



# SAFEGUARDING THE FUTURE OF THE ENDANGERED LAHILLE'S BOTTLENOSE DOLPHIN IN SOUTH AMERICA:

## Five-Year Action Plan

Edited by:  
**Pedro Fruet, Juliana Di Tullio  
and Fábio Daura-Jorge**

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# DOCUMENT PREPARATION

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Commissioned by:



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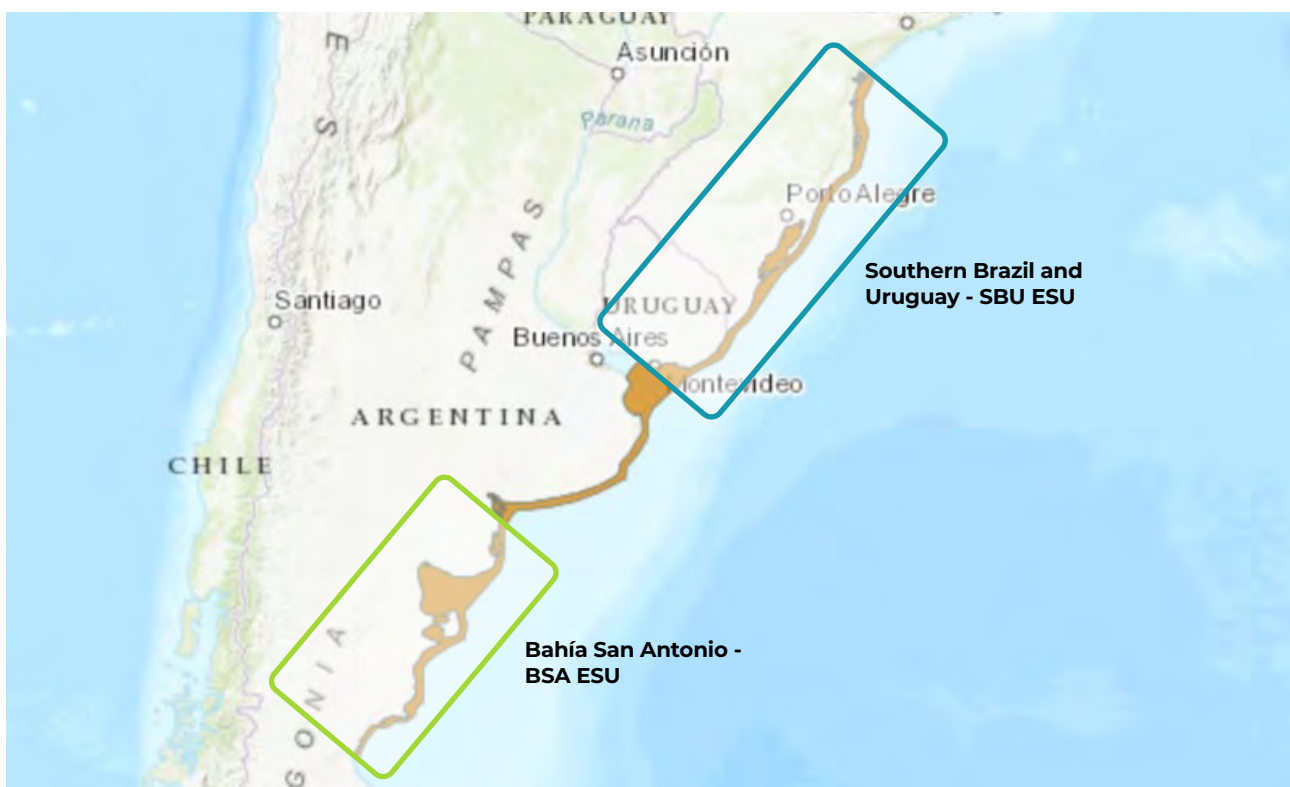
# EXECUTIVE SUMMARY

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The preservation of every single species stands as a crucial requirement in protecting biodiversity and ensuring a healthy planet. In the face of complex times demanding increased coordination and collaboration among partners, it becomes imperative to define priorities in the process of species protection. Dolphins, captivating and emblematic creatures of our oceans, exemplify the threats encountered by numerous species due to human-induced factors such as habitat degradation, pollution, bycatch in fishing nets, climate change, and marine vessel collisions. The distressing decline in dolphin populations globally highlights a critical concern for marine conservationists and wildlife enthusiasts alike. This concern also relates to Lahille's bottlenose dolphins, a coastal dolphin endemic to the Atlantic coast of South America and one of the few in the world that cooperate with fishers in the so called "Cooperative Fishing". The Lahille's Bottlenose Dolphin has been recognised and highlighted as a priority species within the ICPC (Integrated Conservation Planning for Cetaceans), its inclusion underlines its endangered status and the urgent need for targeted conservation efforts. Recognizing the increasing challenges faced by these dolphins and their exceptionally small population size, in January 2023, the Yaqu Pacha Foundation for the Conservation of Latin American Aquatic Mammals and Nuremberg Zoo commissioned a strategic action plan designed to identify research priorities and bolster conservation efforts aimed at preserving Lahille's bottlenose dolphins. The plan's development entailed an exhaustive review of past recommendations stemming from reports of local, regional, and international workshops, projects, and international conservation forums. To further refine the strategy, experts on the species were consulted through specific meetings, focusing on distinct needs within each region. These efforts were organized under five strategic lines: (1) Scientific Research and Conservation, (2) Legislation and Policy, (3) Communication, Outreach and Awareness, (4) Institutional strengthening and Education and (5) Citizen Science. Based on these discussions, researchers developed a comprehensive list of projects aligned with each of the five strategic lines, considering factors such as cost-effectiveness, timelines, budgetary constraints, and potential stakeholder involvement. Ranking these projects was necessary, given the often-limited financial resources available for conservation efforts. The projects were then categorized with varying levels of priority, ranging from 'very high' to 'low', with a total of eight projects identified as 'high priority' out of the 26 deemed essential. By addressing the myriad of challenges Lahille's bottlenose dolphins face, enhancing international cooperation, and engaging key stakeholders, we are confident in our collective ability to safeguard this endangered dolphin species.

