Annex Q

Report of the Small Cetacean Sub-Committee

Participants: Porter and Trujillo (Convenors), Aguilar, Arakaki, Al Jabri, Andriolo, Aranha, Archer, Avila, Babey, Baird, K., Baird, R., Baker, Barreto, Barros, Bartmeier, Beasley, Bell, C., Bell, E., Botta, Bouzouma, Brannan, Brost, Brownell, Campbell, Carlén, Cassani, Castro, Chauca Huánuco, Choi, Cipriano, Citta, Clarke, Collins, Constantine, Coscarella, Cremer, Crespo, Cubaynes, Dalla Rosa, Danilewicz, Demaster, Diallo, Dolman, Domit, Doumbouya, Fernandez, Ferreira, Fortuna, Frey, Fruet, Fyfe, Gallego, Galletti, Garcia-Bellido, Genov, Goetz, Haelters, Heinemann, Hielscher, Hines, Hodgins, Hoelzel, Holm, Houtman, Iñíguez Bessega, Jaramillo Legorreta, Jimenez, M., Jiménez, S., Katara, Khan, Kiszka, Kitakado, Kolesnikovas, Kyung Lee, Lang, Leal, Leaper, Lent, Lokar, Long, Luna, Lundquist, Mallette, Mangel, Marcondes, Miller, Minton, Miranda, Moazzam Khan, Natoli, O'Loughlin, Okyere, Palka, Park, Parsons, Passadore, Peltier, Plön, Reeves R., Reeves, S., Ridoux, Rojas-Bracho, Rose, Rowles, Salvador, Schubert, Seakamela Secchi, Sequeira, Sharkey, Siciliano, Simmonds, Slooten, Stachowitsch, Stack, Staniland, Stepputtis, Stockin, Sucunza, Sutaria, Suydam, Svoboda, Tai, Thomas, Tiedemann, Torres Florez, Trejos, Urbán, Vazquez, Vermeulen, Vrooman, Wade, Webster, Wilberg, Wilkin, Wilson, Yoo, Zerbini.

1. INTRODUCTION

1.1 Opening remarks

Porter and Trujillo welcomed the participants to the meeting and provided an introduction to the work methods of the Scientific Committee and the focus of work in the Small Cetacean (SM) sub-committee. Porter and Trujillo noted that several SM topics would be dealt with in joint sessions with other sub-committees, particularly progress on the Conservation Management Plans (CMP) for the franciscana dolphin (*Pontoporia blainvillei*) and South American River dolphins (*Inia geoffrensis*, *Inia boliviensis*, *Inia araguaiaensis* and *Sotalia fluviatilis*) and the outcomes of the pre meeting on 'Topics related to spatial risk assessment for Hector's and Māui dolphins in New Zealand'.

1.2 Election of Chair and Appointment of Rapporteurs

Porter and Trujillo were elected as Chairs; Cipriano, Brannan, Jiménez and Reeves were appointed as rapporteurs.

1.3 Adoption of agenda

The adopted agenda is given as Appendix 1.

1.4 Review of available documents

The following available documents contained information relevant to the work of the sub-committee: SC/69A/SM/01-08; SC/69A/CMP/13-15; SC/69A/CMP/20; SC/69A/CMP/24; SC/69A/E/01; SC/69A/HIM/01rev1; SC/69A/HIM/10rev1; SC/69A/HIM/11; SC/69A/HIM/14; SC/69A/HIM/15. Papers for information were Bradford *et al.* (2021); CCAHD (2022); da Silva Valente *et al.* (in press); de Moura *et al.* (2023); IWC (2021); Miller (2023); Sucunza *et al.* (2022a); WWF (2022).

2. SMALL CETACEAN USE AS AQUATIC WILDMEAT

2.1 Review new information

New information on the take of South American river dolphins was reviewed in the sub-committee on Conservation Management Plans (CMPs) (Annex F, item 9.1.5.)

2.2 Develop four-year workplan

It was agreed to continue the work of the Aquatic Wildmeat ICG and develop a workplan for 2024-26.

3. RECOMMENDATION REVIEW

3.1 Review of topics related to Hector's and Māui dolphins in New Zealand (with HIM Annex J)

SC/69A/SM/02 details progress on using DNA methylation data to develop an epigenetic clock for ageing Hector's (*Cephalorhynchus hectori hectori*) and Māui dolphins (*C. h. maui*). Specifically, the report includes a review of tooth growth layer counts from calibration samples and provides preliminary age estimates for a subset of samples based on the odontocete epigenetic ageing clock (OEAC, Robeck *et al.*, 2021) and a beluga-specific (*Delphinapterus leucas*) clock

(Bors *et al*., 2021). The next steps for this project are to use these methods to develop and validate a species-specific epigenetic model to estimate the age of Hector's and Māui dolphins using skin samples collected with a biopsy dart.

Baker was thanked for bringing this update to the attention of the sub-committee and the usefulness of this technique to better understand Hector's and Māui dolphins' population structure was acknowledged.

4. SOUTH PACIFIC ISLAND SMALL CETACEANS

Miller (2023) provides an overview of the state of knowledge on threats to cetaceans in the waters surrounding the Pacific Island countries and territories of the Pacific Islands region. There are 34 cetacean species identified from the Pacific Islands region, although it is likely that more species occur across the region but have not been documented. Pacific Island cetaceans face several threats: incidental catch (bycatch) and fishing gear interactions; harvesting (direct take); pollution; vessel traffic; pathogens and introduced species; resource depletion; and ocean-physics alteration, including climate change. Bycatch in commercial oceanic purse seine and longline vessels fishing within the Exclusive Economic Zones of Pacific Island countries and territories has been identified as the most serious current threat to cetaceans based on reports from onboard fisheries observers. Although the widespread use of inshore gillnets in the region could be a significant source of mortality, there is little reliable information on the bycatch of cetaceans in subsistence and coastal fisheries. Besides bycatch in active fishing gear, cetaceans may also become entangled and drown in abandoned, lost or discarded fishing gear (ALDFG), including abandoned Fish Aggregating Devices (d-FADs). The Pacific Community (SPC) trains fisheries observers and provides an archive for storing their reports. In recent years, several analyses have been undertaken of observer data, which provide the best available information on the levels of interaction of commercial fishing with whales and dolphins. The papers containing these analyses are referenced in this report. The low level of observer coverage in the longline fishery inhibits accurate assessment of the number of cetaceans taken as bycatch (with generally less than 5% of sets observed). Until the onset of COVID-19, observer coverage in the purse seine fishery had been over 80% for several years, a sufficiently large sample to provide reliable assessments. Despite the low level of observer coverage in the longline fishery, 298 cetacean gear interactions were reported between 2015 and 2019, comprising 27 cetacean species or species groups, with almost a quarter of the interactions being with false killer whales. In total, 2,131 individuals from 20 species and species groups were reported to have engaged in 'non-gear' interactions with longline fishing vessels. The main species involved in non-gear interactions was again false killer whales (61.8%). For the regional purse seine fishery, the most recent estimates suggest that annual rates of marine mammal bycatch are in the thousands every year and have ranged from 1,623 (1,378-1,939 95% CI) in 2003 to 3,861 (3,789-3,945 95% CI) in 2013. The average for the five most recent years with full available data (2015-19) is 1,942. The impact of interactions on species and populations is difficult to assess without more accurate information on the distribution and population levels of the cetacean species interacting with the fisheries as well as more accurate information from the longline fishery on numbers of interactions. While most of the available information on bycatch is from oceanic fisheries, there is also concern over coastal and subsistence fisheries, particularly in the shallow waters of the Kikori Gulf in Papua New Guinea, where an unmanaged and poorly regulated gillnet fishery has caused a decline in the abundance of snubfin (*Orcaella heinsohni*) and Indo-Pacific humpback dolphins (*Sousa sahulensis*). Coastal cetaceans are also caught in other active fishing gear, such as d-FADs, as well as ALDFG. Direct take also presents a major threat in some areas, most notably the area around Fanalei on the island of Malaita in the Solomon Islands. It is estimated that more than 15,000 dolphins were killed in drive hunts (in which schools of dolphins and small whales were herded into bays by small boats near Fanalei village from 1976 to 2013). Small-scale or occasional hunts have also historically occurred in the Mariana Islands, Kiribati, the western Caroline Islands, Marshall Islands, French Polynesia and Papua New Guinea. An unknown but significant number of bottlenose dolphins were captured alive near Guadalcanal in the Solomon Islands earlier this century, for entertainment parks in several countries, but this was prohibited in 2017, and has not resumed. The report also highlights pollution in the form of noise, chemicals, plastics and microplastics, industrial waste and coastal litter. Deep sea mining is an emerging issue, with as yet unknown consequences to cetaceans. Climate change was identified as a long-term threat to small cetaceans. The report concludes by listing recommendations aimed to improve knowledge of the status and threats to cetaceans in the Pacific Islands region. These include: increasing observer coverage in the longline fishery and the use of electronic monitoring gear on all commercial fishing vessels; building capacity within the Pacific Islands to research the range and distribution of cetaceans and to promote community conservation efforts in coastal waters; improve collection and analysis of information on all cetaceans taken as bycatch or stranded; and improve monitoring efforts, especially for direct hunts.

Miller was thanked for her report and it was acknowledged that the comprehensive review contained much information relevant to this sub-committee and its proposed work on the small cetaceans of the Pacific Islands.

A clarification was sought on the stated low percentage of observer coverage in longline fisheries (5%). It was noted that this figure excluded longline fisheries in the U.S. For other countries, the main limitation to improving observer coverage was noted as resources and the difficulty in the management of large numbers of observers. Within the Western and Central Pacific Fisheries Commission (WCPFC), there has been discussion on increasing observer coverage

to at least 20%, which would contribute significantly to current knowledge gaps. It was stated that the South Pacific Tuna Treaty in the Western Pacific has 100% observer coverage, however, it was further clarified that, with regards to observer coverage, it is important to understand the distinction between rules and practice. In purse seine fisheries, the target is 100%, but this rarely occurs, with actual coverage being nearer 80%. Similarly, for longline fisheries, the target is 5%, but this is rarely met. It is apparent from available information that there is also significant geographical and temporal variability in observer coverage and Miller (2023) focused only on WCPFC and a high-level data aggregation of longline and purse seine fisheries. Data on domestic fishing activities do exist and may possibly be accessed via the Common Oceans Project. A question was raised with regards to data collection protocols for marine debris. It was noted that observers were given a standard form, which is specifically to record the amount of debris that is discarded from the vessel. South Pacific Regional Environment Programme (SPREP) assessed the data provided via the forms and presented their findings at WCPFC, which resulted in a new conservation and management measure on dumping at sea. This information is available on the WCPFC website. It was stressed that the forms do not provide reporting criteria for fishing gear inadvertently lost, abandoned or discarded.

With regards to how this sub-committee would progress with a review of the small cetaceans of the Pacific Islands, a summarised discussion of the South Pacific Islands Small Cetacean ICG was presented. The group had met online intersessionally and proposed that the work should focus on ecologically-alike species rather than regions. Given what is known of threats and the paucity of data on offshore species, four focal species were proposed, specifically: short-finned pilot whales (*Globicephala macrorhynchus*); false killer whales (*Pseudorca crassidens*); melon-headed whales (*Peponocephala electra*); and pygmy killer whales (*Feresa attenuata*). There was also discussion on whether to include rough-toothed dolphins (*Steno bredanensis*) as this species is often bycaught. To assist in developing a framework, it was suggested that a threat matrix might be created and used to prioritise umbrella species. It was also suggested that inshore fisheries and the species impacted could be assessed at a later stage of the review. The discussion continued on the importance of focusing on threats. It was suggested that the review process could follow the CMP approach, drawing on the expertise of sub-committees such as SD-DNA, E and HIM and should integrate with the work of the Bycatch Mitigation Initiative (BMI). It was generally agreed that to move forward, an in-person workshop within the Pacific Island region, that included local research groups and communities working on marine conservation issues, would be required to develop a comprehensive work plan. It was added that the Kikori Delta bycatch of inshore cetaceans had been previously discussed by this sub-committee (IWC, 2022). It was noted that both the HIM sub-committee and the BMI had offered to provide guidance on this specific issue. Beasley stated that the situation in Kikori has not improved and given the apparent immediate and ongoing threat from the coastal gillnet fishery, there is concern that the proposed long-term review of the Pacific Islands might not provide timely enough assistance. It was noted that the situation appeared critical and there was a risk of losing both snubfin and Indo-Pacific humpback dolphin populations in the Kikori Delta, the only place they are known to occur within the South Pacific Island region. It was suggested that the latest update provided to SPREP on the Kikori Delta and the impact of the fishery might be useful to this sub-committee and it was agreed that it would be provided.

In conclusion it was **agreed** to continue discussion within the South Pacific Islands Small Cetaceans ICG review where first actions and timeline would be developed. In addition, it was also **agreed** to consult with other sub-committees to assess how best to include this review within their agendas and work plans.

Attention: SC, R

*So that a review of South Pacific Islands Small Cetaceans might progress in a timely manner, the sub-committee **recommends** that:*

(a) a proposal be developed to hold an in-person workshop in collaboration with the Bycatch Mitigation Initiative (BMI) and that included multiple stakeholders from the South Pacific Island region; and

(b) that funds for such a workshop be sought from within the SC funding mechanisms or from targeted external sources, pending approval from the sub-committee.

5. PROGRESS ON PREVIOUS RECOMMENDATIONS

5.1 Franciscana (*Pontoporia blainvillei*)

The franciscana (*Pontoporia blainvillei*) is a small cetacean endemic to southwestern Atlantic coastal waters between central Brazil and central Argentina (Crespo et al., 1998; Siciliano et al., 2002). It is considered the most threatened marine cetacean species in South America (Secchi et al., 2003a) and is listed as Vulnerable on the IUCN Red List (Zerbini et al., 2017). Incidental mortality in gillnet fisheries has been and continues to be a major conservation concern but franciscana are also exposed to other threats throughout their range, such as those from coastal development, marine debris, disease and vessel traffic (e.g., Di Beneditto *et al.*, 2014; Denuncio *et al*., 2011). Given the conservation status of

franciscana, the sub-committee highlighted its vulnerability to climate change and requested the Scientific Committee to include this species in groups that discuss this matter.

The SC first reviewed the franciscana in 2004 and the species has remained a high priority across its agenda. The Franciscana Task Team (FTT) was established in 2015 and focused on Franciscana Management Area (FMA) I and the results of the FTT work were subsequently presented to this sub-committee (SC/67b/CMP/03 and SC/67b/CMP/05). In 2016, a Conservation Management Plan (CMP) for the franciscana was established (IWC/66/CC/11). This CMP was the first to be adopted for a small cetacean. The overall objective of the CMP was to protect franciscana habitat and minimise anthropogenic threats, in particular, bycatch. In 2018, a review process was agreed that was intended to track and refine research, monitoring and conservation management recommendations and actions specific to the franciscana CMP. Three workshops were conducted between 2020-22, with the aim of finalising the review (SC/68C/REP/02; IWC, 2020; SC/69A/REP/01).

In completing the franciscana review, aspects of the species' biology and conservation status were discussed in joint or individual meetings with several sub-committees, notably SM, CMP, SD-DNA, ASI, HIM and E. Results of the review by these different groups are summarised below. It was noted in discussion that of the 18 recommendations endorsed by the SC, between 2004 and 2016, most have either been achieved or updated since the CMP was implemented. The sub-committee **agrees** that all previous recommendations pertaining to the franciscana be considered completed and only those arising from SC69A onwards be considered current and included in the Database of Recommendations.

5.1.1 Stock structure

In 2003, four Franciscana Management Areas (FMAs), were defined and numbered I to IV (Secchi *et al*., 2003b). Subsequently, FMA I was divided into two separate FMAs: FMA Ia and FMA Ib (Anon., 2015; Cunha *et al*., 2014). Since 2020, the sub-committee has been reviewing evidence relating to stock structure across the range of the franciscana and concluded that genetics was the most informative tool to identify franciscana stocks (SC/69A/REP/01). The sub-committee **agreed** that 11 management units should be recognised, including subdivisions within FMA I, II, and IV, and the designation of "FMA II Babitonga" (Cunha *et al*., 2020b, c; SC/69A/REP/01) (Figure 1). The sub-committee also agreed that a more comprehensive analysis of the franciscana stock structure would benefit from additional range wide genetic analysis using standardised approaches. Stock structure discussions are detailed in IWC, 2022; 2023; SC/69A/REP/01; see also Annex O - item 2.5.

