. Work with local NGOs in all range states to engage local governments and stakeholders to improve environmental assessment and mitigation practices (esp.</p>

	<p>using recognized experts on the species) so that they consider AHD impacts in coastal development plans/EIA</p> <p>3. Engage international companies and lenders (e.g., World Bank, IFC, ADB) involved with coastal development projects in the region in dialogues about how their activities may impact AHD and potential options for increasing protection</p>
2. For each of the methods/approaches listed above, please briefly consider and summarize achievability and likely constraints with regard to <i>Sousa teuszii</i> , its habitats and range state logistics:	<p>1. This document could be produced with the expertise that exists in the CCAHD group. However, it would take dedicated time and effort, as well as input from range-state partners to ensure that messaging and recommendations are clear and appropriate for the target groups.</p> <p>This desk-based programme of work could build on the inventory above, to assess the potential impact of each identified project, using studies from similar developments in other parts of the world (e.g. Hong Kong, where multiple line-transect and mark-recapture studies have been conducted on the impact of coastal construction projects on <i>Sousa chinensis</i>).</p> <p>2. This work could be conducted in conjunction with planned government stakeholder outreach as outlined in the WG2 template report. Modest funding is available for this government outreach through an IUCN-EDGE grant.</p> <p>3. This would build on the inventory of large scale coastal developments (see above) and an understanding of the roles that lenders play in bringing these projects to completion. Priority may be given to engagement of industry stakeholders that have international 'green credentials' that they need to protect or promote. For example, in Gabon industry ended up funding some of the critical first surveys that allowed us to identify dolphin hotspots that required protection. In some cases, international corporations may be more familiar than the government agencies they deal with when it comes to what constitutes a good EIA and what their role in generating the needed data for such an EIA can be. Local or international NGOs (or the CCAHD) can be a good way to let them know that someone is watching, and willing to help them do things the 'right way'.</p>
3. Focusing on conservation/management relevance and practical achievability, what would you recommend as a single priority activity to address this data gap in:	Work with local NGOs and CCAHD partners in all range states to engage local governments and stakeholders to improve environmental assessment and mitigation practices (esp. using recognized experts on the species) so that they consider AHD impacts in coastal development plans/EIA - supported by the drafting of a document outlining impacts of coastal development on <i>Sousa teuszii</i> and other nearshore/coastal species.

(a) the short/medium-term (<2 years) (b) the longer-term (>2 years)	
With regard to 3a (short/medium action), please provide a broad indication of: (i) likely budget requirement (ii) likely core resource/equipment requirements; (iii) potential co-funding and/or donations in kind and/or equipment donations that could support this activity	<p>This would initially require a relatively small budget, under 20,000 USD. It is primarily human resources and time are required, so funds should be available to support the development of suitable guidance documents, and support local CCAHD partners responsible for engaging government/policy and industry stakeholders.</p> <p>9,100 USD is available for government outreach and engagement in conservation planning through an IUCN SSC EDGE grant. Further funds are available to support the CMS Concerted Action, which envisages a meeting of key scientists and government stakeholders for <i>Sousa teuszii</i> range states.</p>

<u>Priority data gap 4: Potential lack of awareness of mitigation protocols and biodiversity offsets that can be implemented during and after development</u>	
1. Please list (as numbered points) possible methods/approaches to addressing the data/resource gap:	1. Produce recommendations for minimum mitigation protocols and suggestions for off-sets that could be adopted for development in areas where AHD are considered likely to occur (based on suitable habitat or the results of baseline surveys). Distribute to key stakeholders and raise awareness. Mitigation options can include improved coastal zone management and the establishment of Marine Protected Areas (MPAs). Very few MPAs have been established in the region (see figure 1), and where they have been established, they are relatively new, and potentially face challenges for adequate management and mitigation of threats. In Gabon, different levels of MPAs and managed use areas dictate what types of human activities and developments are allowed in each area (figure 2). For example seismic surveys are generally not permitted in MPAs, except under certain circumstances, and then under stricter regulations and with more mitigation measures than waters outside of MPAs.
2. For each of the methods/approaches listed above, please briefly consider and summarize	This action is highly feasible, but requires the knowledge gained from the recommended inventory above to be thorough and accurate. As a short-term goal, work could commence on a desk-based study to assess best practices from other regions (e.g. Hong Kong; Sakhalin Island, Russia), where government stakeholders and proponents of coastal developments or offshore oil and gas activities have been