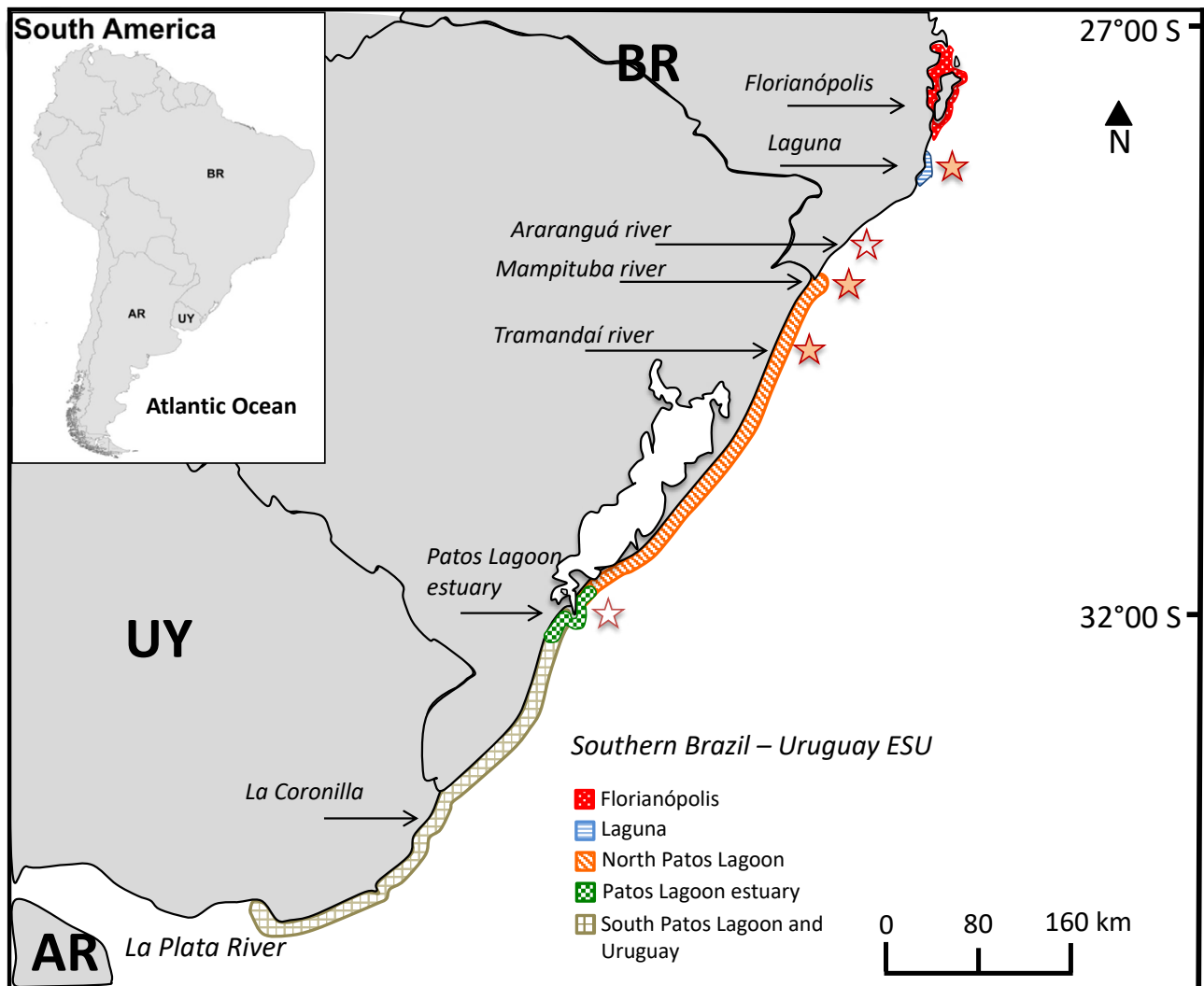
## INTRODUCTION

The western South Atlantic (wSA) hosts two distinct ecotypes of bottlenose dolphins: one predominantly inhabiting offshore regions, and the other constrained to coastal waters, estuaries, and bays. Over the past decade, extensive studies analysing cranial, pos-cranial, external morphology, and genetics, have led to the recognition of the coastal populations (ecotype) as a distinct subspecies by the Taxonomy Committee of the Society for Marine Mammalogy (*T.t. gephyreus* Lahille, 1908)—it is noteworthy that in Brazil, this ecotype is further elevated to species status (*T. gephyreus* Lahille, 1908). Lahille's bottlenose dolphins (LBD) are endemic to the wSA, exhibiting a narrow and fragmented coastal distribution spanning southern Brazil, Uruguay, and Argentina. Based on genetic profiles, two Evolutionarily Significant Units (ESUs) are currently recognized for LBD: the first comprises a unique, small population found along the coastal waters of Central Argentina (BSA) moving along the coast (boundaries not yet defined); the second spans southern Brazil to Uruguay (SBU) and is further subdivided into at least five Management Units (MU) (**Figure 1**).



**Figure 1.** The geographic distribution of Lahille's bottlenose dolphins (brown), indicating the two recognised Evolutionary Significant Units: Southern Brazil and Uruguay (blue), and Bahía San Antonio (green), Argentina. This figure has been adapted from IUCN (International Union for Conservation of Nature): *Tursiops truncatus* ssp. *gephyreus*. The IUCN Red List of Threatened Species. Version 2022-2.

The southern Brazil-Uruguay (SBU) ESU operates as a regional population, where dolphins inhabiting primarily the open move across larger areas, mediating gene flow among localized populations resident near river mouths and estuaries (**Figure 2**).



**Figure 2.** Boundaries of Management Units identified for the Southern Brazil and Uruguay Evolutionary Significant Unit of Lahille's bottlenose dolphins. Coloured stars: active cooperative fishing areas. Blank stars: inactive cooperative fishing areas.

In Southern Brazil, some of these localised dolphin populations exhibit a unique behaviour. For example, a subset of dolphins engages in cooperative fishing with artisanal casting net fishers to catch mullet (**Figure 3**). This remarkable “cooperative fishery” holds profound social, economic, and cultural value for the local coastal communities. Moreover, it has a far-reaching impact on the broader local ecosystem and is recognized as both a cultural and natural heritage in some municipalities in southern Brazil, notably in Laguna and Tramandaí Inlet.

Beyond the limited distribution and extremely low genetic diversity at both mitochondrial and nuclear DNA for LBD, the fragmented populations confront an array of anthropogenic threats. Foremost among these threats is bycatch in gillnet fisheries. However, other factors such as skin diseases, boat collisions, chemical pollutants, and underwater noise also pose significant challenges to dolphins across their entire range. In southern Brazil two estuarine MUs stand out in this regard:

Laguna and Patos Lagoon Estuary. Both units experience high levels of bycatch, and in Laguna, a considerable portion of the population exhibits chronic dermatitis and other skin diseases. Additionally, there is a marked presence of contaminants in the blubber of dolphins from both MUs.



**Figure 3.** The cooperative fishery behaviour of Lahille's bottlenose dolphins is rare around the globe and restricted to specific localities in southern Brazil.

Specifically, the levels of  $\Sigma$ PCB far exceed the established thresholds in the literature concerning PCB toxicity, likely leading to endocrine disruption and physiological effects. At the Mampituba River, the number of dolphins that enter the river and interact with the artisanal fishermen is lower than reported in the past, although the reasons for this decline are not fully known. This unique cooperative foraging relationship between artisanal fishermen and dolphins has indeed disappeared in some localities in southern Brazil, such as Araranguá and Patos Lagoon Estuary. Moreover, the Tramandaí inlet, which connects the ocean to the watershed has been suffering constantly from all kinds of pressure, such as agricultural practices that apply excessive pesticides, untreated sewage discharges, and disorderly urban growth. A construction of a bridge in the canal is projected precisely where the cooperative fishery happens. Within the La Plata River estuary, recent observations have indicated a progressive decline of LBD since 1990, especially in areas around Montevideo, Uruguay, and the Province of Buenos Aires, Argentina, where the species was once abundant. The reasons behind this decline remain poorly understood. In Uruguay, bycatch incidents occur sporadically and are a cause for concern due to the very small population size and an increasing number of dolphins sustaining severe injuries from interactions with fishing activities. Potential threats currently exist for this species on the Uruguayan coast such as a new proposal of a deep-water port around El Palenque (34°32'S, 54°03'W; 34°30'S, 54°01'W) or La Angostura (34°06'S, 53°37'W), both areas located near to two marine protected areas established in

the country. In Argentina, Population Viability Analysis (PVA) simulations suggest a declining trend in the population residing in Bahía San Antonio, which represents one of the southernmost known extents of the species. Further south, in Chubut province, a similar decline has been observed in a coastal population consisting of fewer than 50 individuals. The localized and restricted coastal distribution of LBD leave this species highly vulnerable to increasing human-induced pressures, inbreeding depression, and ultimately extinction. This underscores the pressing need for targeted interventions aimed at ensuring species' future survival.



# BACKGROUND TO EXISTING CONSERVATION EFFORTS

The research and conservation efforts surrounding LBD have been subject of intensive debate in recent years. Starting in the early 2000s, a noticeable increase in the number of incidental captures and strandings of LBD reported in coastal areas raised serious concerns about their conservation. The urgency of this matter became evident during the XIII Meeting of Specialists on Aquatic Mammals of South America, held in Montevideo, Uruguay, in October 2008. Researchers at the conference reached a consensus that the lack of basic scientific information regarding the ecology and threats to LBD was impeding a comprehensive assessment of their conservation status. They also recognized the urgent need to compile information, often restricted to grey literature, and establish research priorities to guide robust data collection, forming the foundation for evidence-based conservation plans.

In response to these needs, a pivotal event took place in 2010: the First Workshop on the Research and Conservation of bottlenose dolphins, which brought together 32 invited researchers from Brazil, Uruguay, and Argentina. Results of this workshop outlined specific work objectives, which included: 1) consolidating existing knowledge about the species; 2) identifying the primary threats to bottlenose dolphins; 3) identifying the most threatened populations; 4) determining research priorities for the species; 5) publishing all compiled information for public access, and 6) articulating multi-institutional research collaborations. Working Groups were designated, each focusing on critical topics such as: 1) distribution and behaviour: occurrence, residency, movements, behaviour, and habitat use; 2) biology and ecology: diet, pathology, and reproduction; 3) vital and demographic parameters: abundance estimates, reproductive rates, age, and growth; 4) stock identification: morphological, geographic, and genetic variation; 5) anthropogenic interactions: fishery, behaviour, tourism, and contamination; 6) ethnoecology. The outcomes of these Working Groups were presented and validated during a plenary session on the final day of the workshop. This event mobilised scientists and ignited institutional collaborations, leading to the initiation of numerous local projects centred focussed on bottlenose dolphins in the ensuing years. In 2016, the Latin American Journal of Aquatic Mammals published a Special Volume (Vol. 11 No. 1-2) dedicated to wSA bottlenose dolphins, stemming from the outcomes of the First Workshop.