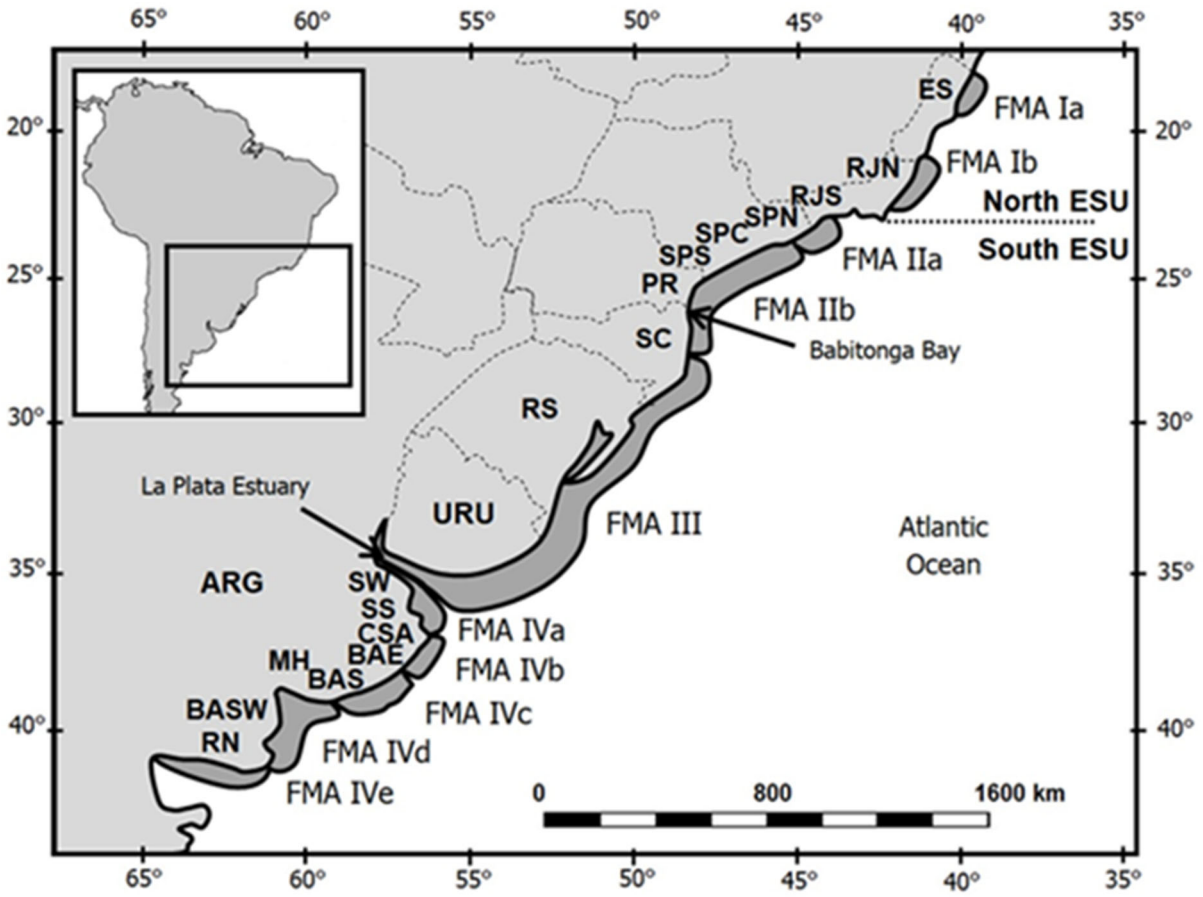

Fig. 1. Franciscana Management Areas (FMAs).

Attention: SC, R

*The sub-committee **agreed** that for the purposes of stock assessment, the franciscana dolphin (Pontoporia blainvillei) is divided into 11 separate management units; FMA Ia; Ib; IIa; IIb; II Babitonga; III; Iva; IVb; IVc; IVd; IVe; and **recommends** that an integrated range-wide analysis be conducted, implementing a genome-wide approach, to further refine the understanding of franciscana stock structure.*

5.1.2. Distribution and Abundance

The franciscana is endemic to the western South Atlantic Ocean, ranging from Espírito Santo State, Brazil, to Golfo Nuevo, Chubut Province, Argentina (Crespo *et al*., 1998; Siciliano *et al*., 2002). The franciscana is primarily coastal, inhabiting waters beyond the surf zone up to 50 m of depth (Danilewicz *et al*., 2009; Crespo *et al*. 2010; Amaral *et al*. 2018) with occurrences in some bays and estuaries (Cremer *et al*., 2008; Santos *et al*., 2009). The species is not distributed continuously throughout its range, with two areas in its northern range where franciscanas are extremely rare or absent (Siciliano *et al*., 2002; Amaral *et al*., 2018). The sub-committee was made aware of new information that further elucidates the boundaries of the northernmost franciscana population in FMA1a. Whereas the northern boundary FMA1a remains as detailed in Amaral *et al*. (2018), it is proposed to extend its southern boundary from 19° 57' to 20° 01' (SC/69A/CMP/13).

SC/69A/ASI/19 details aerial surveys that documented franciscana in high densities in Río de la Plata, Uruguay, highlighting the importance of these estuarine waters. In addition, these surveys sighted franciscana groups from the estuary mouth, north, to the Argentinian border. Existing data thus indicate a possible range expansion during winter months that should be considered during the planning and implementation stages of management and conservation strategies (SC/69A/CMP/20).

Attention: SC, R, G-Argentina, G-Brazil, G-Uruguay

*Given the high density of franciscana (Pontoporia blainvillei) observed at the border of Franciscana Management Areas (FMAs) III and IVa, the sub-committee **recommends** that:*

(a) surveys are conducted to investigate franciscana distribution between the coasts of Argentina and Uruguay and in the Río de la Plata estuarine area; and

(b) surveys are conducted to investigate seasonal distribution across all Franciscana Management Areas.

The SC has reviewed 25 abundance estimates for eight of the 11 franciscana stocks (IWC, 2022; 2023). As part of the review process, advice is provided on how to refine correction factors for perception, availability, and group size bias and how to improve estimates of density and abundance. The franciscana abundance estimates are category ssed in accordance with the guidance provided by the Abundance Estimates (ASI) sub-committee. Six of the estimates are Category 1A (acceptable for use in in-depth assessments or for providing management advice using the RMP, AWMP or other modeling and analysis); six are Category 2 (underestimate - suitable for 'conservative' management but not reflective of total abundance); one is Category 3 (while not acceptable for use in Category 1 or 2, adequate to provide a general indication of abundance); six are Category P (provisional estimates) and two are Not Suitable (NS). Since received, four estimates have been superseded by newer estimates (Table 1).

Relatively small stocks occur in FMA II Babitonga and FMA Ia (about 1,000 dolphins), while FMA III has about 40,000 individuals. Estimates for FMA IVa, IVd and IVe have never been computed and surveys in this region (FMA IV) should be a priority. In addition, additional surveys are required in Argentina, to refine estimates for FMA IVb and IVc and to assess trends in abundance for all stocks. Further discussion on franciscana abundance estimates is detailed in Annex D - item 2.1.7.

Attention: SC, R, Argentina, Brazil and Uruguay

*As abundance estimates are necessary to assess the status of franciscana (Pontoporia blainvillei) stocks, the sub-committee **recommends** that:*

(a) surveys to obtain abundance estimates of FMAs IVa, IVd and IVe in Argentina should be considered the highest priority; and

(b) to compute estimates of trends in population size studies should continue, particularly in FMAs IVb and IVc.

Estimates of cetacean abundance using acoustic methods require computing the number of acoustic detections (e.g., click trains) per individual during the time each individual is available for detection. This is called the cue rate. SC/69A/CMP/14 details synchronous Unmanned Aerial Vehicle (UAV) and Passive Acoustic Monitoring (PAM) surveys to estimate the cue rate of franciscanas off Brazil. The average click train/individual ratio was estimated at 3.48 (CV = 0.59). This is the first study of its kind for franciscana and the cue rate can now be applied as a correction factor to compute estimates of density and abundance of franciscana in future PAM surveys. This cue rate correction factor was applied to a franciscana abundance estimate from FMA Ia and is detailed SC/69A/CMP/13. A sailboat equipped with a towed hydrophone array was used for surveys conducted off Espirito Santo, Brazil. Distance sampling methods were used to estimate the detection probability of franciscana click trains and the cue rate correction factor was used to scale the abundance of click trains to the number of individuals detected. Abundance of franciscanas was estimated at 1,256 (CV =0.69). This study demonstrated the effectiveness of a completely independent system for abundance estimation, eliminating human perception biases and enhancing reproducibility.

Attention: SC-ASI, R

*The sub-committee **agrees** that the use of passive acoustic monitoring methods could provide a reliable method to estimate franciscana (Pontoporia blainvillei) abundance and trends and therefore, **recommends** that:*

(a) efforts to develop approaches to use acoustic methods to estimate population density and abundance be continued.

(b) *the Abundance Steering Group (ASI) reviews the feasibility of the methods described in this report (Annex Q) to estimate the abundance of franciscana (Pontoporia blainvillei).*

5.1.3 Behaviour and movement patterns

The sub-committee noted that the behaviour of the franciscana is explored in detail in Cremer *et al*. (2022), however, for the purposes of this summary, only aspects of franciscana behaviour that were unusual or would benefit from more research were discussed.

There is evidence that adult franciscana form monogamous reproductive pairs of unknown duration and males perform mate guarding. Mate guarding can extend after conception and, in some cases, after the offspring's birth. A matrilineal society where offspring remain for some time in the same group as their mother has been proposed (SC/69A/REP/01).

Telemetry studies indicate that franciscana core areas can vary considerably across different FMA; in Baía Babitonga, Brazil, a mean core area of 1.6km^2 was calculated, in Bahía Samborombón, Argentina, 23.4km^2 and in Bahía San Blas, Argentina, 79.3km^2. Movements appear to be related to tidal flow, with little evidence for migratory patterns (Wells *et al*., 2022).

Attention: SC, R

*The atypical group behaviour of franciscana (Pontoporia blainvillei) and the considerable variation in core areas size was noted. So as to better understand behaviour and movement patterns, the sub-committee **recommends** that: further studies, using telemetry, be conducted throughout the species range.*

5.1.4 Life history

Detailed information on life history parameters of franciscana dolphins is provided in SC/68/REP/01 and Danielwicz *et al*., (2022). It was noted that life history parameters have only been studied from some areas and that available information on reproductive and growth parameters is outdated. It was highlighted that the FMA Ia population is the least known across the species' range and that this small, isolated stock is subject to multiple threats.

The maximum documented ages of female and male franciscanas are 21 and 20 years, respectively, but only a small fraction of the population lives more than 12–14 years. Adult females are on average larger in size than adult males. Size at birth appears to vary among populations; most animals are between 65 and 75 cm at birth. The gestation period ranges from 10.2 to 11.2 months and franciscanas exhibit a typical birth-pulse pattern in most of their range, with calving starting early in the spring and decreasing gradually until the end of the austral summer. Typically, births occur between October and December and the nursing period is estimated to vary between 7 and 9 months. The complete franciscana reproductive cycle lasts an average of 20 months. The average age of franciscana sexual maturity varies between FMAs, i.e., 2.7 to 3.9 years (Danilewicz et al., 2022). Franciscana annual pregnancy rate was estimated as 0.66 for Rio Grande do Sul, Brazil (FMA III), i.e., a calving interval of 1.5 years. Franciscanas appear to have a single-male breeding system (serial monogamy) based on indirect evidence, such as reversed length sexual dimorphism, the absence of secondary sexual characteristics, and the small size of the testes with little evidence of seasonal enlargement, which makes sperm competition unlikely (Cremer *et al*., 2022).

Attention: SC, R

*Available life history information on franciscana (Pontoporia blainvillei) is not available for some stocks (FMA Ia, FMA IVa, FMA IVd and FMA IVe) and outdated for other stocks (FMA III) and as this information is critical for the management of the species, the sub-committee **recommends** that research be conducted to update and provide new estimates on reproductive and growth parameters from across the species' range.*

5.1.5 Ecology

Foraging studies show that echolocation click rate increases and, when compared to other species, appears to have a higher proportion of feeding buzzes, suggesting that either: (i) franciscanas have a high metabolic demand; and/or (ii) it takes more effort to meet metabolic needs from the small prey items consumed by them (Paitach, 2021). Studies of the franciscana's diet may indicate that their habitat and prey species are changing. Recent studies in FMA III show that tropical fishes are now being observed more frequently in their diet, suggesting a less restricted niche than previously understood or that the waters inhabited by franciscanas are becoming warmer (SC/69A/REP/01). The latter possibility is supported by the observed composition of catches in commercial demersal fisheries in the southern region of Rio Grande do Sul, southern Brazil (FMA III) (Perez *et al.*, 2022). Diet is discussed in further detail Annex F - item 2.4.

Attention: SC, CMP, R

*Given the possibility that franciscana (Pontoporia blainvillei) may have an unusually high energy demand and that their habitat and prey species may be changing, the sub-committee **recommends** that studies aimed at better understanding franciscana diet and feeding ecology be conducted throughout their range.*

5.1.5 Threats

The franciscana is impacted by fisheries, coastal and marine infrastructure, exploitation of resources on land and in estuarine and coastal waters, and pollutants from multiple sources (Domit *et al*., 2022; Lailson-Brito *et al*., 2022; SC/69A/REP/01; SM/69A/E/04). These threats can affect the dolphins' directly but also, and more likely, in combination these threats cumulatively affect environmental dynamics and, ultimately, the health and resilience of franciscanas. There are also new threats emerging, such as renewable energy projects, which are planned to commence in the coastal waters of Brazil and Uruguay within the next five years. In Uruguay, it is uncertain where these developments may be located, however, there is concern that sites may overlap franciscana habitat. In Brazil, the areas are better defined, and some will overlap with franciscana habitat (SC/69A/REP01). It was noted that throughout their range, no formal environmental impact assessment framework exists that considers all direct, indirect and cumulative impacts on the franciscana.

Attention SC, CMP; E; R; CG-Brazil, Uruguay, Argentina, S

*Recognising the multiple and cumulative threats that the franciscana (Pontoporia blainvillei) face throughout their range, from existing anthropogenic activities, the sub-committee **expressed concern** that new developments, such as renewable energy installations, could significantly add to these threats. The sub-committee also **drew attention** to the lack of any impact assessment framework that specifically included this species. The sub-committee **agrees** that any assessment of impacts to the franciscana should consider cumulative impacts and thus **recommends** that:*

(a) in all range states, franciscana should be designated as a priority species to be included in any existing and all future environmental impact assessments, particularly when licensing new activities such as renewable energy developments; and

(b) through new research and by drawing on the expertise of the SC, the cumulative effects of chemical pollution, stress hormones, biotoxin, diseases and other stressors on franciscana be conducted and reviewed.

*The sub-committee also **requests** that:*

(c) the Secretariat write a letter to the governments of Brazil, Uruguay and Argentina highlighting concerns over cumulative impacts on the franciscana and the lack of focused assessment processes to protect them.

Incidental take is by far the greatest threat to this species and evidence suggests that bycatch is unsustainable throughout all FMAs (Secchi *et al*., 2021; 2022). In Uruguay, bycatch data is collected in some artisanal gillnet fisheries and in the industrial coastal pair trawl fishery by Dirección Nacional de Recursos Acuáticos (DINARA) (SC/69A/HIM/15). In Argentina, information on bycatch is outdated (Negri *et al*., 2012), except for FMA IVe (SC/69A/CMP/15). In Brazil, Uruguay and Argentina, fisheries management plans lack clearly defined management objectives, both for target and bycatch species, and thus the franciscana and their ecosystem are at risk. One clear management goal should be to

reduce franciscana bycatch in southern Brazil, which will require a combination of no-fishing zones and a reduction of gillnet fishing effort (Prado *et al*., 2021).

Attention: SC, G, Argentina, Brazil, Uruguay, R

*The sub-committee **expressed concern** over the continued and unsustainable incidental take of franciscana (Pontoporia blainvillei) in most Franciscana Management Areas and **requested** that the species' range governments better articulate bycatch reduction goals in fisheries management plans and **further enhance** actions in existing and new marine protected areas.*

*The sub-committee **requests** that the Government of Brazil consider:*

(a) expanding the northern limit of the gillnet fishing exclusion zone established 'IN12/2012' to the Cape of São Tomé whilst maintaining the zone's inshore and offshore boundaries;

(b) establishing marine protected areas in important franciscana habitats, including the estuary mouth of the Rio Doce, areas adjacent to the Jurubatiba National Park, the Baía de Babitonga, and Albardão.