<p>achievability and likely constraints with regard to <i>Sousa teuszii</i>, its habitats and range state logistics:</p>	<p>held to a high standard for mitigation of the impacts of their work and/or offsets such as funding research and conservation activities.</p>
<p>3. Focusing on conservation/management relevance and practical achievability, what would you recommend as a single priority activity to address this data gap in:</p> <ul style="list-style-type: none"> (a) the short/medium-term (<2 years) (b) the longer-term (>2 years) 	<p>Produce recommendations for minimum mitigation protocols and suggestions for off-sets that could be adopted for construction in areas where AHD are considered likely to occur. Use these recommendations in engagement of government and industry stakeholders in range states.</p>
<p>With regard to 3a (short/medium action), please provide a broad indication of:</p> <ul style="list-style-type: none"> (i) likely budget requirement 	<p>This would initially require a relatively small budget, under 20,000 USD. It is primarily human resources and time that are required. Funds would be required to support the development of suitable recommendations through a consultancy if required. Again involvement of range-state partners and stakeholders will be critical to ensuring that recommendations are tailored to local settings and are framed in a way that is most likely to convince relevant stakeholders.</p>

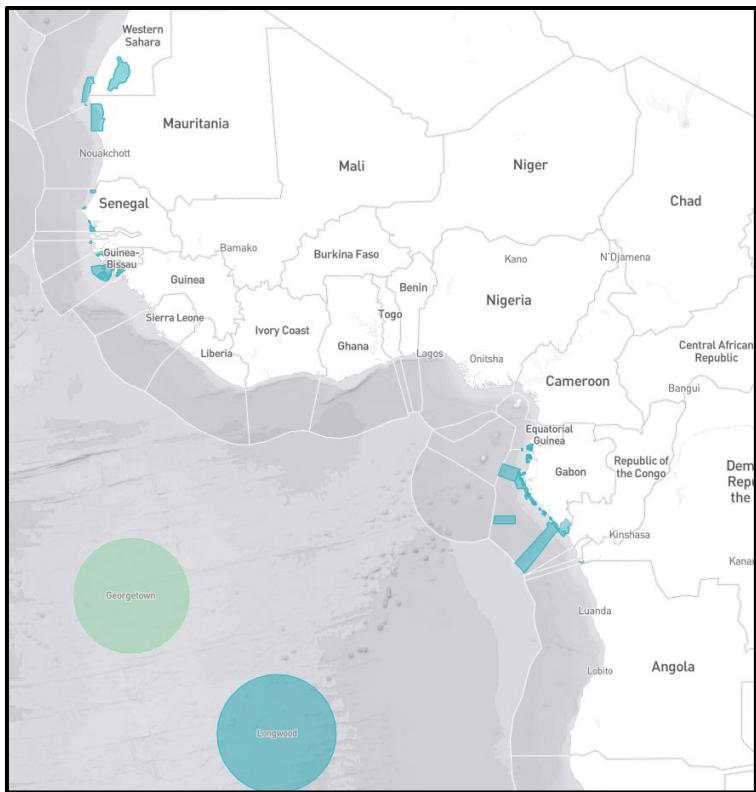


Fig. 1 Overview of Marine Protected Areas in *Sousa teuszii* range states – taken from: The Marine Conservation Institute's Marine Protection Atlas: <https://mpatlas.org/zones>

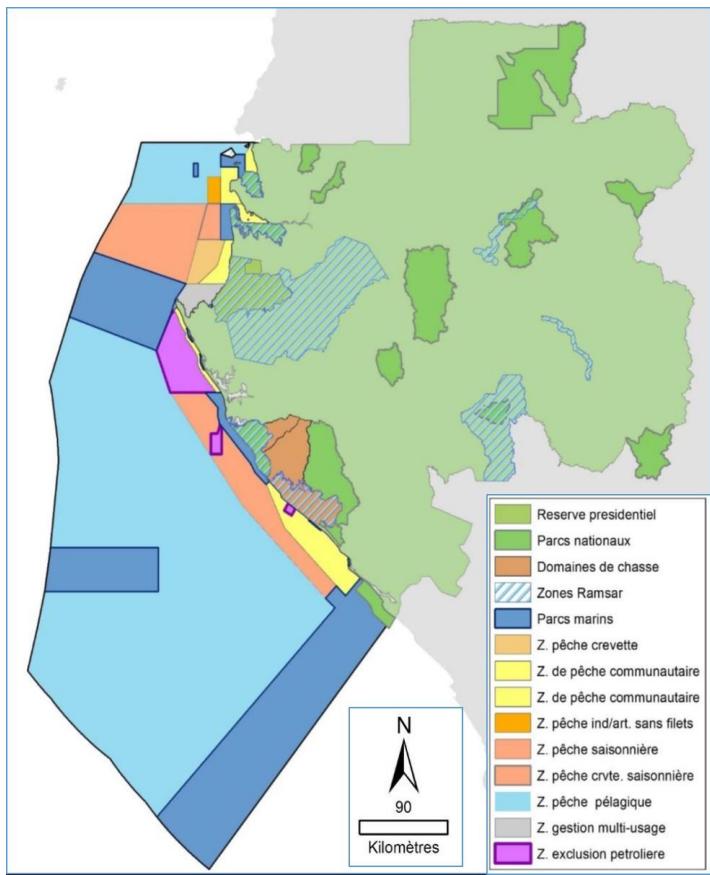


Fig. 2 Map showing existing MPAs in Gabon, and other managed areas that may be useful for AHD conservation