As research progressed, a substantial amount of data and information was produced and published. During the XI Biennial Meeting of the Latin American Society of Marine Mammal Specialists (SOLAMAC), held in December 2016 in Valparaíso, Chile, scientists recognised the necessity for a second workshop focused on *Tursiops*, following a seven-year gap since the initial meeting held in Brazil in 2010. In response to these imperative, 60 invited participants from Brazil, Uruguay, and Argentina, attended the “*Second International Workshop on Research and Conservation of Tursiops in the Southwest Atlantic Ocean*”, convened at Cassino Beach, Rio Grande, Brazil, in April 2017 (**Figure 4**). The primary objectives of this workshop were as follows: 1) review the research progress in alignment with the recommendations established by the Working Groups of the 2010 *Tursiops* meeting; 2) review the taxonomy, population structure and conservation status of the recognized Management Units for bottlenose dolphins; 3) discuss and provide recommendations for future

research over the next five years; 4) foster collaborative research initiatives involving multiple institutions aimed at the conservation of bottlenose dolphins in the wSA—this effort is specifically significant in light of the call to recognize *Tursiops gephyreus* as an endemic species in the coastal waters of the wSA. Additionally, given the ongoing global review of bottlenose dolphins' taxonomy by the Small Cetaceans sub-committee of the Scientific Committee of the International Whaling Commission (IWC) in early 2017, the taxonomy of these dolphins emerged as a paramount topic for discussion during the workshop. Dr. John Wang (CetAsia Research Group and Trent University), a renowned cetacean taxonomist with a distinguished international reputation, was invited and attended the workshop as an external expert. His valuable contributions enriched the discussions on a multitude of research topics during the workshop.



**Figure 4.** Pool of experts during the II International Workshop for the Research and Conservation of *Tursiops* in the western South Atlantic, held at Cassino Beach in 2017, southern Brazil.

The involvement of South American researchers in the global review of *Tursiops* taxonomy conducted by the IWC in 2017 shed light on the status of wSA bottlenose dolphins. During this review, compelling evidence was presented and discussed, supporting the recognition of a distinct taxonomic unit for coastal bottlenose dolphins of southern Brazil, Uruguay, and Argentina, specifically referred to as LBD. Following the taxonomic and population structure review, the Small Cetaceans subcommittee of the Scientific Committee consistently addressed the conservation status of LBD. This resulted in the formulation and reiterated dissemination of a series of recommendations aimed at enhancing research and conservation efforts for LBD (**Figure 5**). Simultaneously, while systematic discussions were ongoing during Scientific Committee meetings of the IWC, the conservation and research initiatives concerning LBD continued to advance through other dedicated forums.

In 2019, due to the markedly low abundance, LBD were classified as “vulnerable” in the IUCN Red List assessment. Both Argentina (2019), Brazil (2022) and Uruguay (2022) mirrored this concern by categorizing the species as “endangered” in their respective National Red Lists, aligning with the IUCN Red List Criteria at the regional level. In Brazil, the conservation efforts for LBD took a significant step forward with the enactment of a specific directive (*Portaria 375/2019/MMA/ICMBio*) that established a revised National Action Plan (PAN) for the conservation of marine cetaceans from 2019 to 2024. Notably, it included a comprehensive set of specific actions aimed at safeguarding LBD throughout their Brazilian range. Furthermore, this directive specifically crafted an Action Plan for the state of Santa Catarina in Brazil. This plan was dedicated to the conservation of the LBD population in Laguna. PVA simulations conducted as part of this plan indicated that only a zero-bycatch approach would be sustainable for the long-term viability of the population.



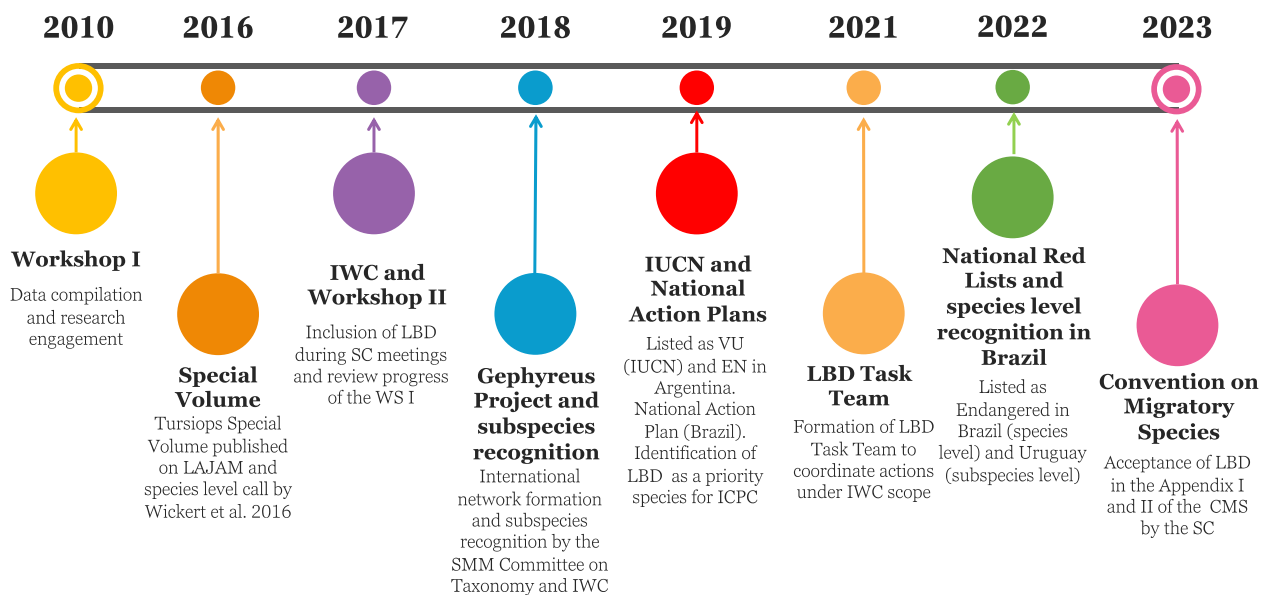
**Figure 5.** Part of the Lahille's bottlenose dolphin pool of experts and national representatives of Brazil during the IWC Scientific Meeting in 2023, Bled, Slovenia.

To address the data gaps and recommendations identified in the above-mentioned forums, a multi-institutional research network was established in late 2018. Its primary objective was to enhance research and conservation efforts on LBD along the coasts of southern Brazil and Uruguay. This initiative, known as the “*Gephyreus Project*”, involved a coordinated, simultaneous photo-identification sampling effort at six locations spanning the distributional range of the species with the aim to understand the population dynamics of Southern-Brazil and Uruguay ESU. Subsequently, in 2021, a “Task Team” was established under the auspices of the IWC to implement specific research initiatives and actions geared towards enhancing the long-term conservation of LBD. This effort involved expanding the sampling coverage initiated by the *Gephyreus Project* to include Argentina. The Task Team is currently engaged in guiding and coordinating research and conservation efforts across the entire species range. This collaborative approach integrates researchers and local communities and encompasses, among other things, full consideration, support, and harmonization with existing agreements, strategies, and activities developed within other forums, as well as ongoing local initiatives.

The Task Team brings together experts from range states and beyond to instigate specific targeted field investigations or conservation efforts, offering guidance, and potentially playing a role in securing suitable financial support for priority activities. This includes the development of an IWC Conservation Management Plan (CMP). In 2023, the results from *Gephyreus Project* revealed connectivity among local populations, including the movement of animals between adjacent sites in the northern distribution and between Brazil and Uruguay. Mark-recapture models were applied

within a Robust Design and Multistate frameworks, utilizing data collected between 2019 and 2022 from five sampled sites in Southern Brazil and Uruguay. The findings indicated low abundance and survival rates for these populations. Predictive modelling through Population Viability Analysis (PVA) under various management scenarios suggested that the current conditions are not sustainable in the long term. It predicted the potential extinction of some local populations and a dramatic reduction in the regional population, highlighting the urgency for revising the risk classification of LBD under the IUCN and National Red Lists. Specific research needs were also indicated to refine population parameters estimates and PVA simulations. More recently, in August 2023, a joint proposal from Argentina, Brazil and Uruguay to list LBD in Appendix I and II of Convention of Migratory Species was accepted by the Scientific Committee. The proposal is now pending final adoption at the COP, scheduled for late 2023 or early 2024.

## Main Milestones for the Conservation of LBD



**Figure 6.** Main achieved milestones for the conservation of Lahille's bottlenose dolphins (LBD) in the last 13 years.

## AIMS

The proposed Strategic Action Plan, commissioned by the Yaqu Pacha Foundation for the Conservation of Aquatic Mammals in January 2023, has the primary objective of identifying research priorities and promoting the conservation of LBD in their entire range.

The Action Plan addresses and identifies two key aspects:

1. The challenges faced by the endangered LBD;
2. The most pressing research needs while outlining strategic measures to ensure the species' survival.

Within the Action Plan, the vital importance of collaborative efforts involving governments, non-governmental organizations, scientists, and concerned citizens to protect this magnificent marine mammal and the fragile ecosystems upon which they depend is highlighted. Specifically, the Action Plan proposes a range of actions aimed at enhancing local research and conservation efforts, raising awareness, capacity building, and securing the necessary financial resources to support these initiatives over the next five years.