*The sub-committee **requests** that the Government of Argentina consider:*

(c) establishing marine protected areas in important franciscana habitats, specifically the Río Negro estuary.

A variety of approaches intended to reduce the bycatch of franciscanas have been implemented or considered. The use of pingers as a bycatch mitigation tool has been tested in FMA II Babitonga, FMA III, FMA Iva and FMA IVb. The tests conducted so far have proven to be effective. When compared to an alternative fishing method (longlines), fishing effort would have to be increased by 2.5 times to have a catch rate of target fish species equivalent to that achieved with gillnets. Even though longline operations may cost less than gillnetting, the necessity for greater fishing effort and more personnel reduces the attractiveness of longlines as an alternative to gillnets.

SC/69A/HIM/15 provided an update on the effectiveness of pingers to reduce franciscana bycatch in artisanal gillnet and industrial trawling fisheries in Uruguay. There is convincing evidence that pingers significantly reduce bycatch in the gillnet fishery, whereas in the trawl fishery there was only a moderate reduction.

SC/69A/HIM/01Rev 1 described a novel, low-cost method intended to reduce bycatch, by using plastic bottles as acoustic reflectors on bottom-set trammel nets. The potential effects on target catch were also assessed. The results of this study suggested that this method may reduce the bycatch of franciscana and other dolphins and it was noted that more extensive trials would be worth pursuing.

In discussion, the sub-committee noted that future research on pinger effectiveness, or other alternative gear, should consider franciscana that inhabit exposed coastal areas, where oceanographic conditions might have a different influence on the dolphins' behaviour.

Attention: SC, G, Argentina, Brazil, Uruguay, R

*The sub-committee **expressed concern** over the continued and unsustainable incidental take of franciscana (Pontoporia blainvillei) in most Franciscana Management Areas and **requests** that the species' range governments better articulate bycatch reduction goals in fisheries management plans. The sub-committee further **recommends** that:*

(a) all available estimates of incidental mortality be reviewed by the Committee and presented at SC69B;

(b) bycatch monitoring be expanded or implemented in fisheries that affect franciscanas throughout the species' range;

(c) technological and/or operational measures (e.g., area-based conservation) be urgently implemented by the three range countries to reduce fishing-related mortality;

(d) *testing the use of low-cost methods (e.g., plastic bottles attached to fishing nets) to reduce franciscana bycatch in gillnets and pingers in trawl nets be continued; and*

(e) *the use of acoustic listening devices be continued and its use expanded in bycatch and mitigation studies so that franciscana activity near fishing gear could be documented and assessed in detail.*

5.1.6 Public awareness

Efforts to change fishing gear types should be accompanied by educational resources and public awareness campaigns (SC/69A/REP/01). It was highlighted that IWC Voluntary Funds have supported education and public awareness campaigns in each range state of franciscana. 'Our neighbour the franciscana' visualises the threats that the dolphins

face and how the public, particularly fishers, can reduce these threats. This educational resource is available on the IWC website in English, Portuguese and Spanish and was showcased at IWC68 in Portorož, Slovenia, in 2022.

5.1.7 Conclusions

At this meeting, a review of stock structure, abundance estimates, some threats and biological parameters was completed, however, estimates of bycatch were not fully assessed. The governments of Argentina and Brazil were applauded for their plan to present a Concerted Action for Franciscana to the Convention on Migratory Species (CMS) at COP14, however, it was re-iterated that this and other endeavours will need continued assessment of the species. The sub-committee **strongly agreed** that a bycatch review was needed and that following such a review, there may be sufficient information to perform an assessment of the franciscana, using the methods established by the SC for larger whales. The sub-committee **requested** that an ICG be established to review estimates of bycatch throughout the species' range and that this review would be completed and reported at SC69B. Such an assessment would be beneficial for all countries along the range of the franciscana to understand the impact that each of the 11 franciscana's stocks are subject to and, consequently, to prioritise conservation actions through the existing franciscana CMP. It would also be beneficial to the BMI as this could assist in the development of a framework to assess the status of other species severely impacted by incidental catches in fishing gear.

5.2 Lahille's bottlenose dolphin (*Tursiops truncatus gephyreus*)

Three papers were presented that detailed progress on the work of the Lahille's bottlenose dolphin (*Tursiops truncatus gephyreus*) Task Team, which was established in March 2021. Prior to the Task Team establishment, several recommendations had been made which have been reviewed as the work of the Task Team progresses. In summary, these recommendations include:

- that an assessment is made of the conservation status of the Argentinean population;
- that governments take immediate action to reduce the level of bycatch, particularly in the southern Brazil Management Units (MUs);
- that monitoring is continued throughout the species range to increase knowledge of its life-history parameters, assess trends in populations abundance and document the prevalence and aetiology of chronic skin diseases; and
- that a health assessment programme for the Lahille's bottlenose dolphin be implemented, including the use of the contaminants mapping tools developed by the SC.
- Additionally, this sub-committee encouraged:
    - coordination of regional efforts between Argentina, Uruguay and Brazil to estimate and monitor population parameters;
    - efforts to seek ways to cooperate with fishing communities and government authorities to reduce bycatch;
    - efforts to explore potential synergies with the franciscana CMP.

SC/69A/SM/04 presented information on the presence of Lahille's bottlenose dolphins, or 'Ferones' as they are known locally, in the Bahía Blanca estuary, Argentina. Sightings and acoustic data were collected from opportunistic platforms, i.e., recreational boats and National Park patrol vessels. Between October 2020 and April 2023, 30 sightings of Lahille's bottlenose dolphins were recorded, totalling some 190 individuals. The overall sighting per unit effort (SPUE) was 0.34 dolphin group/hour. Observed group sizes ranged from one to 20 individuals, but most (76.6%) of the groups observed were of 1-8 dolphins. The results suggest that Lahille's bottlenose dolphins are present year-round in the estuary. Clicks were recorded that were consistent with those attributed to common bottlenose dolphins (*Tursiops truncatus*). This work contributed to previous recommendations, that is, to coordinate efforts across the subspecies range and to improve knowledge of population parameters. This work highlights the importance of the Bahía Blanca estuary for the Lahille's bottlenose dolphin as it is one of the few sites in Argentina where they still occur on a regular basis.

SC/69A/SM/05 reported on fulfilling the recommendations made on research and conservation status of Lahille's bottlenose dolphin. As yet, there has been slow progress in gathering information on Lahille's bottlenose dolphin in Argentina and more work is required to improve our understanding of its conservation status. In Brazil, the timing of the eight recorded strandings from Patos Lagoon estuary's coastal beaches coincided with the artisanal fisheries' seasonal operations in the area, where Illegal fisheries continue to operate, and enforcement remains limited. Bycatch was recorded in Torres and Tramandaí, but no bycatch reports were received from Laguna. In Uruguay, dolphins with severe injuries, likely caused by entanglement in fishing gear, have been recorded in recent years. This work also indicates that the prevalence of lobomycosis-like disease (LLD) has increased, from 9% in 2011 to approximately 19% in 2022 in Laguna, with new cases recorded for Torres and Tramandaí. These results contribute to recommendations that focus on health status and documentation of the prevalence and aetiology of chronic skin diseases.

Mark-recapture models, using a Robust Design and Multistate framework, were fitted to survey data collected from seven locations in southern Brazil-Uruguay, between 2018 and 2022 with the purpose of calculating demographic parameters, such as survival rates, temporary emigration, transience, capture probabilities, and to estimate both the size of each local population and the entire southern Brazil-Uruguay Evolutionary Significant Unit (ESU). These estimates, combined with published data, were used to conduct a population viability analysis (PVA), which estimated the extinction and decline probabilities of populations under different management scenarios, considering uncertainty in parameter estimates, and demographic and environmental stochasticity. To ensure the viability of all local populations, and thus the metapopulation, bycatch-related mortality events must be reduced to zero and habitat quality must be maintained or improved. A poor prognosis is predicted under current management practices for the dolphin population, as models indicate the extinction of some local populations and a dramatic reduction of the metapopulation. Using both mark-recapture and PVA results, the extinction risk of southern Brazil-Uruguay ESU was evaluated against Criteria C and D of the IUCN red list, considering the model that represents current conditions of bycatch and habitat quality (i.e., abundance and survival rates obtained from the mark-recapture analysis for the period 2018-22). This preliminary evaluation suggests that the population would be classified as Critically Endangered – CR (sub-criteria C1: number of mature individuals <250 and a continued decline of 25% projected for the regional population in three generations, and C2ai, i.e., continued decline projected for the regional population and <50 mature individuals in each local population); or Endangered – E (criteria D, i.e., <250 mature individuals). This would change the conservation status of Lahille's bottlenose dolphins from E to CR in the National Red List of Threatened Species in Brazil. In addition, the development of offshore wind farms was identified as a potential new threat to Lahille's bottlenose dolphin in Brazil, due to the concomitant development of inshore support facilities for these developments, a projected increase in boat traffic and uncertainty regarding the impact on fishery dynamics.

SC/69A/SM/06 details the analysis of biopsy samples documenting the bioaccumulation and temporal trends of organochlorine compounds; polychlorinated biphenyls (PCBs), dichlorodiphenyltrichloroethane (DDT) and mirex, in the blubber of male Lahille's bottlenose dolphins from Patos Lagoon estuary Brazil. Blubber biopsy samples from known adult male Lahille's bottlenose dolphins (n = 28) were collected between 2010 and 2020. The dolphins that were sampled were aged using the long-term photo-ID database that was established in 1974. The highest concentration of organochlorine compounds were PCBs, followed by DDTs and mirex. The high ΣPCB concentrations found in the present study (median: 79 µg.g-1 lw) are considerably higher than the thresholds established in the literature regarding PCB toxicity, which are: 1.3 µg.g-1 lw for endocrine disruption, 10 µg.g-1 lw for risk of decline in population growth rates, and 17 µg.g-1 lw (in blubber) for physiological effects. Of the pesticides, DDT profiles reflect the historical use of DDT in agricultural activities in the Patos Lagoon and other regions along the Brazilian coast. The mean mirex concentration was an order of magnitude higher than that recorded in a previous study in the Patos Lagoon. For PCB measurements obtained between 2010-20, there is an increasing trend, while DDT concentrations decreased between 2010 and 2015, after which levels increased. It was noted that the temporal patterns described in this study would benefit from further analyses and should include samples from other age classes as well as samples that are obtained throughout the year.

The sub-committee thanked the Task Team for their work and commended their efforts to better understand the conservation status of the Lahille's bottlenose dolphin. In discussion, it was noted that this new information indicates that there are likely less than 250 mature individuals for the entire subspecies and that PVA models predict a continued decline for the southern Brazil-Uruguay population. It was noted that all previous recommendations for this subspecies remain current and should be kept in the IWC Database of Recommendations. Given the poor prognosis for this subspecies, the sub-committee made several recommendations.

Attention: SC; SC-TT; CG-Brazil; CG-Argentina; CG-Uruguay; IUCN; CMS

All available information indicates that it is likely that less than 250 mature individual Lahille's bottlenose dolphin (Tursiops truncatus gephyreus) remain, and given that PVA models predict a continued decline throughout the subspecies range, the sub-committee:

(a) ***recommends*** *that the range states of the Lahille's bottlenose dolphin treat this subspecies as a priority candidate for a CMP and develop a proposal to be submitted to the SC69B (2024);*

(b) ***strongly encourages*** *the Government of Brazil to reassess the conservation status of the Lahille's bottlenose dolphin for the National Red List of Threatened Species; and*

(c) ***requests*** *that the IUCN and Convention of Migratory Species (CMS) consider reassessing the status of the Lahille's bottlenose dolphin in their respective categories and appendices.*

5.3 Sotalia (*Sotalia guianensis*)

The Guiana dolphin (*Sotalia guianensis*) was listed as a priority species for conservation status evaluation in 2018 and updates were provided in 2020 and 2021 (SC/68A/REP/05; IWC 2021). The most recent update, presented at this meeting, was based on the data collected from a seven-year biota stranding monitoring programme, conducted in southern and south-eastern Brazil. The monitoring programme occurred between January 2016 and December 2022 and encompassed some 1000 km of along the coastlines of São Paulo to Santa Catarina states. A total of 1290 individual Guiana dolphins strandings were recorded and were concentrated in the Paranaguá Estuarine Complex (PEC), located in the State of Parana, during austral winter and spring. Of the recorded dolphins, there was a higher proportion of males than females (ratio of 2:1). Regardless of sex, the number of stranded mature (515) and immature (total 505; comprising 419 juveniles, 71 calves and 15 foetuses) were similar. Over 30% of the dolphins showed evidence of anthropogenic interactions, mainly from fisheries, but the cause of death was often not identified as the remains were too decomposed.

Considering that regional populations of Guiana dolphins are known to have low abundances, such as 147-365 individuals in Babitonga Bay, Santa Catarina State; 392-438 individuals in Cananéia Estuarine Complex in São Paulo State; and up to 2,000 individuals in the PEC in Paraná, the stranding rate of almost 3.5 animals each week is of concern. This high stranding rate emphasises the importance of ongoing monitoring and the urgent need to develop mitigation actions, which should be based on empirical research. Therefore, collaborative efforts are necessary to reduce impacts and establish management actions aimed at conserving Guiana dolphins throughout southern and south-eastern Brazil. In discussion it was noted that the Guiana dolphin are listed as "Vulnerable" in Brazil's National Red List and as "Endangered" in the southern and south-eastern states of Brazil; the regional populations are exposed to multiple threats and habitat degradation.

The sub-committee **noted** that the large body of work reported for the Guiana dolphin highlights the species vulnerability and **agreed** that the species would benefit from conservation efforts throughout its range. The Commissioner for Brazil, on behalf of Brazil, France and Panama, proposed the Guiana dolphin as a candidate species for a CMP. Brazil expressed its interest in coordinating with other regional governments to develop a CMP proposal to be shared with the sub-committee at SC69B. The main objective of the CMP will be to promote the conservation of the Guiana dolphin in South and Central America, the distribution area of this species.

The sub-committee thanked Brazil, France and Panama for this new initiative and **endorsed** the proposal to consider the Guiana dolphin for a CMP. It was noted that the proposal would be further developed in coordination with the Conservation SWG on CMPs during the intersessional period.

Attention: SC, CC

Following the nomination by Brazil, France and Panama for the development of a Conservation Management Plan (CMP) for the Guiana dolphin (Sotalia guianensis), the sub-committee:

(1) ***endorses*** *the nomination by Brazil, France and Panama to establish a Conservation Management Plan (CMP) for the Guiana dolphin;*

(2) ***encourages*** *the proponents to prepare a draft CMP, pending consideration and endorsement of the nomination by the Conservation Committee and;*

(3) ***established*** *an Intersessional Correspondence Group to interact with the proponents on scientific matters and priorities to be included in the draft CMP.*

5.4 Vaquita (*Phocoena sinus*)

SC/69A/SM/01 provided an update on acoustic monitoring for the vaquita (*Phocoena sinus*). The population of vaquita has been declining for many years, as estimated by a series of acoustic monitoring studies conducted since 1993. Use of this approach has been established as the primary method for providing information on the status of the species, which is classified as 'critically endangered' by the IUCN. Between 2015-18, acoustic data indicated that the population was reduced to less than 20 individuals. Along with the decline in abundance, it was also noted that the distribution area was also shrinking, with most acoustic detections now restricted to the Zero Tolerance Area (ZTA). Acoustic monitoring was conducted between April and December 2022, during neap tide periods, within the ZTA. Sampling was conducted during eight neap tide periods. A total of 13,964 hours of effort were collected across 42 sites and 77 acoustic detections of vaquita were recorded at 17 sites. The distribution of detections showed that most occurred in the western portion of the ZTA, with very low activity in the east. By selecting data from 21 sampling sites between October and November (the same sites used in 2021), it was estimated that the acoustic detection rate had decreased by 11.99% (95% C.I. -38.45% to 21.13%), with a 79.64% probability of an actual decrease. Using detection rate change as a proxy for population trend, this indicates that the vaquita population continues to decrease. The acoustic detection dataset

also demonstrated that, at least for some periods, more than one group of vaquitas were found within the ZTA at the same time. There is funding available for the acoustic monitoring programme for 2023, which will take place between July and November. Vessel-based surveys will be conducted in May and will, again, use expert elicitation techniques to estimate the minimum abundance of the vaquita population.

In discussion, it was clarified that acoustic detections of a 'group' indicated the presence of one or more individuals, as it was not possible using this method to determine exactly how many individuals were present. The sub-committee expressed its appreciation to Jaramillo Legorreta and colleagues for continuing with this important work and noted that these acoustic studies had provided invaluable information for monitoring the status of vaquita.