## DOCUMENT PREPARATION AND PROCESS

All existing recommendations, research priorities, and actions that directly or indirectly impact LBD were reviewed and compiled in a comprehensive table (see **Annex 1**). These included:

- Scientific Reports from the the International Whaling Commission (2018-2023);
- The Brazilian National Action Plan for Marine Cetaceans (2019-2024);
- Reports stemming from the I and II Tursiops workshop in the Western South Atlantic;
- Final Technical Report of the Gephyreus Project, prepared for Fundação O Boticário de Proteção a Natureza (2023);
- Final Technical Report titled 'Building Bridges to conserve Lahille's bottlenose dolphins', prepared for Whitley Found for Nature (2021-2022);
- The Action Plan dedicated to Laguna Dolphins

The review table included the following key details: target number (i.e. recommendation/ action number), specific region and localized action target areas, strategic categorization (encompassing research and conservation, legislation and policy, education and citizen science and communication and outreach), the area of expertise involved (e.g., population parameters, taxonomy), the source of the recommendation, a description of the recommendation, and its current status (on hold, ongoing, partially completed or completed). In instances where certain actions appeared rather general and not explicitly tailored to LBD, such as some actions listed in National Action Plans, supplementary explanatory notes were incorporated in the description section. These notes aimed to elucidate the link between the proposed action and its potential indirect benefits for LBD conservation and research. In total, the review identified 93 recommendations. Among these, only 31% (n=29) were considered fully or partially implemented. For instance, in cases where a recommendation had been successfully implemented at the local level but not yet extended to the regional context, it was categorized as partially completed. Approximately 33.4% (n=31 recommendations) were still in progress, while the remaining 38% (n=35 recommendations) remained on hold.

Building on this review, the Task Team held a series of meetings aimed at formulating research and conservation initiatives. These meetings included virtual regional gatherings in 2021, which brought together researchers from Southern-Brazil, Uruguay and Argentina, along with an in-person meeting held in Laguna, involving researchers from Southern Brazil and Uruguay (**Figure 7**). The primary objectives of these meetings were to facilitate training, standardizing research methodologies, assessing ongoing research projects within each respective region, engaging in discussions regarding the primary research and conservation objectives for the upcoming years, and revising and updating the new priorities for the Gephyreus network. The topics and actions related to conservation and research requirements, goals and strategies were thoughtfully categorized into five strategic areas:

- Scientific Research and Conservation
- Legislation and Policy
- Communication, Outreach and Awareness
- Institutional strengthening
- Education and Citizen Science



**Figure 7.** Pool of experts working during the Lahille's bottlenose dolphin Workshop, 2021, held in Laguna, southern Brazil.

The workshop resulted in a tabulation of proposed projects, categorized under each of the five strategic lines, aimed at addressing the identified needs and both past and updated recommendations. These proposed projects also took into consideration the optimal cost-benefit approaches and emphasized key details such as the estimated time required, budgetary considerations, and potential stakeholder involvement in each project, as outlined below. All projects were considered for this document, and their hierarchical priority was determined by a panel of experts, considering the urgency of action required, based on the latest available information, as well as the number of targets identified in the existing recommendations listed in **Annex 1**. To denote the varying levels of priority, four distinct categories were employed: very high (red), high (orange), mid (yellow) and low (green).

## ENDORSED PROJECTS TO COVER URGENT NEEDS AND PREVIOUS RECOMMENDATIONS FOR THE CONSERVATION OF LAHILLE'S BOTTLENOSE DOLPHINS

STRATEGIC LINE: Scientific Research & Conservation (SRC)									
SRC#	Project's title	Aims	Actions	Region	Period	Budget	Deliverables	Stakeholders	Priority
SRC#001	Assessing the extinction risk and defining management goals for LBD in southern Brazil and Uruguay	To refine estimation of population parameters and feed a PVA model to estimate extinction risk of LBD under a series of scenarios, considering the effects of bycatch and pollution.	Boat-based surveys for photo-id along 6 sampling sites. Integrated mark-recapture analysis. Review literature. PVA modelling.	southern Brazil and Uruguay	3yrs	€ 20.000 per year	Reports, social medias, scientific publication, trends in abundance, IUCN Risk Assessment	Kaosa, UFSC, FURG, UFRGS, GEMARS, Uergs, UNESC, Yaqu Pacha Uruguay, Univali, ICMBio	Very High
SRC#002	Abundance and connectivity of LBD in two areas of Argentina	To generate new abundance estimation for BSA, the first estimate for Bahía Blanca Estuary and investigate population structuring	Seasonal boat-based surveys for photo-id and biopsy sampling. Mark-recapture and genetic analysis.	Bahía San Antonio and Bahía Blanca	2yrs	€ 15.000 per year	Reports, GIS maps, social medias, scientific publication	CENPAT and Aqua Marina	Very High
SRC#003	Mapping the distribution and hotspots of LBD in Brazil and Uruguay	To evaluate the distribution and density of LBD	Seasonal aerial surveys (n=4) (helicopter).	southern Brazil and Uruguay	2yrs	€ 18.000 per survey	Reports, social medias, scientific publications, GIS maps	Kaosa, UFSC, UDESC, FURG, UFRGS, GEMARS, Uergs, UNESC, Yaqu Pacha Uruguay, Univali, ICMBio	Very High
SRC#004	Investigating the disappearance of LBD in Argentina	Evaluate current occurrence of LBD along the province of Buenos Aires	Seasonal aerial surveys (helicopter) (n=2).	Province of Buenos Aires	1yr	€ 15.000 per survey	Reports, social medias, GIS maps	CENPAT, GEMARS	Very High



ENDORSED PROJECTS TO COVER URGENT NEEDS AND PREVIOUS RECOMMENDATIONS FOR THE CONSERVATION OF LAHILLE'S BOTTLENOSE DOLPHINS

SRC#005	In-depth Health assessment	To investigate health status of two resident populations of LBD	Capture-release expedition (n=2), tissue samples collection, processing samples, lab work and data analysis.	Patos Lagoon and Laguna	2yrs	€ 55.000 per expedition	Project plan, reports, scientific publications public engagement, outreach materials	UFSC, NMMF, Kaosa, UDESC, FURG	Very High
SRC#006	Health risk assessment of estuarine resident populations of the endangered LBD	To predict how the exposure to POPs may impact survival and reproduction	Biopsy sampling; Analysis of POPs, prevalence of skin diseases, DNA damage and water quality for detection of pathogenic organisms in the context of One Health Assessment	southern Brazil and Uruguay	2yrs	€30.000 per year	Reports, social medias, scientific publication	Kaosa, UFSC, UERJ, Uergs, GEMARS, UFRGS	High
SRC#007	Monitoring artisanal fishing dynamics and associated risk for LBD conservation	To understand the artisanal fisheries dynamics and how it relates to bycatch risk	Interviews; fleet characterization, GPS tracking of artisanal fishery activities.	southern Brazil and Uruguay	2yrs	€ 15.000 per year	Report, GIS maps	Kaosa, UFSC, UDESC, FURG, UFRGS, GEMARS, Uergs, UNESC	High
SRC#008	Assessing effectiveness of cost-effective bycatch mitigation methods for LBD	To evaluate the effectiveness of low-cost mitigation methods to reduce LBD bycatch in small-scale fisheries	Trial cost-effective mitigation methods (e.g., upcycled air-filled plastic bottles), evaluate the effects on target catch, use passive acoustic monitoring to assess LBD occurrence and behaviour near fishing gear, and test simple remote electronic technologies (e.g., GPS logger).	Southern Brazil and Uruguay	4 yrs	€ 7.500 per year per site	Reports, social medias, scientific publication, trends in bycatch, BMI/ IWC reports	Kaosa, UFSC, UDESC, FURG, UFRGS, GEMARS, Uergs, UNESC, Yaqu Pacha Uruguay, Univali, ICMBio	High
SRC#009	Cooperative fishing between artisanal fishermen and LBD: investigating and protecting this cultural heritage	To investigate historical and current aspects of this unique cooperative fishing and promote the protection and valorisation of this cultural heritage	Seasonal land-surveys for photo-id, behaviour studies and interviews with artisanal fishermen, in addition to interlocution with local stakeholders	southern Brazil	3yrs	€ 3.500 per year	Reports, social medias, scientific publications and propositions of local laws and heritage recognitions.	Kaosa, UFSC, UDESC, FURG, UFRGS, GEMARS, Uergs, UNESC,	High

ENDORSED PROJECTS TO COVER URGENT NEEDS AND PREVIOUS RECOMMENDATIONS FOR THE CONSERVATION OF LAHILLE'S BOTTLENOSE DOLPHINS