The sub-committee was provided an update on the IWC initiative to provide alerts on the decline of species toward extinction, which in past reports has been referred to as 'the Extinction Initiative'. This effort grew out of a concern for the increasing number of endangered populations and species of cetaceans and the bleak prognosis for many of these taxa. The Initiative is a communications tool, which will allow the IWC to speak out in a timely manner when grave concern exists for the survival of a species or a distinct population. There have been repeated suggestions that a different name for the Initiative was needed, that would better represent the aims of the effort. This initiative is now known as the "Extinction Alert". The IWC web page now provides information on the Initiative (*https://iwc.int/management-and-conservation/cetaceans-and-extinction*).

At IWC68 the Commission was presented with a template for the initiative and a completed template for the vaquita. These were agreed, and a process proposed whereby such statements would be developed by the SC and issued after review and approval by the Bureau or Commission, noting the process would be adapted as the Initiative progressed.

The sub-committee reviewed the updated text of a completed statement of concern for the vaquita, developed intersessionally by a small group drawn from those involved with both the initial development of the approach and vaquita research and status concerns. In discussion, it was clarified that the process expected was for the statement to then be available for review and suggestions for corrections and improvements within the SM sub-committee. It was also noted that the Secretariat's Communications lead would develop an associated package of supplementary material, including *inter alia* photos and videos and potentially an even shorter simplified statement as a newspaper or press release headline suitable for media outlets.

The sub-committee was presented with a broad overview of efforts currently underway related to vaquita within various multinational environmental agreements, with a focus on the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), as well as initiatives pursued domestically in the United States of America (UASA) to address ongoing threats to the vaquita. Under CITES, Mexico has now prepared a compliance action plan to combat illegal fishing in the Upper Gulf of Mexico and the illegal trafficking in totoaba (*Totaba macdonaldi*). While the plan has not been released, it is currently being implemented and Mexico faces the prospect of a trade ban if it fails to make sufficient progress in plan implementation by November 2023 when the CITES Standing Committee next meets. The World Heritage Committee will, in September 2023, consider corrective measures and criteria for the desired state of conservation for the Islands and Protected Areas of the Gulf of California World Heritage Site that were, in part, developed with input from members of the IWC Scientific Committee. In the USA, the Department of Interior will determine if Mexico will be certified under the Pelly Amendments to the Fishermen's Protective Act by 19 May 2023 with the possible imposition of trade sanctions. Although progress is being made by the Sea Shepherd Conservation Society (SSCS) working in collaboration with the Mexican Navy to reduce illegal fishing in the ZTA, illegal fishing both inside and outside the area remains the biggest threat to the vaquita. Vaquita recovery is not possible without the full and urgent implementation of Mexico's September 2020 regulations to enforce fishing restrictions.

In discussion, it was suggested that sending a letter to Mexican authorities might be useful in making them aware that the sub-committee was cognisant of these new developments related to conservation of the vaquita.

The sub-committee was presented with information on PESCA ABC, a civil association of fishers from San Felipe, Baja California whose mission is to contribute to the well-being of local families and the conservation of the Upper Gulf of California. PESCA ABC are dedicated to developing, testing and implementing alternative fishing gear to ultimately enable fishing in the Upper Gulf (where permitted) without endangering the vaquita. PESCA ABC conducted an interview survey to assess the value of the *chango ecológico* (small artisanal trawl), the only fishing gear authorised for shrimp catching in the Upper Gulf. A total of 80 fishermen from different cooperatives were interviewed, 85% of whom declared that they only used gillnets, not the *chango ecológico.* Respondents who did use the *chango ecológico* participated in training courses to improve their skills, including net repair and gear use. It was noted that during the subsequent fishing season (November-March), the lead fisherman caught a similar amount in the *chango ecológico* gear as he would have done from traditional gillnets. In 2022, a new sustainable fishing model was initiated using alternative gear and sustainable methods with the objective of selling harvested fish at a higher monetary rate. To date, fish caught and handled under this project sold at well over double the typical value, with all profits going to the participating fishermen. Alternative gear testing will continue throughout 2023. The sub-committee note that the success of these efforts are

due PESCA ABC, Cetacean Action Treasury, Museo de la Ballena in La Paz, Mexico, and the Monitoreo Administrativo Regional de Especies Marinas (MAREM).

In discussion, the sub-committee welcomed the efforts of local fishers to test and use alternative, vaquita-safe gear. It was clarified that fishers using the alternative gear were obstructed by vessels using existing gear, and thus are restricted in the distance from shore they were able to operate, which also reduces the alternative gears catch potential.

The sub-committee was made aware that at the 19th Conference of the Parties of CITES, Mexico stated that the decline of the vaquita was related to the altered natural habitat and associated environmental changes and not bycatch, however, no evidence was provided at the time in support of this statement. Following the CITES meeting, it was reported in the Mexican media that a proposal to examine the impact of reduced flow from the Colorado River into the vaquita's habitat was to be submitted to the authorities for approval and funding. The study purportedly aims to determine the impact of river flow disruption on vaquita, based on changes in $\delta 18O/\delta 16O$ isotope levels in vaquita bones and teeth obtained from specimens maintained in museum collections. Notwithstanding problems associated with the outlined methodology, as no full research proposal is available, it was not possible for the sub-committee to evaluate either the suitability or the robustness of the proposed study. It was strongly agreed, however, that this sub-committee has, for decades, recognised that the decline in the vaquita population is directly linked to bycatch.

The sub-committee was presented with media reports from an event organised by the Sea Shepherd Conservation Society (SSCS) and the Government of Mexico, which reported a 90% decline in illegal fishing in the ZTA, based on an analysis of illegal fishing data collected over the past year. It is clear that illegal fishing (for totoaba, shrimp, and other species) continues in the Upper Gulf, both inside (where fishing effort is less than documented historically) and outside the ZTA, but how SSCS calculated the reduction in illegal fishing was not apparent in the media reports.

In discussion, it was clarified that the apparent reduction in illegal fishing activities within the ZTA is due in large part to the installation of anti-gillnet devices by the Mexican Navy, supported by SSCS. The reduction in illegal fishing activities was welcomed, however, the sub-committee re-iterated its long-standing statement that the situation for the vaquita is dire and that illegal fishing has to cease completely if there is to be any hope for the species survival.

5.5 Strait of Gibraltar killer whales (*Orcinus orca*)

The sub-committee received an update on the interactions between killer whales (*Orcinus orca*) and vessels along the Atlantic coast of the Iberian Peninsula and adjacent waters (which come under the jurisdictions of Spain and Portugal). Since 2020, 483 interactions have been documented from members of the public, systematic questionnaires, press releases and social media. Analyses of these data show that interactions occur year-round and during both day and night-time hours. It was noted that interactions peak between June and October and at midday. On average, interactions last 35 minutes and typically involve medium-sized (< 15m), spade-rudder sailing vessels, travelling at approximately 6kt, either sailing or motoring. Interactions consistently involved 15 individuals, most of which were young animals, comprising four different groups. Since 2021, several mitigation measures to protect both killer whales and vessels have been implemented. In Spain, medium-sized sailing vessels have been restricted from certain areas. In Portugal, whale watching vessels have been advised to avoid killer whales. Following a workshop in Lisbon in 2023, the Portuguese Navy and the Institute for Nature Conservation and Forests (ICNF) agreed to collaborate to further investigate and develop mitigation measures to minimise the risks posed by these interactions. Until such solutions can be found, vessels in Portuguese waters are advised to report both sightings of, and interactions with, killer whales to the Marine Rescue Coordination Centre (MRCC) and to avoid areas where killer whales have been sighted. In the event of an interaction, recreational vessel users are advised to 'play dead' by stopping vessel operations and avoiding visual contact with the whales. Despite this, there have been reports of recreational vessel users resorting to illegal measures such as throwing flares, firecrackers, sand, ropes, diesel, sticks and hooks at killer whales to deter them, often unsuccessfully. It was suggested that these attempts likely act as 'positive reinforcement' for the killer whales and may encourage further interactions.

The Government of Spain is funding several projects, aimed at better understanding and mitigating interactions between killer whales and vessels. These include: (i) monitoring killer whale populations using photo-ID, to identify which individuals are involved in interactions with vessels; (ii) mapping the spatial distribution and movement patterns of killer whales in the Strait of Gibraltar using satellite tags; (iii) understanding how vessel behaviour, e.g., stopping, accelerating, reversing, changing direction, may provoke interactions and if non-invasive acoustic deterrents, i.e., metal pipes, pilot whale vocalisations, might be effective in deterring this behaviour.

In discussion, it was noted that the only reported interactions between killer whales and vessels in the Strait of Gibraltar prior to 2020, were depredation events in tuna fisheries. It was also recalled that three of the killer whales that initially began to interact with recreational vessels in 2020, two had severe injuries, possibly of anthropogenic origin.

The sub-committee **expressed concern** that the number of individual animals interacting with vessels appears to be increasing and that aggressive attempts to deter the animals appear to be escalating. It was **agreed** that the ICG continue

to work on this issue and **advised** that an in-person workshop, incorporating animal behaviour expertise, social scientist, management authorities and other stakeholders may assist in developing mitigation measures.

5.6 Tursiops taxonomy

The *Tursiops* taxonomy ICG was established following a workshop held in 2018 to develop a better understanding of the taxonomy of the Genus *Tursiops* worldwide and a widely applicable taxonomy assessment framework for small cetaceans. It was agreed to conduct regular updates evaluating new available information every 2-3 years. A previous update was conducted in 2021 (IWC, 2022, p.123). Recalling recommendations SC21167 and SC21169, an ICG was convened by Natoli and new references reviewed during an online meeting on 5 April 2023. The goals of the meeting were to: (1) review new publications published between 2021-23 relevant to *Tursiops* taxonomy; and (2) update summary tables created for the 2018 Tursiops Workshop Report (IWC, 2019) with new information, including a review of the geographic regions that have few information on *Tursiops*.

The list of references, summary table and table of data deficient regions are appended as supplementary information (Appendices 2, 3 and 4). The review concluded that:

(1) new work reinforces the existence of two different lineages in the Western Indian Ocean (WIO), with new morphological data in support of the genetic evidence available previously (see recommendation SC18186);

(2) new information with morphologic and genetic evidence now clarifies the species status of the coastal bottlenose dolphin population in the Western North Atlantic (WNA);

(3) new morphologic evidence on the Eastern Tropical Pacific (ETP) population supports the presence of a different subspecies (*Tursiops truncatus nuuanu*);

(4) new information is available on the evolutionary history of the pelagic and coastal North Atlantic (NA)*Tursiops* populations;

(5) the population structure at the southern range of the Lahille's bottlenose dolphin population (*T. t. gephyreus*) in Western South Atlantic (WSA) remains poorly understood; and

(6) no progress in addressing the taxonomic status of *Tursiops* in the Indian Ocean (IO) (Australian waters) has been made although new information is available on individual populations.

The sub-committee noted that new morphological data supported the existing genetic data that shows two different lineages in the Western Indian Ocean (WIO). The sub-committee continues to encourage new work to further better understand these lineages and to expand sampling into the waters of Pakistan, Bangladesh, Gulf of Aden, eastern Africa and the Arabian/ Persian Gulf.

The sub-committee noted that both morphologic and genetic evidence now clarifies the species status of the coastal bottlenose dolphin population in the WNA (Shintaku, 2021) and encouraged work to continue on the investigation of population boundaries of this new coastal species particularly in the Gulf of Mexico.

The sub-committee noted that new morphological evidence from the ETP supported the presence of a new subspecies (*T. t. nuuanu*) (Costa *et al*., 2022) and **reiterates** the urgent need to investigate the taxonomic status of the Tursiops population in the Upper Gulf of California, noting museum specimens may be available for such analysis.

The sub-committee **draws attention** to its previous recommendations that knowledge of Tursiops taxonomy remain poor in many areas, e.g., the African coast of the eastern North Atlantic and South Atlantic; the southern and eastern Mediterranean Sea; the eastern South Pacific; eastern Australia and in the western Pacific islands of Micronesia and Melanesia; Polynesia; the Philippines; Vietnam and the Red Sea.

The sub-committee **commended** Natoli, Hamda and Cipriano for their thorough review and requested that they continue to report to the sub-committee every 2-3 years.

5.7 Atlantic humpback dolphin (*Sousa teuszii*)

The sub-committee was provided a summary of the activities of the Consortium for the Conservation of the Atlantic Humpback Dolphin (CCAHD, 2022) and an update on the proposed rule to list the Atlantic humpback dolphin as endangered under the U.S. Endangered Species Act (ESA). CCAHD, the previously informal network of scientists and conservationists, is now formally registered as a foundation (stichting) in the Netherlands and holds a bank account under Dutch law, allowing the group to more efficiently raise funds for its mission of 'working towards the long-term sustainability of Atlantic humpback dolphin (*Sousa teuszii*) populations and their habitats through research awareness, capacity building, and action'. Ongoing funding from the Friends of Nuremberg Zoo supported the core activities of the CCAHD Secretariat and CCAHD welcomed new partners, mostly from Atlantic humpback dolphin range countries.

Boat surveys were conducted in Senegal and Guinea to document Atlantic humpback dolphin distribution and habitat preferences, as well as to obtain imagery for photo-ID catalogues, which are hosted by CCAHD partners African Aquatic Conservation Fund (AACF) and Biotope Guinea. Practical training programmes were also conducted in Gabon, supported by the Gabon National Parks Agency (ANPN). A regional project to collate local ecological knowledge using interview surveys commenced in seven Atlantic humpback dolphin range countries: Congo, Gabon, Cameroon, Liberia, Guinea, the Gambia and Senegal. These projects focused on capacity building for scientists and conservation managers, as well as developing protocols and resources to be used throughout Atlantic humpback dolphin range countries.

CCAHD board members and partners have formally contributed to the Convention on Migratory Species' (CMS) Single Species Action Plan, which will be reviewed and hopefully endorsed at the CMS Conference of Parties in October 2023. CCAHD partners have also contributed extensively to a species review conducted by NOAA in response to a petition to include the Atlantic humpback dolphin as a threatened species under the U.S. ESA. In April 2023, NOAA announced the proposed rule to list the Atlantic humpback dolphin as endangered under the ESA.

The sub-committee thanked Minton for presenting the ongoing work of CCAHD and **commended** the tremendous progress made on the research and conservation of the Atlantic humpback dolphin. The sub-committee **reiterated** its strong support of the CCAHD workplan and **requested** that an update be provided at SC69B.

5.8 Asian river dolphins

Khan summarised the report from an international workshop held on 5-7 October 2022 in Islamabad, Pakistan to address fishery threats to freshwater cetaceans in Asia (WWF, 2022). Freshwater cetaceans (river dolphins and finless porpoises) are present in eight Asian countries: Bangladesh, Cambodia, China, India, Indonesia, Myanmar, Nepal and Pakistan. The four Asian freshwater cetacean species face similar challenges from fisheries practices: bycatch is the main cause of mortality for freshwater cetaceans. Infrastructure projects adjacent to and within river systems, deteriorating water quality and habitat destruction represent additional threats. During the workshop, government representatives, cetacean experts and fishery experts from all eight Asian freshwater cetacean countries discussed how best to tackle the threat from fisheries, both through reducing cetacean mortality and seeking more sustainable fishing practices. In summary, all workshop participants agreed to the 'Islamabad Recommendations' contained within the report: to develop, collaboratively, a fishery-focused freshwater cetacean Conservation Management Plan for Asia. Bangladesh, Cambodia, Indonesia, Nepal and Pakistan agreed to actively participate in the development of such a proposal.

During discussion it was noted that an event to sign a global declaration on river dolphins is planned for October 2023, to be held in Bogota, Colombia, which will be attended by government ministers from throughout the range states of all river dolphin species. The sub-committee also **agreed** to establish an ICG, to prepare an Asian river dolphins CMP.

6. REVIEW DIRECT TAKES AND LIVE CAPTURES OF SMALL CETACEANS

In previous sub-committee reports, the Secretariat prepared a summary table of direct takes of small cetaceans, extracted from National Progress Reports, online reports posted by appropriate country authorities or management entities and other information provided by authorities or other SC groups. These data spanned approximately 25 years and the tables themselves were unwieldy to display in a document format. During the intersessional period, the Statistics Department developed a more accessible repository which can be provided on request (statistics@iwc.int). The sub-committee **noted** its great appreciation for all who have assisted in the compilation and review of the data on directed takes.

6.1 Direct takes

An ICG was established at SC68D to progress the analyses of small cetacean direct take data, compiled by this sub-committee. A need to fill data gaps through a gap analysis was proposed at SC69D and an intern from Oxford University (Sharkey) made significant progress on this work during the inter-sessional period. The available data included direct takes per year and by country, as well as direct takes plus bycatch per species and country. Challenges in data quality were identified, particularly that only 10% of the records included coordinates. To fill identified gaps, it was suggested that data be 'crowdsourced' from the scientific community and, potentially, via citizen science reporting. Moving forward, the ICG plans to focus on species and areas by collecting data on abundance estimates and highlighting information gaps. Outcomes of this project include the establishment of a 'clean' database of existing information on small cetacean takes held by the IWC (currently 4,379 records) with related metadata and documentation; and code for data cleaning/checking has been archived on GitHub. Moving forward, Katara plans to highlight knowledge gaps with additional graphical analyses and start collating abundance estimates. Katara requested the assistance of the sub-committee members in the provision of suitable data. The sub-committee **thanked** Sharkey for his work and **agreed** that this work would continue, noting that this is a long-term and iterative process.

Sub-committee members were identified who were willing to provide data for this project moving forward and were included in the ICG. The need to assess data quality and how best to integrate different data sources was highlighted

and it was agreed that this would be considered by the ICG. It was suggested that ICG include members of the *Ad hoc* Working Group on Databases and related Issues (GDR) and further, that a broader strategy for the collation of IWC databases be developed. It was acknowledged that a tremendous amount of work had been achieved in the intersessional period because of the internship, which had been made possible by the Crankstart Internship and Mentoring Programme of the University of Oxford.

SC/69A/SM/03 expands on Kasuya's (2019a; b) analysis of catch statistics (1970 to 2014) from the drive hunts operating from Taiji (33°36'N-135°57'E) and from villages on the coast of Izu Peninsula (34°38'N-35°03'N, 138°45'E-139°26'E), on the Pacific coast of central Japan. The decline in numbers of small cetaceans hunted off Taiji is following the same pattern documented in the commercial whaling of great whales, with the most valuable species depleted first, followed by less desirable species in sequence. For instance, the reported catches at Taiji ranged between 33% and 59% of the quota for short-finned pilot whales since 1982, and the catches in 2015-19 had declined to 11% of the catch during the peak years (1980-1985). The preferred size and sex of bottlenose dolphins removed alive for aquariums are weaned, immature females; other remaining individuals are likely released and not counted against the bottlenose dolphin quota. The information provided in SC/69A/SM/03 greatly reinforces the concerns of this sub-committee as it suggests that coastal populations of the multiple species involved in the Japanese drive hunts have declined, and in relation to current abundance the quotas are now so high that the catch levels are limited primarily by dolphin abundance (i.e., availability of animals to be hunted) and not by the quota itself. Therefore, quotas must be drastically reduced to stop further declines of the populations and a much more precautionary management approach is needed.

It was noted with concern that analysis of catch statistics from the drive hunts of small cetaceans along the Pacific coast of central Japan indicates declines in the populations of multiple species, although available evidence is insufficient to assess their individual status with confidence. Given the evidence for several species that catch levels are limited by animal abundance (availability) and not by the quota, a much more precautionary management approach for the Japanese drive hunting of small cetaceans, with enforcement of reduced quotas, is **strongly encouraged**.

SC/69A/SM/08 presented an update of small cetacean hunts in Greenland. Seven odontocete species are targeted by hunters in Greenlandic waters. Beluga (*Delphinapterus leucas*) and narwhal (*Monodon monoceros*) are hunted under annual quotas. Atlantic white-sided (*Lagenorhynchus acutus*), white beaked dolphin (*Lagenorhynchus albirostris*), harbour porpoise (*Phocoena phocoena*), killer whale (*Orcinus orca*) and long-finned pilot whale (*Globicephala melas*) are hunted without quotas. Between 2003-22, 72,970 small cetaceans were reported killed in Greenland and 4,206 individuals in 2022. Knowledge of population status and trends is generally poor for most small cetaceans (e.g., Ugarte *et al*., 2020), as is the understanding of the impact of hunting and other anthropogenic impacts on these species. A significant number of hunted individuals are likely unreported and there is incomplete accounting for struck and lost individuals. It was noted that some of the targeted small cetacean populations are experiencing declines in abundance. This sub-committee has previously raised concerns regarding the unsustainability of some of these hunts (e.g., IWC, 2022). The paper concludes that to ensure the protection of small cetaceans in Greenland, the government should urgently implement measures for all small cetacean hunts consistent with international conservation management recommendations, ensuring sustainability and taking into account other causes of mortality.

In discussion, it was noted that this sub-committee had previously expressed serious concern over the imminent risk of extirpation of the narwhal (*Monodon monoceros*) population present in southeast Greenland due to overhunting and had recommended that Naalakkersuisut, the executive body for the government of Greenland, immediately reduce the quota for the southeast Greenland hunt of narwhals to zero (SC2288). In 2022, a request (SC2289) was made to the Secretariat to write a letter to Naalakkersuisut expressing this recommendation and this sub-committee's concerns over these continued hunts and it was noted that this letter had been sent. In addition, NAMMCO, the body that advises on Greenland hunt limits, has raised similar concerns and their efforts to reduce the hunts to a sustainable level was acknowledged. It was also noted during discussion that abundance estimates are available from Greenland for some of the species which are hunted, and considerable effort has been made to estimate the population size of narwhals in particular, which should be both acknowledged and included in future discussions on this topic. The sub-committee **reiterated** its previous recommendation that the quota for the southeast Greenland narwhal be reduced to zero.

The issue of incorporating hunter knowledge into decisions regarding catch and strike quotas was raised and it was acknowledged that hunters know a great deal about small cetaceans and their habitats in west Greenland and could contribute to the work of the sub-committee but, at times, face challenges in engaging in highly technical discussions. It was **agreed** that engaging hunters and communities in discussions was desirable and should be planned as part of this sub-committee's work. The sub-committee **requested** that the SC and CC collaborate on how best to engage with hunters and incorporate hunter knowledge into future discussions and provide a report to SC69B.

Attention: SC, C

~~*The sub-committee* ***expressed its concern*** *regarding the sustainability of small cetacean hunts in Greenland and* ***recommended*** *that: a review of the progress of the previous recommendations made by this sub-committee be conducted intersessionally and that it is reported at SC69B.*~~

[This recommendation was re-worded during Plenary, see below]

The Committee ***expressed its concern*** *regarding the sustainability of small cetacean hunts in Greenland, and* ***recommended*** *that:*

(a) Greenland follows the scientific recommendations from NAMMCO and JCNB on sustainable removals,

(b) a review of the progress of the previous recommendations made by this Committee be conducted intersessionally and that it is reported at SC69B.

Further, the Committee ***agrees*** *that:*

(c) the Vice Chair of this Committee contact NAMMCO to communicate on these issues and to develop the way forward.

7. STATUS OF THE VOLUNTARY FUND FOR SMALL CETACEANS

The Voluntary Fund for Small Cetacean Conservation Research currently totals £124,368, of which £88,554 is unallocated (SC/69A/O/03). Since April 2022, contributions have been received from the Governments of France, Switzerland and the Netherlands, the Animal Welfare Institute (AWI), Ocean Care, Campaign Whales, Pro Wildlife, LegaSeas, WeWhale, Oceanic Preservation Fund, Whaleman Foundation, Cetacean Society International and Whale and Dolphin Conservation (WDC). The Secretariat has updated the Small Cetacean Voluntary Fund webpage with a full list of donors, completed and ongoing projects and new publications.

The sub-committee **expressed** its sincere gratitude for these contributions and noted that the Fund is intended to support critical conservation research projects of direct relevance to the work of the small cetacean sub-committee.

During the IWC68 Commission Meeting, held in Slovenia in 2022, a special event promoting all Voluntary Funds was held. A summary of the history of the Voluntary Fund for Small Cetacean was presented and key projects were highlighted, including one of the first projects funded, *Threatened Franciscanas: improving estimates of abundance to guide conservation actions* (Sucunza *et al*., 2022b). This specific project led to the establishment of the franciscana Task Team and then to the development of the first CMP for a small cetacean which is reaching its conclusion and is summarised in Appendix II.

7.1 Progress on Funded Projects

At SC68C, the Small Cetacean Voluntary Fund Review Panel recommended five projects for funding. These projects were approved at the 2021 Virtual Meeting of the Commission. At SC68D, an information gathering expedition to remote hunting communities in the Solomon Islands was proposed and funding was approved at the Commission Meeting IWC68, with funds allocated from the SC Research Fund. The progress of each project will be reported to this sub-committee yearly and final reports for all projects will be submitted between 2023-26 (see Table 1).

Table 1

Proposals Approved for Funding from the Voluntary Research Fund for Small Cetaceans.

Principal Investigator	Title	Anticipated Final Report (SC Year)
Gopal Khanal	Understanding the effects of trans-boundary barrage operations on the Nepal-India border for Ganges River dolphin habitat and population dynamics (*Platanista gangetica).*	SC 2023
Laura J May-Collado	Rapid assessment of the occurrence and conservation status of Guiana dolphins at the northern periphery of their range in Central America (*Sotalia guianensis).*	SC 2023
Yurasi Briceño	More knowledge, less mortality: education for the conservation of Guiana dolphins (*Sotalia guianensis*), Lake Maracaibo, Venezuela.	SC 2023
Joanna Alfaro Shigueto	Assessing the conservation status of Burmeister's porpoises in Peru – trialing tools for estimating abundance and bycatch of this cryptic and poorly known species (*Phocoena spinipinnis).*	SC 2024
SM Sub-Committee	Solomon Islands: information gathering expedition to remote hunting communities to obtain logbook data on hunts.	SC 2025
Mariano Alberto Coscarella	Population assessment and dynamics of Lahille's bottlenose dolphins in Argentina (*Tursiops truncatus gephyreus).*	SC 2026

7.1.1 Rapid assessment of the occurrence and conservation status of Guiana dolphins at the northern periphery of their range in Central America

The northernmost populations of the Guiana dolphin (*Sotalia guianensis*) occur in the Cayos Miskito Reserve, Nicaragua, the Gandoca-Manzanillo Wildlife Refuge, Costa Rica, and Changuinola and Colon, Panama. However, little is known of population status in these areas. The 'Sotalia' ICG, led by Domit, identified significant knowledge gaps on the occurrence, abundance and status of Guiana dolphins in Central America. To address this data gap, this project, led by May-Collado, has three objectives:

- build a network of collaborators representing all sectors of governance, NGOs, community leaders, research groups in Honduras, Nicaragua, Costa Rica and Panama;
- assess Guiana dolphin interaction with fisheries and collect information on the occurrence of Guiana dolphins in Cayos Miskitos (Nicaragua) and Gandoca-Changuinola (Costa Rica/Panama) through interview survey; and
- assess the occurrence, distribution and relative abundance of Guiana dolphins in Cayos Miskitos (Nicaragua) and Gandoca-Changuinola (Costa Rica/Panama) by conducting vessel surveys.

Management authorities, NGOs, community leaders and research groups were contacted throughout the region and information on Guiana dolphins was requested. In Honduras, no reports of this species exist. To better understand the situation and to better prepare for the planned interviews and vessels surveys, the project team travelled to Nicaragua in June 2022 to work with the URACCAN University, with the aim of preparing permits and logistics for the proposed August 2022 fieldwork in Cayos Miskitios. It became apparent that the political situation was such that the team did not feel safe and were unable to progress on obtaining the required permits, despite several attempts to meet personally with the Ministry of the Environment and Natural Resources (MARENA), the Secretary for Natural Resources (SERENA) and the National Institute of Fisheries and Aquaculture (INPESCA). Given that no authorisation was obtained and that the team's local collaborators had safety concerns, both for themselves and the project team, this part of the proposal was not pursued. For Costa Rica-Panama, research permits, and survey logistics were easier to obtain and establish and fieldwork was planned for August-September 2022. As heavy rainfall in June/July caused several landslides which blocked access to the survey area, field work has been postponed to mid-2023. The sub-committee thanked the project team for their update and looks forward to receiving their project results and their final report at SC69B.

7.1.2 More knowledge, less mortality: education for the conservation of Guiana dolphins (Sotalia guianensis), Lake Maracaibo, Venezuela

This education-focused community project was led by Briceño and centres on the population of Guiana dolphins in Lake Maracaibo, Venezuela. The project commenced in January 2022 and was completed in March 2023. This project had three objectives:

- assess the level of dolphin bycatch and hunting in unexplored fishing communities in Lake Maracaibo;
- promote dolphin watching operation as an alternative income in the south of Lake Maracaibo; and
- establish an education and outreach campaign at the local and regional level concerning the importance and conservation status of *S. guianensis* in Lake Maracaibo.

Interviews were conducted in five fishing communities to collect information on bycatch, hunting and the use of the Guiana dolphins as wildmeat. Data were obtained from 12 communities, which reported 201 dolphins taken either as bycatch or direct hunting. From the north of the lake, one community reported that 43 dolphins had been taken between January and December 2022. From the south of the lake, interviews conducted prior to this project's commencement indicated that three individuals were bycaught per month (Briceño *et al*., 2021). The information gathered from interviews from this study indicated that now only two individuals were bycaught per month. In addition, the interviewees showed less interest in consuming these dolphins than before. It was not clear if this change in community attitude was a response to newly initiated conservation activities or other factors. Meetings were also held with the Ministry of Environment and Fisheries, members of the National Parks Institute and representatives of the fishermen's councils, to discuss strategies aimed at reducing mortality that could be practicably implemented. In discussion with these agencies, the urgency of reactivating surveillance and enforcement in the communities with the highest incidence of catches was stressed. Workshops on ecotourism and best practice dolphin watching were conducted in communities in both the north and the south of the lake and included 31 participants. In addition, four schools were visited and 65 children plus six teachers were provided material on dolphin biology and conservation. Using social networks, online media and press, information was disseminated on dolphin protection within the lake. For the first time in Venezuela, the International Day of Freshwater Dolphins was celebrated and included participants from many sectors of the local communities. The final report from this project will be made available on the IWC website. The sub-committee thanked the project team for their work and offered to provide assistance in future work on this extremely small population.

7.1.3 Understanding the effects of trans-boundary barrage operations on the Nepal-India border for Ganges River dolphin (Platanista minor) habitat and population dynamics

This project focuses on the Ganges River dolphin (*Platanista minor*) that reside between barrages in the Nepal-India border. The project is led by Khanal and addresses one of the recommendations of the South Asian River Dolphin Task Team:

> 'As a priority, studies should be conducted to fully understand movements of dolphins across barrages in all countries and quantify the extent of population connectivity and impacts on dolphin populations in fragmented riverine habitats.'

The study site comprises three areas; the Karnali-Ghaghra area is upstream of a barrage and has a population of 20-30 dolphins, the Narayani-Gandak area is upstream of the Triveni (Gandak) barrage and 1-3 dolphins occur there and, the Kosi area downstream of the Birpur (Koshi) barrage has a population of 15-20 dolphins. The project has four objectives:

- understand the effects of trans-boundary barrages on river habitats for Ganges River dolphins along the Nepal-India border, in the Karnali-Ghaghara, Narayani-Gandak, and Sapta Koshi/Kosi river systems;
- assess responses of Ganges River dolphins to alterations in river discharge dynamics and geomorphological changes upstream and downstream of these barrages in Nepal and India;
- identify similarities and differences in the operation of the three barrages that allow for differential population persistence and river dolphin movement through barrages; and
- increase barrage authority awareness of adaptive and ecologically oriented management of trans-boundary barrages.

Between September and October 2022, 75 km of survey effort was conducted in the Karnali and Geruwa channels. Seven individual dolphins were sighted in the Karnali section, and no dolphins were sighted in the Geruwa section. Kelkar joined the survey and provided advice on methodology. Tandem to the vessel surveys, sustainable fishery practices and dolphin conservation were discussed with the fishing communities of Tharu and Sonata and management officers of the Bardia National Park. Market surveys were also conducted to document fishing gear types, particularly those that contribute to dolphin mortality and unsustainable fisheries, e.g. fine-mesh gillnets.

The project was originally intended to be completed by February 2023, however, while surveys were completed in the Karnali and Naryani river systems, the Koshi river survey is still to be completed. The new anticipated completion date for this project is August 2023. The sub-committee thanked the project team for their update and looks forward to receiving project results and the final report at SC69B.