SRC#010	LBD satellite tagging	To investigate fine scale movement, habitat use and connectivity of open coastal LBD	Field surveys for tagging coastal dolphins using crossbow. Estimated number of tags: 10 for SBU and 5 for BSA.	southern Brazil, Uruguay and Argentina	2yrs	€ 41.000 per year	Reports, social medias, scientific publications, GIS maps	Kaosa, UFSC, FURG, UFRGS, GEMARS, Yaqu Pacha Uruguay, Univali, ICMBio	Mid
SRC#011	LBD mortality patterns and trends along SBU	Investigate mortality patterns, bycatch rates and trends in mortality	Capacity building for data collection; monthly beach surveys; data compilation; GLGs age estimation; data analysis.	southern Brazil and Uruguay	3yrs	€ 6.000 per year	Reports, scientific publication, GIS maps	Kaosa, UFSC, UDESC, FURG, UFRGS, GEMARS, Uergs, UNESC, Yaqu Pacha Uruguay, Univali, ICMBio	Mid
SRC#012	Genetics of LBD	To estimate genetic diversity, re-evaluate population structure, geneflow and boundaries of LBD Management Units.	Boat-based surveys for biopsy sampling in areas of low sample size. Collate samples collected from living animals and strandings. DNA extraction, sexing, mtDNA sequencing and nDNA genotyping. Data analysis.	southern Brazil, Uruguay and Argentina	2yrs	€ 5.000 per year	Report, maps (Management Units boundaries), genetic database.	Kaosa, FURG, GEMARS, Uergs, Unisinos, Yaqu Pacha Uruguay, CENPAT, Aqua Marina, Mundo Marino	Mid
SRC#013	Soundscape ecology at LBD hotspots	To characterise the soundscape at the main utilization areas of LBD; compare LBD vocalizations among the areas	Passive acoustic monitoring using SoundTraps or equivalent	southern Brazil	4 years	€16.000 per year	Reports, Social medias, Scientific Publication, Presentation in conferences	FURG, UFSC, UFRGS, Gemars, Univali, Uruguay	Low
SRC#014	Monitoring stress levels in LBD	To evaluate stress levels using hormones (e.g., cortisol) and their relationship with disturbance	Biopsy sampling; Lab. Work; data Analysis.	southern Brazil	2yrs	€ 4.000 per year	Reports, Social medias, Scientific Publication, Presentation in conferences	FURG, UFSC, UFRGS	Low

STRATEGIC LINE: Institutional Strengthening (INS)									
INS#	Project's title	Aims	Actions	Region	Period	Budget	Deliverables	Stakeholders	Priority
INS#001	Gephyreus Project Coordination	To coordinate the Gephyreus Project, facilitating data collection in multiple sampling sites, organization, and analysis. Interact with IWC Task Team and other conservation initiatives.	Contract a scientific coordinator to run Gephyreus Project	southern Brazil, Uruguay, and Argentina	5yrs	€ 12.000 per year	Data analysis, reports, database organization, fund raising prospect, workshops coordination	Kaosa	Very High
INS#002	Conservation Management Plan	To conduct a workshop to elaborate the LBD CMP proposal for IWC	Define 30 attendees; logistics; Three-days WS.	southern Brazil, Uruguay, and Argentina	3mo	€ 14.000	CMP proposal for IWC, Social and traditional medias, Presentation at IWC	Kaosa, Yaqu Pacha Uruguay	High
INS#002	Influencing decision-makers for the conservation of LBD	To provide information for decision makers to promote legislation and policy for the conservation of LBD	Attend national and international conservation meetings and forums (e.g., IWC, CMS...)	southern Brazil, Uruguay, and Argentina	5 yrs	€ 3.000 per year	Reports	UFSC, FURG, Kaosa, Yaqu Pacha Uruguay, CENPAT, AquaMarina	High
INS#002	Capacity building to support long-term projects and conservation of LBD	To train local students for leadership and succession in LBD conservation projects	Workshops (n=2) for students: leadership, fundraising, field surveys and analysis, reporting	southern Brazil, Uruguay, and Argentina	2yrs	€ 5.000 per year	Reports, Social medias, Certificates	Kaosa, FURG, Yaqu Pacha Uruguay, UFSC	Mid
INS#002	Developing a web GIS database	To develop an integrated database for Gephyreus project	Data compilation and organization, scope, individual history track, GIS, database development	southern Brazil, Uruguay, and Argentina	1.5yr	€ 7.000	Report, WebGIS database	Univali	Low

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STRATEGIC LINE: Education and Citizen Science (ECS)									
ECS#	Project's title	Aims	Actions	Region	Period	Budget	Deliverables	Stakeholders	Priority
ECS#001	Using citizen science to promote LBD conservation in partnership with local communities	Increase social engagement on the conservation process through a citizen science approach and awareness campaigns	Refine the existent mobile app to be used in citizen science, training sessions for locals to collect data on dolphins and illegal fisheries	southern Brazil, Uruguay and Argentina	2yrs	€ 8.000 per year	Reports, Mobile app, social medias, Web Citizen Science database	Kaosa, Yaqu Pacha Uruguay, UFRGS, GEMARS, Uergs, UNESCO, Aqua Marina, CENPAT	Very High
ECS#001	Blue School	Environmental Education for local fishery communities; Human dimension in conservation of LBD and its ecosystem.	Capacity building on marine science and conservation for teachers; short course for young's; Didactics material for teachers; field activities and artistic-educational activities	southern Brazil and Uruguay	2yrs	€ 11.000 per year	Reports, Social and traditional medias, Certificates	Kaosa, FURG, UFRGS, GEMARS, Uergs, UNESCO, UFSC, Yaqu Pacha Uruguay	Very High
ECS#001	A social approach to investigate the occurrence of LBD in northern Argentina and characterize local fisheries	To investigate the current occurrence and historic use of LBD in San Clemente del Tuyú and understand local fisheries operations in coastal waters	Interviews with local fishers and educational campaigns	Province of Buenos Aires, Argentina	1yr	€ 7.000	Report, social media	Mundo Marino, Aqua Marina	High

STRATEGIC LINE: Communication, Outreach, and Awareness (COA)									
COA#	Project's title	Aims	Actions	Region	Period	Budget	Deliverables	Stakeholders	Priority
COA#001	LBD related website for raise awareness and public engagement	To create a website to promote LBD conservation efforts	Define content; personalize domain name; allow for donations and to connect with partners;	southern Brazil, Uruguay, and Argentina	8mo	€ 6.000	Social media profile, website	Univali, UFSC, Gemars, Uergs, UNESC, UFRGS, Kaosa, FURG, Yaqu Pacha Uruguay, CENPAT, Aqua Marina	Very High
COA#002	Raising awareness for the conservation of LBD	To raise awareness for the conservation of LBD and their habitat	Develop short videos (n=6), feed and boost social medias. Develop products to be handed out during courses, workshops, and meetings (e.g., booklet, cups) and delivery to conservation influencers and decision makers	southern Brazil, Uruguay, and Argentina	2yrs	€ 6.000 per year	Report, Social and traditional medias	Univali, UFSC, Gemars, Uergs, UNESC, UFRGS, Kaosa, FURG, Yaqu Pacha Uruguay, CENPAT, Aqua Marina	High
COA#003	Gephyreus book	Design a book as a lasting outreach source	Scope definition; edition; print; distribution to decision makers and conservation influencers. Printed copies: 1000 (21x26cm)	southern Brazil, Uruguay, and Argentina	1yr	€ 30.000	Report, Social and traditional medias, 1000 books	Univali, UFSC, Gemars, Uergs, UNESC, UFRGS, Kaosa, FURG, Yaqu Pacha Uruguay, CENPAT, Aqua Marina	Low

ENDORSED PROJECTS TO COVER URGENT NEEDS AND PREVIOUS RECOMMENDATIONS FOR THE CONSERVATION OF LAHILLE'S BOTTLENOSE DOLPHINS

STRATEGIC LINE: Legislation and Policy (LEP)									
LEP#	Project's title	Aims	Actions	Region	Period	Budget	Deliverables	Stakeholders	Priority
LEP#001	Capacity building to provide support for combat illegal fisheries	To provide training sessions for inspectors to combat illegal fisheries in areas of conflict between fisheries and LBD	Regular workshops with inspectors and decision makers	Patos Lagoon and Laguna	3yrs	€ 4.000 per year	Reports, Social medias, certificates	Kaosa and UFSC UFRGS, UNESCO	Very High
LEP#002	Protected areas for the conservation of LBD and their habitat	To elaborate a proposal for the creation of protected areas for LBD in southern Brazil and Uruguay	Review literature, meetings with peers, define criteria and writing. Workshop with decision-makers. Workshop with local communities.	southern Brazil and Uruguay	2yrs	€ 5.000 per year	Policy document	Kaosa, UFSC, FURG, UFRGS, GEMARS, Yaqu Pacha Uruguay, Univali, ICMBio	High
LEP#003	Promote ecotourism activities with LBD	To propose a regulation of ecotourism activities focused on LBD watching	Identify local, regional, and national laws regarding dolphin watching and companies operating or with potential to operate LBD watching. Promote community-based ecotourism and capacity building for locals. Propose a specific regulation for LBD watching.	southern Brazil, Uruguay, and Argentina	1.5yrs	€ 7.000	Report and regulation proposals	UFRGS, Yaqu Pacha Uruguay, ICMBio	Low