7.1.4 Assessing the conservation status of Burmeister's porpoises in Peru: trialling tools for estimating abundance and bycatch of this cryptic and poorly known species (Phocoena spinipinnis)

Burmeister's porpoise (*Phocoena spinipinnis*) occur in the coastal waters of Peru, Chile, Argentina and infrequently Brazil and are one of the least known small cetacean species. Throughout their range, Burmeister's porpoise have a high mortality in fisheries operations, and it is from these bycaught individuals that most knowledge of the species is derived. Although little is known of population structure, the Peruvian population of Burmeister's porpoises is thought to be genetically distinct. Burmeister's porpoise were listed as a priority species in the Small Cetacean Voluntary Fund 2021 call for proposals and this project, led by Shigueto, has six objectives:

- design and trial boat-based visual and passive acoustic survey methods suitable to determine distribution and abundance of Burmeister's porpoises in open coast shelf-waters;
- determine distribution and abundance of Burmeister's porpoises and sympatric delphinids (e.g., dusky dolphins) in two pilot survey areas that represent different environmental characteristics;
- assess the range and intensity of anthropogenic threats to small cetaceans in the two pilot study areas during the at-sea surveys;
- complement at-sea data collection on the distribution of and threats to the focal species with fishers' local knowledge by conducting interview-based surveys in relevant fishing communities;
- build regional capacity in survey techniques relevant to cost-effective, regionally appropriate monitoring of the population status of Burmeister's porpoises including development of a Spanish language best practice guide for small cetacean monitoring; and
- enhance awareness of the general public and relevant stakeholders (fishers, government agencies, local universities) of Burmeister's porpoises (and other small cetacean species) and their conservation needs.

Vessel-based visual and acoustic surveys have been conducted at two sites, Puerto Morin and Paracas. First surveys in Puerto Morin recorded common dolphins but no dusky dolphins. Seventy-four sightings of Burmeister's porpoise were recorded, over 68 hours (421.2 nm) of effort. The Paracas survey is still to be conducted. Anthropogenic threats noted during at sea surveys included vessel traffic, fishing operations (haul and set nets) and presence of marine debris. Also, many dead seabirds were noted, likely due to avian influenza (H5N1) which had been confirmed in the area at the time of the survey.

During the first six months of the project period, the fishing community interview content and format were developed and tested. For each port, the aim was to interview at least 20% of the gillnet fishers, using census data from the Peruvian government to establish the total number of artisanal gillnet fishers per port. Interviews commenced in July 2022, and will be conducted in five ports; Salaverry, Chimbote, Tambo de Mora, San Andres and Lomas. The first interviews were conducted in the port of Salaverry, and 37 fishers were interviewed. The best time to interview fishers in the port was during the early morning, and in the town during the afternoon, when fishers could be found mending their nets. During this survey, the local coastguard representative was approached so that permits could be obtained for the on-board monitoring component of the project, planned for May-August 2023. Interviews were then conducted in Chimbote, where a total of 62 interviews were completed. In Chimbote, the main landing pier was visited in the early morning and a secondary landing site (El Dorado) was visited in the afternoon, to accommodate different working schedules of the fishers. Approximately 80% of the surveys have been completed, with two more sites still to be surveyed. During interview surveys, the team also used the opportunity to provide information to the fishers on cetacean conservation, in particular Burmeister's porpoise and dusky dolphins, highlighting the threat to these species from incidental capture in fisheries.

Training in survey techniques and analyses (Distance, PAMGuard and Cybertracker) has been provided to members of the local NGO ProDelphinus and personnel from the Instituto del Mar del Peru. More training will be conducted as this project continues. During the vessel surveys in Puerto Morin, the crew of the survey platform (a fishing vessel) was also included in fieldwork survey methodology and for the second survey area, in Paracas, the Marine Reserve rangers will be trained and will participate in fieldwork surveys. This project will be completed in August 2023. The sub-committee thanked the project team for their update and looks forward to receiving their project results and the final report at SC69B.

7.1.5 Population assessment and dynamics of Lahille's bottlenose dolphins in Argentina (Tursiops truncatus gephyreus) (SC/68C/SM/03)

In Argentina, Lahille's bottlenose dolphin (*Tursiops truncatus gephyreu*s) are distributed between Bahía Samborombón (Province of Buenos Aires) and the Province of Chubut, although few records have been made further south in the Provinces of Santa Cruz and Tierra del Fuego. There have only been a few research studies conducted on this species in Argentina and none since 1980. Today, there are infrequent sightings reported in areas where they were once very common, e.g. Bahía Samborombón, Península Valdés and Bahía Engaño. This study aimed to update information on Lahille's bottlenose dolphin in Argentina, to contribute to the work of the Lahille's Task Team of this sub-committee, to address the recommendation made to conduct photo-ID work on all Lahille's bottlenose dolphin populations to refine survival estimates and assess trends in abundance. This project therefore had two objectives:

- establish a network with Argentinean colleagues to stimulate national collaboration and the generation of one large national dataset;
- conduct photo-ID surveys in the areas where more sightings have been noted to assess:
    - abundance and population dynamics;
    - survival and birth demographics, with a special focus on recruitment rate;
    - population viability (extinction risk under several management scenarios); and
    - movement patterns and population connectivity.

The scientific permits required for this project have been issued for Chubut and are pending for Río Negro. Data collection and analyses protocols have been defined. Surveys have also been conducted in Bahía San Antonio, where both photo-ID imagery and three skin samples were collected in March 2023. Between June 2022 and February 2023, 18 surveys were completed in Golfo Nuevo and Golfo San José, during which only one bottlenose dolphin sighting was made, which comprised at least three distinct individuals. No skin samples were obtained. In Rada Tilly, 13 surveys were completed, and bottlenose dolphins were encountered on two occasions, however, neither suitable imagery nor skin samples were obtained, although it is noted that a single skin sample was collected prior to this project and is available for analysis. One survey was completed in the Bahía Blanca estuary and four individuals were identified. The anticipated completion date for this project is 2025. The sub-committee thanked the project team for their update and looks forward to receiving a progress report at SC69B.

7.1.6 Solomon Islands: information gathering expedition to remote hunting communities to obtain logbook data on hunts

Between 2011-13, the Voluntary Fund for Small Cetacean Conservation Research supported a project in the Solomon Islands, investigating the hunt of small cetaceans, *Genetic and demographic assessment of dolphins taken in live-capture and traditional drive-hunt in the Solomon Islands* (Oremus *et al*., 2013). As part of this project, hunt logbook data, spanning 37 years, were analysed. At SC68D, a request was made to support the travel of local researchers to the remote islands of the Solomons where this hunting occurs so that the hunters' logs from 2013 onwards could be copied. It was agreed that the Voluntary Fund for Small Cetacean Conservation Research would provide funds, however, at IWC (2022), the required funds were approved from the Scientific Committee Research Fund. This sub-committee is working with Solomon Islands Government officials to obtain these data which will be incorporated into the table of direct takes and are currently being assessed by the IWC Statistics Department.

8. BIENNIAL WORKPLAN

The workplan was reviewed in session and established from progress updates from different ICGs, identified actions and recommendations made during SC69A. Several ICGs/AGs were noted as long term and ongoing; Poorly Documented Take of Small Cetaceans, Recommendation Review, Small Cetacean Task Team Steering Committee, Lahille's Dolphin Task Team, Direct Takes of Small Cetaceans and Tursiops Taxonomy Review. In addition, several groups were re-established during the meeting as they remain active; the Strait of Gibraltar Killer Whale Advisory Group and the group planning the forthcoming review of the South Pacific Islands Small Cetaceans Group. Several ICGs were noted as completed and/or were moved to other parts of the Committee; the Franciscana CMP coordination group (CMP complete), the finless porpoise (marine) ICG, the Guiana Dolphin Review (proposed as a CMP so a new group will be formed), the South American River Dolphins CMP co-ordination (now in CMP) and the Management of the Solitary Dolphin of Northwest Spain AG. A new ICG was established to review recommendations on direct takes from the waters of Greenland called 'Greenland Small Cetacean Hunt'. The updated work plan is presented in Table 2.

Table 2

Summary of workplan and ICGs.

Item	Intersessional 2023-24	2024 Annual Meeting (SC69B)
Poorly Documented Take of Small Cetaceans (ICG)	Porter (Convenor), Ingram, Avila, Hodgins, Cassani - continue development of framework for SM work on Aquatic Wildmeat.	Report progress
Recommendation Review (ICG)	Trujillo (Convenor), Porter, Jimenez, Couto di Tullio, Vrooman, Hodgins, Hielscher - make progress on new review framework; establish regional and species assessment teams.	Report progress
Small Cetacean Task Team Steering Committee (AG)	Simmonds (Convenor), Donovan, Genov, Minton, Parsons, Porter, Reeves, Rojas-Bracho, Staniland, Thomas, Trujillo, Minton - provide ongoing advice and support to established Task Teams; consider any new proposals.	Report progress
Lahille's Dolphin Task Team (ICG)	Vermeulen (Convenor), Fruet (Convenor), Berninsone, Von Fersen, Laporta, Daura-Jorge and Coscarella - conduct proposed workshop; provide a plan for CMP development; continue work on LBD TT objectives.	Report progress
Direct Takes (ICG)	Katara (Convenor), Allison, Fisher, Hines, Porter - make progress on the analysis of direct take database of small cetaceans held by the IWC Secretariat.	Report progress
Tursiops Taxonomy (ICG)	Natoli (Convenor), Cipriano, Hoezel -monitor new publications related to this issue and update Tursiops taxonomy database developed by this ICG.	Report progress
Strait of Gibraltar, Killer whale (ICG)	Esteban (Convenor) García-Bellido, Rose, Sequeira, Simmonds, Porter - compile information on the behaviour of the Strait of Gibraltar killer whale subpopulation; if possible, organise a workshop comprising experts, including marine mammal behaviouralists, to decide how best to approach this escalating issue.	Report progress
The South Pacific Island SM Group (ICG)	Porter (Convenor), Amepou, Beasley, Baird, K., Baird, R., Baker, Childerhouse, Constantine, Donoghue, Garigue, Miller, Orams, Poole, Read - seek funding for a workshop focused on establishing collaborations with local researchers and other stakeholders throughout the South Pacific Island area; develop a workplan for 2024-28.	Report progress
South Asian River Dolphin Planning Group	Porter (Convenor), Trujillo (Co-Convenor), Bell, C., Iñiguez, Khan - progress towards developing a South Asian River Dolphin CMP.	Report progress
Small Cetacean Greenland Hunt	Dolman (Convenor), Fisher, Hodgins, Sigurdsson, Suydam and Zerbini. *Review progress on previous recommendations.*	Report progress

REFERENCES

Amaral, K. B., Danilewicz, D., Zerbini, A., Di Beneditto, A. P., Andriolo, A., Alvares, D. J., Secchi, E., Ferreira, E., Sucunza, F., Borges-Martins, M., Cesar de Oliveira, S., Cremer, M., Denuncio, P., Ott, P. H., Moreno, I. B. 2018. Reassessment of the franciscana Pontoporia blainvillei (Gervais & d'Orbigny, 1844) distribution and niche characteristics in Brazil. *J. Exp. Mar. Biol. Ecol.* 508:1–12. [Available at: https://doi.org/10.1016/j.jembe.2018.07.010].

Bors, E. K., Baker, C. S., Wade, P. R., O'Neill, K. B., Shelden, K. E. W., Thompson, M. J., Fei, Z., Jarman, S., Horvath, S. 2021. An epigenetic clock to estimate the age of living beluga whales. *Evol. Appl.* 14:1263-73. [Available at: https://doi.org/10.1111/eva.13195].

Bradford, A. L., Oleson, E. M., Forney, K. A., Moore, J. E., Barlow, J. 2021. Line-transect Abundance Estimates of Cetaceans in U.S. Waters around the Hawaiian Islands in 2002, 2010 and 2017. United States Department of Commerce, NOAA Technical Memorandum, NMFS-FIDSC-115. [Available at: https://doi.org/10.25923/daz4-kw84].

Briceño, Y., Sánchez, L., Trujillo, F., von Fersen, L., Ramírez, S. 2021. Aquatic Wildmeat Consumption of Guiana Dolphins (*Sotalia guianensis*) in Lake Maracaibo System, Venezuela. *Front. Mar. Sci.* 8: 625801. [Available at: https://doi.org/10.3389/fmars.2021.625801].

CCAHD, 2022. Progress Report of the Consortium for the Conservation of the Atlantic Humpback Dolphin. 17pp [Available at: https://www.sousateuszii.org/resources/?author=&s_year=2023&category=&keyword=&tab=scientific]

Costa, A. P., Archer, F. I., Rosel, P. E., Perrin, W. F. 2022. *Tursiops truncatus nuuanu*, a new subspecies of the common bottlenose dolphin from the eastern tropical Pacific. *J. Mamm. Evol.* 30(1):213-229. [Available at: https://doi.org/10.1007/s10914-022-09641-5].

Cremer, M. J., Simões-Lopes, P. C. 2005. The occurrence of *Pontoporia blainvillei* (Gervais & d'Orbigny) (*Cetacea, Pontoporiidae*) in an estuarine area in southern Brazil. *Rev. Bras. Zool.* 22(3):717-723. [Available at: https://doi.org/10.1590/S0101-81752005000300032].

Cremer, M. J., Danilewicz, D., Sucunza, F., Berninsone, L., Paitach, R. L., Wells, R. S. 2022a. Behavior and movement patterns. In: P. C. Simões-Lopes, M. J. Cremer (Eds.). *The Franciscana Dolphin: On the Edge of Survival* (pp.149-74). Elsevier. [Available at: https://doi.org/10.1016/B978-0-323-90974-7.00014-8].

Cremer, M. J., Prado, J. H., Chupil, H., Kolesnikovas, C. K. M., Tavares, M., Valle, R. R., Denuncio, P., Rosenthal, A., Rodriguez-Heredia, S., Zapata, M. F., Ott, P. H., Barbosa, C. B., Castilho, P. V., Domit, C., Estima, S., Colosio, A. C., Maranho, A., Fallabrino, A., Vélez-Rubio, G., Laporta, P., Valdivia, M., Jiménez, S., Barreto, A. S. 2022b. Long-term patterns of franciscana strandings throughout its distribution. In: P. C. Simões-Lopes, M. J. Cremer (Eds.), *The Franciscana Dolphin: On the Edge of Survival* (pp.303-332). Elsevier. [Available at: https://doi.org/10.1016/B978-0-323-90974-7.00019-7].

Crespo, E. A., Harris, G., González, R., 1998. Group size and distributional range of the franciscana (*Pontoporia blainvillei*). *Mar. Mamm. Sci.* 14(4):845-849. [Available at: https://doi.org/10.1111/j.1748-7692.1998.tb00768.x]

Crespo, E. A., Pedraza, S. N., Grandi, M. F., Dans, S. L., Graffo, G. V. 2010. Abundance and distribution of endangered Franciscana dolphins (*Pontoporia blainvillei*) in Argentine waters and conservation implications. *Mar. Mammal Sci.* 26:17-35. [Available at: https://doi.org/10.1111/j.1748-7692.2009.00313.x].

Cunha, H. A., Medeiros, B. V., Barbosa, L. A., Cremer, M. J., Marigo, J., Lailson-Brito, J., Azevedo, A. F., Sole-Cava, A. M. 2014. Population structure of the endangered franciscana dolphin (*Pontoporia blainvillei*): reassessing management units. *PLoS ONE* 9(1):e85633. [Available at: https://doi.org/10.1371/journal.pone.0085633].

da Silva Valente, F., Domit, C., Barreto, A. S. in press. Anthropogenic debris ingestion in cetaceans: Insights from necropsies in southern Brazil. *Mar. Pollut. Bull.*

Danilewicz, D., Secchi, E. R., Ott, P. H., Moreno, I. B., Bassoi, M., Martins, M. B. 2009. Habitat use patterns of franciscana dolphin (*Pontoporia blainvillei*) off southern Brazil in relation to water depth. *J. Mar. Biolog.* 89(5):943-949. [Available at: https://doi.org/10.1017/S002531540900054X].

Danilewicz, D., Denuncio, P., Secchi, E. R., Taniosd, G. 2022. The life history of franciscana dolphins. In: P. C. Simões-Lopes, M. J. Cremer (Eds.), *The Franciscana Dolphin: On the Edge of Survival* (pp.85-110). Elsevier. [Available at: https://doi.org/10.1016/B978-0-323-90974-7.00012-4].

de Moura, S. P. G., Schulze, B., Broadhurst, M. K., Cantor, M., Domit, C. 2023. Population parameters of Guiana dolphins (*Sotalia guianensis*) in a southern Brazilian estuary. *Mamm.* [Available at: https://doi.org/10.1007/s42991-023-00354-7].