## – ANNEX I –

# COLLATED RECOMMENDATIONS FOR LAHILLE'S BOTTLENOSE DOLPHIN: THE BASIS FOR PROJECT DESIGNS

STRATEGIC LINE: Research & Conservation					
Target#	Region	Area of Expertise	Source	Action	Status
1	wSA	Taxonomy	Ott et al. 2016	<i>Increase and refine the studies related to taxonomy and stock discreteness using different methodologies (e.g., genetics, morphology, parasites, contaminant loads, stable isotopes) along the entire range of the genus Tursiops in the SWAO, including specimens from oceanic waters;</i>	COMPLETED
2	wSA	Taxonomy	Ott et al. 2016	<i>Conduct collaborative studies on the coloration patterns of bottlenose dolphins based on the analysis of pictures taken from sighted, stranded, or incidentally caught animals in different areas of the SWAO</i>	PARTIAL
3	wSA	Demography	Ott et al. 2016	<i>Estimate population parameters of bottlenose dolphin along its entire distribution in the SWAO.</i>	PARTIAL
4	wSA	Taxonomy	Ott et al. 2016	<i>A revised diagnosis and formal redescription of <i>T. geophyreus</i> Lahille, 1908, is necessary before the recognition of its validity. In addition, in order to clarify the taxonomic status of the bottlenose dolphins of the 'northern form' (sensu Barreto, 2000), we recommend the examination of the type specimens of <i>T. truncatus</i> (Montagu, 1821) and <i>T. compressicauda</i> (Lesson, 1828)</i>	COMPLETED
5	wSA	Taxonomy	Ott et al. 2016	<i>The southern and northern forms of <i>T. truncatus</i> in the SWAO (sensu Barreto, 2000) should be considered as distinct units for management purposes. This distinctiveness should be considered in the future evaluations of the threatened status of the bottlenose dolphins in Brazilian waters</i>	COMPLETED
6	wSA	Habitat use/ Distribution	Lodi et al. 2016	<i>To stimulate systematic studies along the coastal and oceanic regions of the SWAO, aiming to determine and delimit the distribution of the species, especially regarding the oceanic and coastal populations along northern and north-eastern Brazilian coast;</i>	ONHOLD
7	wSA	Demography	Lodi et al. 2016	<i>To monitor the resident and seasonally resident populations, particularly in environments with strong anthropogenic influences.</i>	IN PROGRESS
11	N and NE	Habitat use/ Distribution	Lodi et al. 2016	<i>Promote systematic studies of the species in the north and north-eastern regions of Brazil and increase the survey effort in the offshore region in order to fulfil the knowledge gap in those areas.</i>	ONHOLD
12	wSA	Habitat use/ Distribution	Laporta et al. 2016a	<i>Improve habitat use characterization in regions where resident, partially and seasonally resident populations exist.</i>	PARTIAL

13	wSA	Habitat use/ Distribution	Laporta et al. 2016a	<i>In-depth studies of the species habitat use patterns in relation to prey distribution are strongly encouraged as this information is essential in order to identify priority areas for conservation purposes.</i>	PARTIAL
14	wSA	Pop. Structure	Laporta et al. 2016a	<i>Intensify the studies of individual identification and promote a systematic comparison between catalogues of the different regions to further investigate the movement patterns within SWAO.</i>	COMPLETED
15	wSA	Pop. Structure	Laporta et al. 2016b	<i>Further effort on individual and stock identification, as well as stock structure in coastal areas and oceanic islands is encouraged in order to determine the degree of exchange between these regions and management units.</i>	IN PROGRESS
16	wSA	Demography	Laporta et al. 2016b	<i>Increase effort to collect data (body length, growth, age, feeding ecology, etc.) from areas such as northern Brazil, Uruguay and Argentina, where there is not sufficient biological data available</i>	IN PROGRESS
17	wSA	Demography	Laporta et al. 2016b	<i>Efforts should be made to investigate sex-specific growth patterns, since there is evidence of sexual dimorphism in this species. The use of analysis allowing modeling multiple growth phases should be preferred over single-pulse growth models</i>	COMPLETED
18	wSA	Demography	Laporta et al. 2016b	<i>The collection of basic biometric data (especially corporal and cranial measurements) from incidentally caught and/or stranded dolphins in a standardized way. Sex of dolphins should be identified by external and internal examination when possible. For decomposed specimens the sex could be identified using genetic analyses of tissue samples</i>	IN PROGRESS
19	wSA	Diet	Laporta et al. 2016b	<i>More studies should be conducted with free-ranging animals to infer trophic relationships and diet composition from tissue samples (stable isotopes, fatty acids) throughout the range of species distribution. In resident populations, it may be useful to consider biopsy sampling of individuals during different times of the year to evaluate potential variation in diet composition and trophic relationships according to changes in the environment</i>	IN PROGRESS
20	SBr	Health	Laporta et al. 2016b	<i>Conduct specific histological studies for those bottlenose dolphin populations affected by LLD in southern Brazil and evaluate the water quality of their habitat. Long- term monitoring is highly recommended in those populations where cases of LLD have been reported, especially in Laguna bottlenose dolphins, as well as in neighbouring populations such as Baía Norte, Tramandaí and Mampituba rivers, southern Brazil.</i>	IN PROGRESS
21	wSA	Demography	Fruet et al. 2016a	<i>Estimate the age and determine the sex from bottlenose dolphins' teeth deposited in scientific collections along the SWAO. Such effort is critical to allow a more robust analysis that would help to understand the mortality patterns of bottlenose dolphins in the SWAO.</i>	PARTIAL
22	wSA	Demography	Fruet et al. 2016a	<i>From thus aged animals, to use adequate models to reliably estimate the mean life span of bottlenose dolphins</i>	PARTIAL
23	wSA	Demography	Fruet et al. 2016a	<i>Organize and analyze current photo-identification catalogues in areas where population parameters are lacking such as in Norte Bay and adjacent coastal waters (SC), open coastal areas of RS (southern Brazil) and Argentina</i>	COMPLETED



24	wSA	Demography	Fruet et al. 2016a	<i>Estimate reproductive data from populations where long-term photo-identification data are available, as well as from stranded carcasses. Special attention should be given to estimate the age of attainment of sexual maturity or age of first reproduction (from photo-identification data)</i>	COMPLETED
25	wSA	Demography	Fruet et al. 2016a	<i>Estimate sex-specific adult survival and abundance to infer on population trends. Specifically, for those locally adapted populations where long-term mark-recapture data are accessible, we suggest the use of open-population or robust- design models to estimate both parameters. On the other hand, for populations inhabiting large areas, like the open coast, where individuals presumably have greater home ranges (and recapture rate is low), line-transect and distance sampling may be more feasible to estimate abundance. Simultaneous surveys could be conducted to cover larger areas</i>	COMPLETED
26	wSA	Demography	Fruet et al. 2016a	<i>Estimate population trends for populations where long-term data are available. Although linear regression and statistical power analysis are easily accessible, we strongly recommend the use of a Bayesian approach to conduct such analysis</i>	COMPLETED
27	wSA	Fisheries	Fruet et al. 2016a	<i>The implementation of an integrated systematic monitoring program of the main artisanal fishing fleets operating in coastal waters of southern Brazil, Uruguay and Argentina is highly recommended since the presence of coastal bottlenose dolphins is common in these waters. This program should focus on obtaining standard information such as: current fleet size, preferred fishing areas, main target species, fishery characteristics (net type, mesh and size), fishery effort, numbers of incidental captures of cetaceans and other marine mammals. This information could be obtained in partnership with stakeholders through local knowledge in addition to studies of the fisheries carried out by researchers</i>	PARTIAL
28	wSA	Health	Fruet et al. 2016a	<i>To conduct studies to investigate levels of micropollutants in bottlenose dolphins from the SWAO, taking into account the effects of ontogeny and life history parameters. It is suggested that the use of biopsy sampling from bottlenose dolphins to obtain tissue samples may be more effective. Also, it is recommended to perform studies regarding pollutant- pathology relationships through biomarker analyses</i>	IN PROGRESS
29	wSA	Health	Fruet et al. 2016a	<i>To conduct studies aimed at estimating the rate of injuries on bottlenose dolphins caused by fishery interaction and boat strikes. This information could be accessed through analysis of the current available photo-identification databases from different regions</i>	ONHOLD
31	wSA	Ethnobiology	Zappes et al. 2016	<i>To stimulate ethnobiological research on the bottlenose dolphin</i>	ONHOLD
36	wSA	Behaviour	Domit et al. 2016	<i>It is strongly recommended for students and researchers interested in behavior to find a suitable method in the available literature (e.g., Cetacean Societies - Mann, 1999b; and Handbook of Ethological Methods - Lehner, 1996)</i>	NA

37	wSA	Behaviour	Domit et al. 2016	<i>Behavioural data (events and states) should be described from bottlenose dolphins in different areas using standard definitions, implementing focal-sampling protocols (group and/or individuals) to evaluate: (i) behavioural patterns and budgets and their variations in response to different environmental parameters, and so facilitate analysis about habitat use; and (ii) spatial-temporal behavioural changes and their relationship with anthropogenic activities. Behavioural data should be collected following the sampling methods defined by Shane (1990b) and Mann (1999a, b). In addition, behavioural events should be sampled to assess the influences of extrinsic factors on their frequency and context, and to evaluate potential effects of anthropogenic activities;</i>	PARTIAL
38	wSA	Behaviour	Domit et al. 2016	<i>Evaluate association patterns of individuals, including sex ratios and age classes (adults, juveniles, and calves) per group and populations, and also any spatial-temporal variability in social structures and dynamics;</i>	COMPLETED
39	wSA	Behaviour	Domit et al. 2016	<i>Expand acoustic data sampling from different populations of bottlenose dolphins using standardized definitions (modulation patterns and spectral and temporal parameters) and appropriate equipment to describe the bioacoustics physical parameters and environmental noises;</i>	IN PROGRESS
41	SBr and Ar	Habitat use/ Distribution	II Tursiops WS – Fruet et al. 2017	<i>To conduct additional boat-based survey data in areas north and south of the proposed distributional boundaries is necessary to explicitly test for the proposed restricted distribution of the “gephyreus-type”;</i>	ONHOLD
42	wSA	Taxonomy	II Tursiops WS – Fruet et al. 2017	<i>Investigate congruence between morphological, genetics and ecology of bottlenose dolphin ecotypes;</i>	COMPLETED
43	Ar	Pop. Structure	II Tursiops WS – Fruet et al. 2017	<i>To maintain a systematic data collection and expand geographically the photo-id program on bottlenose dolphins in Bahía San Antonio, Argentina. It is also strongly recommended to collect biopsy samples from individuals ranging further north and south BSA to improve resolution on population structure and help to elucidate ESUs classification;</i>	ONHOLD
44	SBr, Uy and Ar	Conservation	II Tursiops WS – Fruet et al. 2017	<i>To estimate total abundance separately for each “gephyreus-type” ESU and conduct an in-depth assessment on their conservation status using IUCN RED LIST criteria. For abundance estimates a multi-state mark-recapture analysis is recommended, as other parameters can also be estimated using this approach. However, as it costs much more and is time consuming, aerial surveys can be used as an alternative;</i>	IN PROGRESS
45	SBr	Demography	II Tursiops WS – Fruet et al. 2017	<i>To estimate age and sex-specific survival rates from populations where long-term photo-id data is available (i.e., Laguna, Florianópolis, Southern Patos Lagoon-Uruguay MUs);</i>	COMPLETED
46	SBr, Uy and Ar	Demography	II Tursiops WS – Fruet et al. 2017	<i>To use a series of available datasets to investigate mortality patterns and estimate bycatch rates;</i>	ONHOLD
47	wSA	Taxonomy	II Tursiops WS – Fruet et al. 2017	<i>Studies should provide, whenever possible, morphotype-specific biological and ecological data (“truncatus-type” and “gephyreus-type”). This is especially important regarding studies using stranded carcasses as a source of data (e.g., studies estimating mortality/survival and bycatch).</i>	COMPLETED

48	wSA	Health	II Tursiops WS – Fruet et al. 2017	<i>To design a health dolphin assessment program aiming to investigate potential differences between areas with high and low incidence of individuals with skin lesions</i>	ONHOLD
49	wSA	Noise	Fruet et al. 2017	<i>To stimulate a research program to study the effects of noise in coastal populations, especially those exposed to intense human activities.</i>	IN PROGRESS
50	N and NE	Habitat use/ Distribution	II Tursiops WS – Fruet et al. 2017	<i>Increase efforts to collect data on sightings and strandings on the north-eastern and northern Brazil that remains little known</i>	ONHOLD
51	wSA	Conservation	SC/66b-IWC	<i>An updated assessment of population status of the Argentine population (BSA-ESU) of this subspecies</i>	ONHOLD
53	SBr, Uy and Ar	Demography	SC67b-IWC	<i>Continued monitoring and photo-identification work on the populations throughout the subspecies' range to refine survival estimates and to assess trends in abundance and the prevalence and aetiology of the chronic skin infections</i>	IN PROGRESS
54	wSA	Conservation	SC67b-IWC	<i>That the conservation status of the subspecies be prioritized for assessment in the future</i>	ONHOLD
55	wSA	Demography	SC/68B/SM/11	<i>Continue with coordinated sampling effort in southern Brazil and Uruguay population (or ESU) to estimate its total abundance, understand movement patterns of individuals between areas, and estimate population parameters for the respective Management Units;</i>	COMPLETED
58	Ar	Demography	SC/68B/SM/11	<i>Urgent need retaken dedicated research efforts in larger Argentina (especially province of Rio Negro);</i>	ONHOLD
62	wSA	Health	Action 3.9 National Action Plan (Br)	<i>Develop and implement a health monitoring program for marine cetacean populations</i>	ONHOLD
63	wSA	Health	Action 3.11 National Action Plan (Br)	<i>Identify and evaluate pollutant biomarkers of exposure and effect in marine cetaceans</i>	IN PROGRESS
64	wSA	Health	Action 3.13 National Action Plan (Br)	<i>Monitor the prevalence of skin lesions that may indicate the health status of individuals, as well as their diagnosis</i>	ONHOLD
65	wSA	Health	Action 5.2 National Action Plan (Br)	<i>Identify and quantify pollutant compounds emerging in the National Action Plan target species. Interface: T. geophyreus is a target species.</i>	IN PROGRESS
67	wSA	Demography	Action 8.12 National Action Plan (Br)	<i>Expand knowledge on population parameters of S. guianensis, T. geophyreus and Eubalaena australis that are needed to allow a robust assessment of their conservation status</i>	IN PROGRESS

68	wSA	Demography	Action 9.3 National Action Plan (Br)	<i>Create and ensure the continuity of long-term research programs, focusing on the effects of climate change on marine cetaceans. Interface: The longest running monitoring projects with systematic data collection in Brazil are focused in <i>Tursiops gephyreus</i></i>	ONHOLD
71	Laguna	Fisheries	Action 1.3 State Action Plan	<i>Carry out a diagnosis of gillnet fishing and identify the actors involved.</i>	IN PROGRESS
72	Laguna	Bycatch	Action 1.4 State Action Plan	<i>Estimate the levels of LBD bycatch in gillnets and its space-time distribution.</i>	COMPLETED
76	Laguna	Noise	Action 2.4 State Action Plan	<i>Carry out a space-time assessment of the underwater noise present in the dolphin's home range in Laguna and its potential impacts</i>	IN PROGRESS
78	Laguna	Demography	Action 3.1 State Action Plan	<i>Monitor the population parameters of dolphins</i>	COMPLETED
79	Laguna	Habitat use/ Distribution	Action 3.2 State Action Plan	<i>Evaluate the space-time distribution of dolphins</i>	COMPLETED
80	Laguna	Health	Action 3.3 State Action Plan	<i>Develop a project to seek funding to develop tympanic microfissure analysis using tomography</i>	ONHOLD
81	Laguna	Health	Action 3.4 State Action Plan	<i>To assess the prevalence of skin diseases in the dolphin population</i>	IN PROGRESS
82	Laguna	Health	Action 3.5 State Action Plan	<i>Monitor strandings, assess the cause of death and detect emerging diseases in dolphins</i>	IN PROGRESS
83	Laguna	Health	Action 3.6 State Action Plan	<i>Quantify and monitor concentrations of pollutants (POPs, trace elements, PBDEs) and their adverse effects on the health of the dolphins</i>	IN PROGRESS
84	Laguna	Demography	Action 3.7 State Action Plan	<i>Develop a project to individually identify dead dolphins through genetic analysis</i>	ONHOLD

85	Laguna	Health	Action 4.1 State Action Plan	<i>Using an aquatic drone to investigate the disposal of automotive batteries as a source of lead in the Laguna Estuarine System</i>	ONHOLD
86	Laguna	Health	Action 4.2 State Action Plan	<i>Establish partnership for the development of water quality monitoring</i>	IN PROGRESS
88	Laguna	Health	Action 4.4 State Action Plan	<i>Assess levels of contaminants in the environment - different trophic levels and sediment matrix - (hydrocarbons, metals) and their biochemical and molecular responses (biomarkers) in organisms</i>	IN PROGRESS

STRATEGIC LINE: Communication, Outreach and Awareness					
Target#	Where	Area of Expertise	Source	Action	Status
90	Laguna	Awareness	Action 5.2 State Action Plan	Include the dolphin theme in the IMA's environmental education actions, and in the preparation of materials	COMPLETED
91	Laguna	Awareness	Action 5.3 State Action Plan	Elaborate strategies to raise awareness of gillnet fishers mapped on action 1.3	COMPLETED
93	Laguna	Awareness	Action 5.5 State Action Plan	Develop a communication strategy to publicize the life of dolphins and their interaction with artisanal fishermen	COMPLETED
94	Laguna	Awareness	Action 5.6 State Action Plan	Elaborate a book on the life of dolphins and their interaction with artisanal fishermen	IN PROGRESS
95	Laguna	Awareness	Action 5.7 State Action Plan	Develop the dolphin as a flagship species for the Lagoon Complex	IN PROGRESS