Denuncio, A. P., Bastida, R., Dassis, M., Giardino, G., Gerpe, M., Rodríguez, D. 2011. Plastic ingestion in Franciscana dolphins, *Pontoporia blainvillei* (Gervais and d'Orbigny, 1844), from Argentina. *Mar. Pollut. Bull.* 62(8):1836-41. [Available at: https://doi.org/10.1016/j.marpolbul.2011.05.003].

Di Beneditto, A. P., Ramos R. M. 2014. Marine debris ingestion by coastal dolphins: What drives differences between sympatric species? *Mar. Pollut. Bull.* 83: 298-301. [Available at: https://doi.org/10.1016/j.marpolbul.2014.03.057].

Domit, C., Trevizani, T. H., Farro, A. P. C., Silva, A. Z., Van Belleghem, T., Herbst, D. F., Tardin, R. H., Bisi, T. L., Laporta, P., Vidal, L. G., Chupil, H., Marcondes, D. S., Fraga da Fonseca, G., del Rio do Valle, R., Berninsone, L. G., Barbosa, C. B., Cremer, M. J., Broadhurst, M. K. 2022. Coastal development and habitat loss: understanding and resolving associated threats to the franciscana, *Pontoporia blainvillei*. In: P. C. Simões-Lopes, M. J. Cremer (Eds.), *The Franciscana Dolphin: On the Edge of Survival* (pp.265-302). Elsevier. [Available at: https://doi.org/10.1016/B978-0-323-90974-7.00010-0].

Ingram, D. J., Prideaux, M., Hodgins, N. K., Frisch-Nwakanma, H., Avila, I. C., Collins, T., Cosentino, M., Keith-Diagne, L. W., Marsh, H., Shirley, M. H., Van Waerebeek, K., Djondo, M. K., Fukuda, Y., GLaus, K. B. J., Jabado, R. W., Lang, J. W., Luber, S., Manolis, C., Webb, G. J., W., Porter, L. 2022. Widespread use of migratory Megafauna for aquatic wild meat in the tropics and subtropics. *Front. Mar. Sci.* 9:837447. [Available at: https://doi.org/10.3389/fmars.2022.837447].

International Whaling Commission. 2019. Report of the Workshop: Resolving Tursiops Taxonomy Worldwide. *J. Cetacean Res. Manage. (Suppl.)* 20:521-546.

International Whaling Commission. 2021. Report of the Workshop on the Review of the Status of the Franciscana. *J. Cetacean Res. Manage. (Suppl.)* 23:347-365.

International Whaling Commission. 2021. Report of the IWC Scientific Committee. *J. Cetacean Res. Manage.* (Suppl.) 23:1-365.

International Whaling Commission. 2022. Report of the Scientific Committee. *J. Cetacean Res. Manage. (Suppl.)* 19:115-153.

Kasuya, T. 2019a. Biology and conservation of small cetaceans around Japan [in Japanese]. University Tokyo Press, Tokyo.

Kasuya, T. 2019b. In order to avoid repetition of tragedies of dolphin fisheries [in Japanese]. University Tokyo Press, Tokyo.

Lailson-Brito, J., Oliveira-Ferreira, N., Manhães, B. M. R., Bisi, T. L., Santos-Neto, E. 2022. Chemical pollution and franciscana: a review. In: P. C. Simões-Lopes, M. J. Cremer (Eds.), *The Franciscana Dolphin: On the Edge of Survival* (pp.235-264). Elsevier. [Available at: https://doi.org/10.1016/B978-0-323-90974-7.00017-3].

Miller, C. 2023. Review of cetacean diversity, status and threats in the Pacific Islands region 2021. Secretariat of the Pacific Regional Environment Programme, Apia, Samoa.

Negri, M. F., Denuncio, P., Panebianco, M. V., Cappozzo, H. L. 2012. Bycatch of franciscana dolphins (*Pontoporia blainvillei*) and the dynamic of artisanal fisheries in the species' southernmost area of distribution. *Braz. J. Oceanogr.* 60:149-158.

Oremus M., Leqata, J., Hurutarau, J., Taei, S., Donoghue, M., Baker, C.S. 2013. Population status of Indo-Pacific bottlenose dolphins (*Tursiops aduncus*) in the Solomon Islands and assessment of live capture sustainability. South Pacific Whale Research Consortium, Avarua, Rarotonga, Cook Islands.

Paitach R. L. 2021. Padrões de uso de habitat e comportamento de toninhas abordagens acústicas para monitoramento e conservação de uma espécie ameaçada [in Portuguese]. Ph.D thesis submitted to Federal University of Santa Catarina, Brazil.

Perez, J. A. A., Sant'Ana, R. 2022. Catch composition time series for demersal species in the Brazilian Meridional Margin (2000-19). PANGAEA. [Available at: https://doi.org/10.1594/PANGAEA.946292].

Prado, J. H. F., Kinas, P. G., Pennino, M. G., Seyboth, E., Silveira, F. R. G., Ferreira, E. C., Secchi, E. R. 2021. Definition of no-fishing zones and fishing effort limits to reduce franciscana bycatch to sustainable levels in southern Brazil. *Anim. Conserv.* 24(5):770-782. [Available at: https://doi.org/10.1111/acv.12679].

Robeck, T. R., Fei, Z., Lu, A. T., Haghani, A., Jourdain E., Zoller, J. A., Li, C. Z., Steinman, K. J., DiRocco, S., Scmitt, T., Osborn, S., Van Bonn, B., Katsumata, E., Mergl, J., Almunia, J., Rodriguez, M., Haulena, M., Dold, C., Horvath, S. 2021. Multi-species and multi-tissue methylation clocks for age estimation in toothed whales and dolphins. *Commun. Biol.* 4:642. [Available at: https://doi.org/10.1038/s42003-021-02179-x].

Santos, M. C. D. O., Oshima, J. E. D. F., Silva, E. D. 2009. Sightings of franciscana dolphins (*Pontoporia blainvillei*): the discovery of a population in the Paranaguá estuarine complex, Southern Brazil. *Braz. J. Oceanogr.* 57:57-63.

Secchi, E. R., Danilewicz, D., Ott, P. H. 2003a. Applying the phylogeographic concept to identify franciscana dolphin stocks: implications to meet management objectives. *J. Cetacean Res. Manage.* 5(1):61-68. [Available at: https://doi.org/10.47536/jcrm.v5i1.827].

Secchi, E. R., Ott, P. H., Danilewicz, D. S. 2003b. Effects of fishing by-catch and conservation status of the franciscana dolphin, *Pontoporia blainvillei*. In: N. Gales, M. Hindell, R. Kirkwood (Eds.), *Marine Mammals: Fisheries, Tourism and Management Issues* (pp.174-191). CSIRO Publishing.

Secchi, E. R., Cremer, M. J., Danilewicz, D., Lailson-Brito, J. 2021. A Synthesis of the Ecology, Human-Related Threats and Conservation Perspectives for the Endangered Franciscana Dolphin. *Front. Mar. Sci.* 8:1-18. [Available at: http://doi.org/10.3389/fmars.2021.617956].

Secchi, E. R., Monteiro, D., Claudino, R. 2022. Is the franciscana bycatch in gillnet fisheries sustainable? In: P. C. Simões-Lopes, M. J. Cremer (Eds.), *The Franciscana Dolphin: On the Edge of Survival* (pp.201-234). Elsevier. [Available at: https://doi.org/10.1016/B978-0-323-90974-7.00004-5].

Shintaku, N. 2021. Population Genomics of Bottlenose Dolphins (*Tursiops truncatus*) in the Northwest Atlantic. M.Sc thesis submitted to Duke University.

Siciliano, S., Di Beneditto, A. P. M., Ramos, R. M. A. 2002. A toninha, *Pontoporia blainvillei* (Gervais & d´Orbigny, 1844) (*Mammalia, Cetacea, Pontoporiidae*), nos estados do Rio de Janeiro e Espírito Santo, costa sudeste do Brasil: caracterização dos hábitats e fatores de isolamento das populações [in Portuguese]. *Bol. Mus. Nac.* 476:1-15.

Simões-Lopes, P. C., Cremer, M. J. (Eds.), 2022. *The Franciscana Dolphin: On the Edge of Survival*. Elsevier.

Sucunza, F., Danilewicz, D., Andriolo, A., de Castro, F. R., Cremer, M., Denucio, Ferreira, E., Flores, P. A. C., Ott, P. H., Perez, M. S., Pretto, D., Sartori, C. M., Secchi, E. R., Zerbini, A. N. 2022. Assessing bias in aerial surveys for cetaceans: results from experiments conducted with the franciscana dolphin. *Front. Mar. Sci.* 9:1016444. [Available at: https://doi.org/10.3389/fmars.2022.1016444].

Ugarte, F., Rosing-Asvid, A., Heide-Jørgensen, M. P., Laidre, K. L. 2020. Marine Mammals of the Greenland Seas. In M. I. Goldstein, D. A. Della Sala (Eds.), *Encyclopedia of the World's Biomes* (pp.575-586). Elsevier. [Available at: https://doi.org/10.1016/B978-0-12-409548-9.12485-6].

Wells, R. S., Cremer, M. J., Berninsone, L. G., Albareda, D., Wilkinson, K. A., Stamper, M. A., Paitach, R. L., Bordino, P. 2021. Tagging, ranging patterns and behavior of franciscana dolphins (*Pontoporia blainvillei*) off Argentina and Brazil: considerations for conservation. *Mar. Mammal Sci.* 38(2):571-605. [Available at: https://doi.org/10.1111/mms.12879].

WWF. 2022. International Workshop Report Addressing the threats from fisheries to the freshwater cetaceans of Asia. WWF, 2022.

Appendix 1

AGENDA

1. Introduction
   - 1.1 Opening remarks
   - 1.2 Election of Chair and appointment of Rapporteurs
   - 1.3 Adoption of Agenda
   - 1.4 Review of available documents
2. Small cetacean use as aquatic wildmeat
   - 2.1 Review new information
   - 2.2 Develop four-year workplan
3. Recommendation review
   - 3.1 Review of topics related to Hector's and Māui dolphins in New Zealand (with HIM)
   - 3.2 Other
4. South Pacific island small cetaceans
5. Progress on previous recommendations
   - 5.1 Franciscana (with CMP)
   - 5.2 Lahille's dolphin
   - 5.3 Sotalia
   - 5.4 Vaquita
   - 5.5 Other
6. Review direct takes and live captures of small cetaceans
   - 6.1 Direct takes
   - 6.2 Live captures
7. Status of the Voluntary Fund for Small Cetaceans
8. Biennial workplan

Appendix 2

Recommendation tracker

Tursiops Taxonomy workshop report - 2018 SC67				Tursiops Taxonomy review 2021					Tursiops Taxonomy review 2023-TBD			
Text	Rec. N.	Addressed to	Region	Progress			Addressed to	Region	Progress		Addressed to	Region
Having reviewed the extensive information included in the 2015-2017 review and 2018 workshop for evaluation of Tursiops species, subspecies and population distinctions, the Committee **draws attention** to the need for Tursiops research in the areas identified as data deficient (the African coast of the eastern Atlantic, southern and eastern Mediterranean Sea, eastern South Pacific, Pacific coast north of California and off the Mexican mainland, Central American coast of the eastern North Pacific, Central American Atlantic and Caribbean Sea and Atlantic coast of northern and north-eastern Brazil, eastern Australia and in the western Pacific the islands of Micronesia, Melanesia, Polynesia, the Philippines and Vietnam).	SC18184	SC, General Scientific Community	DD		The Committee again draws attention to the need for bottlenose dolphin research in areas the 2018 Tursiops Taxonomy Workshop identified as being data deficient (SC18184): - the eastern South Atlantic, - the African coast of the eastern North Atlantic, - the southern and eastern Mediterranean Sea, - the eastern South Pacific, and the Mexican mainland and Central American coasts of the eastern North Pacific, eastern Australia and in the western Pacific islands of Micronesia, Melanesia, Polynesia, the Philippines and Vietnam, and - the Red Sea. The Committee encourages Tursiops research and collaborative efforts to examine and analyse Tursiops specimens throughout these regions. The Committee requests that updated information be provided to the Committee when available.	SC21168	R, SC	DD	Partial in ENP	The XXX again draws attention to the need for bottlenose dolphin research in areas the 2018 Tursiops Taxonomy Workshop and 2021 pre-meeting identified as being data deficient (IWC, 2018, p49): - the African coast of the eastern North Atlantic and South Atlantic - the southern and eastern Mediterranean Sea, - easter South Pacific - eastern Australia and in the western Pacific islands of Micronesia, Melanesia, - Polynesia, the Philippines and Vietnam, - the Red Sea The ICG noted that not much new information is available on the data deficient areas and encourages to reach out with other initiatives in this region that can help with data and sample collection		DD
The Committee therefore **encourages** collection of additional data, including morphometrics, and high-resolution genetic analyses (e.g. ddRAD which may also be useful in other areas where there are similar questions requiring high-resolution analysis), to better characterise divergence between coastal and offshore forms in the **western South Atlantic Ocean**, to help confirm whether subspecies or species classification is more appropriate for **T. t. gephyreus**;	SC18185	SC, General Scientific Community	WSA	Yes	The Committee recalls its previous recommendations (SC18184) and welcomes recent progress in characterising divergence between coastal and offshore forms of Tursiops in the western South Atlantic Ocean. The Committee encourages researchers working on Lahille's bottlenose dolphin (T. t. gephyreus) to investigate the possibility that there is a third type or population of bottlenose dolphins in Argentine waters. The Committee respectfully requests that updates be provided to the Committee as new information becomes available.	SC21164	R	WSA	No progress	Recalls the previous recommendation (SC21164) and encourage researcher working on Lahille's bottlenose dolphin (T.t. gephyreus) to investigate the northern and southern end of the range of this subspecies to better define the population structure and rule out whether they may be different populations in these aras (e.s.third type or population of bottlenose dolphins in Argentine waters). Aware of the small number of this unit overall, this will enable to better evaluate the potential effects of any bycatch and promote conservation measures.		WSA
				Yes	The Committee recalls its previous recommendations (SC18184) and welcomes recent progress in characterising divergence between coastal and offshore forms of bottlenose dolphins in the **western South Atlantic Ocean**. The Committee encourages researchers working on bottlenose dolphins in Brazil, Uruguay, and Argentina to adopt a unified approach for understanding the distribution, habitat use and taxonomic and population-level divergence of Southwest Atlantic bottlenose dolphins, including collaborations to merge independent sample sets to (1) identify sampling gaps and (2) allow analysis of nuclear DNA data from across the entire geographic range so that outstanding questions of taxonomic and population-level divergence of the different forms of Tursiops identified in that region can be addressed. The Committee respectfully requests that updates be provided to the Committee as new information becomes available.	SC21166	R	WSA	No progress			
The Committee therefore **encourages** further investigation of T. aduncus lineages in the Indian Ocean and western South Pacific to assess potential subspecies recognition, extending the geographic coverage to include eastern Africa, the region between Pakistan and Indonesia, and the region between Australia and China.	SC18186	SC, General Scientific Community	IO						Yes	The ICG welcomes the new work reinforcing the existence of two different lineages in the WIO with new morphological data in support of the genetic evidences available previously. Encourages further work to further investigate and clarifying the two lineages observedby both genetic and morphological evidences by analysisng more samples expanding the range (Pakistan, Bangladesh, Gulf of Aden and eastern Africa, Arabian/ Persian Gulf).		IO, WIO
The Committee therefore **encourages** continued study of the genetics and morphology of southern Australia bottlenose dolphins with the "T. australis" mtDNA lineage, in the context of both T. truncatus and T. aduncus.	SC18187	SC, General Scientific Community	E IO		The Committee recalls its previous recommendations (SC18184) and, given the lack of progress in clarifying the phylogenetic affinity of the **"T. australis"** mtDNA lineage in the context of both T. truncatus and T. aduncus, encourages researchers working on bottlenose dolphin taxonomy in southern Australia to focus future efforts on ensuring that (1) such efforts include collaborations to allow analysis of samples from around Australia, (2) a consistent genomic approach is applied to all samples,	SC21165	R	E IO	No progress	Notes a number of works on population structure analysis in different areas of **Australia**, but none of them relevant in addressing to clarify taxonomic issues. We recalls its previous recommendations (SC18184) and, given the lack of progress in clarifying the phylogenetic affinity of the "T.		IO