STRATEGIC LINE: Legislation and Policy					
Target#	Where	Area of Expertise	Source	Action	Status
8	wSA	Regulation	Lodi et al. 2016	<i>Compile available information regarding the species occurrence inside existing Marine Protected Areas (MPA) to implement and/or reinforce conservation measures as part of the MPAs' management plans;</i>	ONHOLD
9	wSA	Regulation	Lodi et al. 2016	<i>Develop zoning plans in areas where resident and seasonally resident populations are known to occur, in order to mitigate the effects of anthropogenic activities;</i>	ONHOLD
30	wSA	Regulation	Fruet et al. 2016b	<i>To elaborate regulations for tourism activities on bottlenose dolphins along coastal areas in the SWAO. This could be based on the best-documented studies, such as Shark Bay, Australia (Bejder et al., 2006) and Fiordland, New Zealand (Lusseau et al., 2006). This precautionary approach should be sustained until the effects of tourism and recreational boat traffic have been properly measured</i>	IN PROGRESS
40	wSA	Regulation	Domit et al. 2016	<i>Combine different sources of information from behaviour, bioacoustics, genetics and social organization to determine priority areas for species conservation (foraging, breeding and care of calf areas) and ultimately, manage impacting anthropogenic activities.</i>	ONHOLD
52	SC and RS	Enforcement	SC67b-IWC	<i>immediate action to reduce the level of bycatch in the Southern Brazil MU's</i>	IN PROGRESS
56	Patos Lagoon Estuary	Enforcement	SC/68B/SM/11	<i>Intensify enforcement against illegal fishing in protected areas in Laguna and Patos Lagoon Estuary, southern Brazil, in order to reduce incidental catches;</i>	IN PROGRESS
57	Patos Lagoon Estuary	Regulation	SC/68B/SM/11	<i>Include a ban on the use of setnets and beach seine along the bottlenose dolphin protection area in the Patos Lagoon Estuary and surroundings (Article 8 norm 12/2012);</i>	ONHOLD
59	Patos Lagoon Estuary	Regulation	Action 1.8 National Action Plan (Br)	<i>Evaluate the effectiveness of Normative Instruction INI/MMA 12/2012 for the reduction of bycatch. Interface: Article 8 defines an exclusion fishery zone within Patos Lagoon Estuary and surrounding coastal areas, where there is the largest population of the species and the highest bycatch numbers reported</i>	IN PROGRESS
60	Patos Lagoon Estuary and Laguna	Regulation	Action 1.11 National Action Plan (Br)	<i>Propose the inclusion of specific fisheries control and inspection operations in critical areas and periods of incidental capture of S. guianensis and T. gephyreus, integrating different governmental spheres. Interface: enforcement of the Article 8 of the INI 12/2012 norm in the Patos Lagoon Estuary and surrounding coastal areas. In addition, it should reduce the bycatch in Laguna population</i>	ONHOLD
61	wSA	Regulation	Action 1.15 National Action Plan (Br)	<i>Propose local fisheries regulation in areas of occurrence of S. guianensis and T. gephyreus. Interface: Expansion of regulation for coastal areas other than Patos Lagoon Estuary and Laguna</i>	ONHOLD

66	Patos Lagoon Estuary	Regulation	Action 6.6 National Action Plan (Br)	<i>Articulate with the competent bodies the definition of routes and standardization of vessel traffic in the priority areas of the National Action Plan. Interface: Patos Lagoon was defined as one priority area</i>	ONHOLD
69	Laguna	Enforcement	Action 1.1 State Action Plan	<i>Project writing to apply for funding (FRBL, SDE Funds, MPF, MPE and others) in order to obtain and maintain boats for inspection in the Lagoon</i>	ONHOLD
70	Laguna	Enforcement	Action 1.2 State Action Plan	<i>Elaborate an annual and permanent schedule for the inspection of gillnet fishing.</i>	COMPLETED
73	Laguna	Enforcement	Action 2.1 State Action Plan (Laguna)	<i>Develop a project to seek funding for the acquisition of speed cameras for inspection of vessels</i>	IN PROGRESS
74	Laguna	Regulation	Action 2.2 State Action Plan	<i>Articulate with the Brazilian Navy the inclusion of LBD theme in capacity building for permit issuing</i>	ONHOLD
75	Laguna	Regulation	Action 2.3 State Action Plan	<i>Elaboration of the Waterway Traffic Management Plan for the Lagoon Complex</i>	IN PROGRESS
77	Laguna	Regulation	Action 2.5 State Action Plan	<i>Propose a rule within the scope of environmental licensing that includes analysis of sound impacts on the dolphin population</i>	ONHOLD
87	Laguna	Regulation	Action 4.3 State Action Plan	<i>Propose a rule within the scope of environmental licensing to consider potential impacts of infrastructure projects on LBD</i>	ONHOLD
92	Laguna	Regulation	Action 5.4 State Action Plan	<i>Monitor the process of recognition of cooperative fishing as Intangible Cultural Heritage</i>	IN PROGRESS



STRATEGIC LINE: Education and Citizen Science					
Target#	Where	Area of Expertise	Source	Action	Status
32	wSA	Capacity Building	Zappes et al. 2016	To develop courses and train members of coastal communities in how to deal with dolphin entanglement in fishing nets	ONHOLD
33	Patos Lagoon and Laguna	Awareness	Zappes et al. 2016	To plan and implement educational campaigns for coastal communities related to bycatch of bottlenose dolphins, especially in Patos Lagoon estuary, where high bycatch rates in artisanal fisheries have been reported	IN PROGRESS
34	wSA	Awareness	Zappes et al. 2016	To generate coordinated educational activities along the SWAO related to coastal and marine ecosystem conservation involving an exchange of scientific and local knowledge	IN PROGRESS
35	wSA	Awareness	Zappes et al. 2016	Use the steps suggested in this document as guidance in studies involving ethnobiology and environmental education in areas where there are coastal populations of bottlenose dolphins in the SWAO	ONHOLD
89	Laguna	Awareness	Action 5.1 State Action Plan	Environmental education in the schools of the municipality of Laguna highlighting the socio-environmental importance of the LBD for the region	IN PROGRESS

STRATEGIC LINE: Institutional Strengthening					
Target#	Where	Area of Expertise	Source	Action	Status
10	wSA	Institutional	Zappes et al. 2016	Identify research groups that focus on other marine species in areas of strong occurrence of bottlenose dolphins in order to promote coordinated conservation strategies to ensure the sound management of the SWAO.	IN PROGRESS

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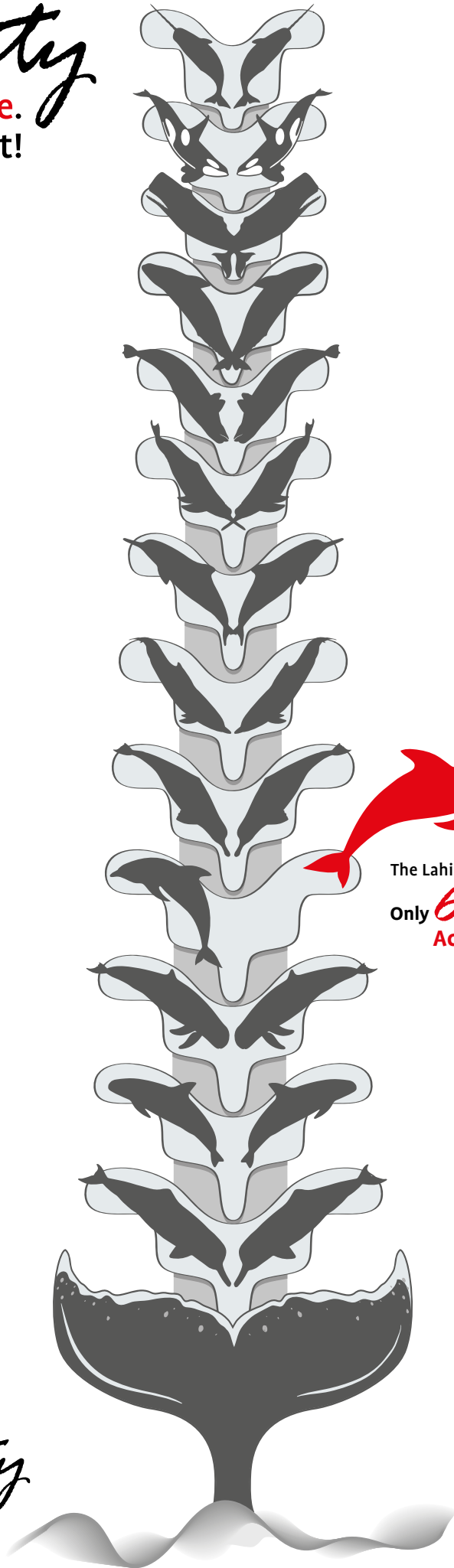
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