Tursiops Taxonomy workshop report - 2018 SC67				Tursiops Taxonomy review 2021					Tursiops Taxonomy review 2023-TBD			
Text	Rec. N.	Addressed to	Region	Progress			Addressed to	Region	Progress		Addressed to	Region
					(3) analysis of "ancient DNA" from historical (bone) samples also be incorporated, if possible, and (4) the available mitochondrial DNA, nuclear DNA and morphological data are incorporated into the analysis, particularly if there are samples for which both genomic and morphological data are available. The Committee respectfully requests that updates be provided to the Committee as new information becomes available.					australis" mtDNA lineage in the context of both T. truncatus and T. aduncus, encourages researchers working on bottlenose dolphin taxonomy in southern Australia to focus future efforts on ensuring that (1) such efforts include collaborations to allow analysis **and comparison** of samples from around Australia, with particular attention to the South Australia (2) a consistent genomic approach is applied to all samples, (3) analysis of "ancient DNA" from historical (bone) samples also be incorporated, if possible, and (4) the available mitochondrial DNA, nuclear DNA and morphological data are incorporated into the analysis, particularly if there are samples for which both genomic and morphological data are available. {we need to look closer at South Australia, mtDNA fits in with truncatus, one from Moller fits better with aduncus}		
The Committee therefore **encourages** examination of the level of male-mediated gene flow between the coastal and offshore forms in the **western North Atlantic** to determine whether the coastal form should be elevated to species or subspecies status.	SC18188	SC, General Scientific Community	WNA						Yes	The ICG welcomes the new information both with morphologic and genetic evidences that now clarify the species status of the coastal bottlenose dolphin population in the WNA. Encourages to better investigate the population boundaries to understand how far this coastal population penetrate into the Gulf of Mexico.		WNA
The Committee therefore **encourages** more comprehensive morphometric analyses comparing T. truncatus in the Mediterranean, Black Sea, and eastern Atlantic to integrate with genetic data and evaluate whether any regions in addition to the Black Sea (T. t. ponticus) harbour a taxonomic unit above the level of population.	SC18189	SC, General Scientific Community	MED/BS						No progress			
The Committee therefore **encourages** comprehensive morphometric analyses of coastal and offshore T. truncatus in the **eastern North Atlantic** and comparison to those from the **western North Atlantic** to better evaluate potential regional differences.	SC18190	SC, General Scientific Community	ENA/WNA						No progress	The ICG welcomes, new information on the evolutionary history of the tursiops pelagic and coastal North Atlantic populations.		ENA/WNA
The Committee therefore **encourages** morphometric analyses of Gulf of California coastal and offshore dolphins relative to those from **California** and the **eastern tropical Pacific**, with a particular focus on the level of divergence of coastal dolphins in the **upper Gulf of California** to other areas.	SC18191	SC, General Scientific Community	ENP						Partial	The ICG welcomes the new information on the morphology of ETP Tursiops that support the presence of a new subspecies Tursiops truncatus nuuanu. Encourages to address the population identity/ taxonomic status of the Tursiops population in the Upper Gulf of California considering the high level of bycatch in this area and encourages the analysis of museum speciments available from this area for comparison with other regions.		ENP
The Committee therefore **encourages** the collection of additional genetic and morphological data throughout the **eastern South Pacific** and further studies to investigate coastal versus offshore forms throughout the region, including coastal and offshore waters from Central America to Mexico, and if possible around the southern tip of South America to Argentina.	SC18192	SC, General Scientific Community	ENP/ESP						Partial?			
The Committee also **agrees** to continue compilation of specimen, study, and researcher details, and concentrated effort to improve our understanding of Tursiops in data-deficient areas.		SC, General Scientific Community	DD	Ongoing	The Committee recalls its previous recommendation (SC18184) and agrees that the Committee should continue compilation of specimen, study, and researcher details, and concentrate effort on improving understanding of Tursiops species, subspecies and population-level divergence in data-deficient areas.	Sc21169	R, SC ??		Ongoing			

Tursiops Taxonomy workshop report - 2018 SC67				Tursiops Taxonomy review 2021					Tursiops Taxonomy review 2023-TBD			
Text	Rec. N.	Addressed to	Region	Progress			Addressed to	Region	Progress		Addressed to	Region
After reviewing the 2018 Tursiops Taxonomy Workshop's evaluation of the support provided for taxonomic (subspecies, species) and population-level distinctions proposed in the publications reviewed, the subcommittee **concludes** that the current taxonomy provided for Tursiops by the Society for Marine Mammalogy's Committee on Taxonomy is well supported by morphological and molecular genetic data, as well as ecological and distributional data.	SC18193											
The Committee also **agrees** to continue compilation of specimen, study, and researcher details, and concentrated effort to improve our understanding of Tursiops in data-deficient areas. After reviewing the 2018 Tursiops Taxonomy Workshop's evaluation of the support provided for taxonomic (subspecies, species) and population-level distinctions proposed in the publications reviewed, the subcommittee **concludes** that discordance in currently available results from morphometric analyses and across different genetic markers of the recently described 'T. australis' from southern Australia calls into question its validity at this time.			IO									
The Committee also agrees to continue compilation of specimen, study, and researcher details, and concentrated effort to improve our understanding of Tursiops in data-deficient areas. After reviewing the 2018 Tursiops Taxonomy Workshop's evaluation of the support provided for taxonomic (subspecies, species) and population-level distinctions proposed in the publications reviewed, the subcommittee **encourages** use of the criteria and guidelines in Reeves et al. (2004) for the assessment of species-level taxonomy, in Taylor et al. (2017) for subspecies-level taxonomy, and in Martien et al. (2015) for Demographically Independent Populations.	SC18194		ongoing		The Committee recalls its previous recommendation (IWC, 2019, p49) and agrees that Annexes D and E, developed by the 2018 Tursiops Taxonomy Workshop to summarize available data relevant to this topic for the major geographic areas worldwide, and indicative of where such data are still lacking or incomplete, will continue to be updated and made publicly available as a 'living document' on the IWC website. The Committee respectfully requests such updates be supplied to the Committee at regular intervals, preferably of not more than 2-3 years.	SC21167	SC		Ongoing	ICG agree with previous recommendation (SC21167) on the importance of updates at regular intervals no more than 2-3 years.		
After reviewing the development and use of a strategy for objective evaluation of species, subspecies, and population-level distinctions by the 2018 Tursiops Taxonomy Workshop, the Committee: (1) agrees with the strategy implemented at the workshop for the evaluation of species, subspecies and population level distinctions;			Closed									
After reviewing the development and use of a strategy for objective evaluation of species, subspecies, and population-level distinctions by the 2018 Tursiops Taxonomy Workshop, the Committee: (2) encourages use of the criteria and guidelines in Reeves et al. (2004) for the assessment of species-level taxonomy, in Taylor et al. (2017) for subspecies-level taxonomy, and in Martien et al. (2015) for Demographically Independent Populations; and												
After reviewing the development and use of a strategy for objective evaluation of species, subspecies, and population-level distinctions by the 2018 Tursiops Taxonomy Workshop, the Committee: (3) concludes that future taxonomic questions should be examined within an appropriately wide and inclusive geographic context and that multiple lines of evidence are necessary when positing taxonomic changes.			Concluded									

Appendix 3

Tursiops Resource Table

##	Location	Oceanographic features	Geographic / habitat break	Data for coast-al/offshore?	Materials used and quantities			Genetic markers		Genetic analysis		Morphological markers							Feeding Ecology			Parasite data	Behaviour			Overall Degree of Differentiation		
					Morphological	Biochemical	Genetic	mtDNA	nuclear	Phylogenetic	Population	Tot body length	Teeth	Coloration	Skulls	Dorsal fin	Vertebrae	Other	Stable isotop es/fatty acids	stomach contents	Other		Acoustic	Migratory	Other	Genetics	Habitat	Morphology
IO	Bangladesh, Thailand (Andaman Island)			coastal			**Amaral et al., SC/66a/SM/18**: 17 samples compared against database **Piboon et al., 2022:** Samples of stranded T. aduncus (n = 30), 17 ISSR primers. **Prasitwiset et al., 2022:** Skin tissue samples (n = 30) T. aduncus.	**Amaral et al., SC/66a/SM/18** 380bp control region **Prasitwiset et al., 2022:** 265 bp mtDNA control regions	**Piboon et al., 2022:** 17 Inter Simple Sequence repeats (ISSR) primers. **Prasitwiset et al., 2022:** 11 microsatellite loci	Median-joining network, Maximum likelihood	Structure					**Smith et al., SC-66a-SM19;** photo-ID 1,144 photo-identified Indo-Pacific bottlenose dolphins gave abundance estimates of 1,701 - 2,239 between 2005 and 2009. Dorsal fins were highly variable, but extensively affected by fisheries interaction scarring and tissue loss									Reciprocal monophyly when compared with database		
IO	Pakistan, Oman		exposure of the Sunda and Sahul shelves during Pleistocene proposed	coastal	**Gray, 2017 PhD.** Skull morphology based on 26 cranial characters across 50 individuals (Hol-Ta: n = 29, AS-Ta: n = 4, Tt: n = 9, unknown: n = 8) **Gray et al., 2022.** Skull morphology Tursiops spp. based on 50 cranial characters across 54 samples from Oman (including the 50 mentioned above); 10 samples from Pakistan; 1 from Iran. **Laghari et al., 2022.** Skull morphology Tursiops spp. based on 39 characters across 10 samples from Balochistan and Sindh (Pakistan)		**Gray et al., 2018:** n=40 compared against database; mtDNA, Actin intron & α-Lactalbumin intron; **Moura et al., 2020:** 1 sample for RADseq phylogeny: basal within 'holotype' (South African) lineage. **Gray et al.2021:** 28S aduncus and 37 truncatus; 18 microsatellites	**mitogenome: Moura et al., 2015:** 4,301bp mtDNA **Gray et al.2021:** 28S aduncus and 37 truncatus; mtDNA 479bp	**Introns: Gray et al., 2018:** Actin intron & α-Lactalbumin intron **RADseq: Moura et al., 2020:** 1 sample for RADseq phylogeny: basal within 'holotype' (South African) lineage. 4Mb	Bayesian analysis, maximum parsimony, BEAST						Morphometrics data were consistent with the molecular phylogenetic assessment of the group, where there is clear separation between T. truncatus and T. aduncus, and AS-Ta is differentiated from Hol-Ta, but those two sample sets group most closely together **Laghari et al., 2022:** Confirmed the presence of T. aduncus and T. truncatus in Pakistan. But T. aduncus skulls not verified against the two lineages identified by Gray et al., 2022.									Reciprocal monophyly when compared with database New 'aduncus-type' lineage identified from waters of Oman, Pakistan and India.		non-overlapping PCA clusters two separated lineages within T.aduncus identified also based on Cranial morphological analsys (Gray et al2022)
IO	South Africa			coastal	**Hale et al., 2000:** 25 Body length/Skull lengh ratios truncatus vs aduncus length **Ngqulana et al., 2018:** 241 cranial 2-D analysis Differences likely correspond to.T. truncatus and T. aduncus in different regions/oceanographic conditions		**Natoli et al., 2004/ 2008:** mtDNA (N=38/ 50) and microsatellite DNA (n=107/ 142) compared against multiple populations and among populations within South Africa; **Moura et al., 2020:** RADseq phylogeny - differentiated lineage within T. aduncus lineage. **Hoelzel et al., 1998:** mtDNAcr	**mtDNA cr: Natoli et al., 2004/ 2008:** 297bp/599bp	**msat: Natoli et al,. 2004/ 2008:** 9 loci; **RADseq: Moura et al., Pers.comm.:**4Mb	Minimum spanning network, Median Joining Network, Neighbor Joining, Maximum Parsimony; Bayesian	FST, RhoST, PhiST, spatial autocorr.	**Hale et al., 2000:** truncatus vs aduncus length			**Hale et al., 2000:** truncatus vs aduncus - body length to skull ratios									Well-defined lineage separate from other T. aduncus lineages (RADseq data, mtDNA data); T. truncatus within broad global lineage (**Hoelzel et al., 1998**). Differentiation north and south of Ifafa along Natal coast, and between South Africa and all other populations compared (8 worldwide including Australia and China);		Distinguish aduncus from truncatus - note that compared against Australian samples as well and consistent for skull length/ body length ratios.
IO	Tanzania, Zanzibar			coastal		**Mapunda et al., 2017**: 21 kidney, liver, lung samples of T. aduncus from coastal waters around Zanzibar carry low concentrations of metals compared with dolphins from other areas.	**Sarnblad et al., 2010:** n= 45	**mtDNA cr: Sarnblad et al., 2010:** 534bp		Median Joining Network, Maximum Parsimony, Bayesian	PhiST														Differentiated from Australasia, not from South Africa		
IO	Western Australia			coastal / offshore	**Tomo et al. 2018**: 162 T. aduncus complete skeletons. (83 from gulf St. vincent, 79 from Spencer Gulf). Prevalence of pathology increased with dolphin relative age, and GSV dolphins had more pathology than those in SG		**Allen et al., 2016:** n=344 Population structure in NW Australia, species delination between offshore and inshore Tursiops	**mtDNA cr: Allen et al., 2016:** 420bp **Krützen et al., 2004**: 351bps **Cornaz:** mitogenome **Chabanne et al., 2021**: 412-	msat: Allen et al., 2016: 19 loci Krützen et al., 2004: 11 loci **Chabanne et al., 2021:** 32 microsatellite loci. SNP:	Bayesian; Maximum Likelihood	FST, Structure, IMA and migrate-n modelling; AMOVA, PhiST, RhoST	**Ross & Cockcroft, 1990:** differentiation between T. truncatus & T. aduncus, and by geography **Van Aswegen et al., 2019:** 12 full body measurements	**Jedensjo et al., 2020**: 264 skulls. 2-D analysis., 3DGM, tooth counts. Reports T. aduncus higher tooth count than T. truncatus.	**Ross & Cockcroft, 1990:** differentiation between T. truncatus & T. aduncus, and by geography	**Jedensjo et al., 2020:** 264 skulls. 2-D analysis., 3DGM, tooth counts. Reports T. aduncus skulls smaller than T. truncatus. T. aduncus: round cranium. T. truncatus: angular.			**Nicholson et al., 2021:** 96 tissue samples were collected and analysed for δ13C and δ15N concentrations. Socially, spatially and isotopically distinct						Fine-scale population differentiation among nearshore habitat (3 identified, all T. aduncus), differentiated from offshore (T. truncatus); Cornaz - in Shark Bay T. aduncus but ~40%	nearshore/ offshore	

##	Location	Oceanographic features	Geographic / habitat break	Data for coast-al/offshore?	Materials used and quantities			Genetic markers		Genetic analysis		Morphological markers							Feeding Ecology			Parasite data	Behaviour			Overall Degree of Differentiation		
					Morphological	Biochemical	Genetic	mtDNA	nuclear	Phylogenetic	Population	Tot body length	Teeth	Coloration	Skulls	Dorsal fin	Vertebrae	Other	Stable isotop es/fatty acids	stomach contents	Other		Acoustic	Migratory	Other	Genetics	Habitat	Morphology
					Van Aswegen et al., 2019.: 23 T. aduncus full body measurements from South-Western Australia and Shark Bay. Morphotypic variations likely reflect regional adaptations to local water temperatures **Jedensjo et al., 2020**: 264 skulls. 2-D analysis., 3DGM, tooth counts Analyses provided support for the presence of two forms, aligned to T. aduncus (Ehrenberg, 1832) and T. truncatus (Montagu, 1821), including type specimens. Tursiops australis (Charlton-Robb et al. 2011) fell well within T. truncatus for both methods		**Krützen et al., 2004:** n=302 Population structure within Shark Bay **Cornaz 2015**; n=37 genomes plus n=119 previously published Mitogenomics of Tursiops in Australasian and Indonesian waters **Chabanne et al., 2021:** n= 87. Perth. Evidence for one panmictic population with continuous gene flow.	6p primers dlp1.5 and dlp5.	**Batley et al., 2021:** - localized T. aduncus comparisons - no taxonomic information			reported samples from South Western region longer total body length in comparison to Shark Bay samples.							community of Indo-Pacific bottlenose dolphins in the Peel-Harvey Estuary.							have T. truncatus haplotypes.		
WSP	Eastern Australia			coastal	**Hale et al., 2000:** 25 Body length/Skull lengh ratios truncatus vs aduncus length **Jedensjo et al., 2020:** 264 skulls. 2-D analysis., 3DGM, tooth counts Analyses provided support for the presence of two forms, aligned to T. aduncus (Ehrenberg, 1832) and T. truncatus (Montagu, 1821), including type specimens. Tursiops australis (Charlton-Robb et al. 2011) fell well within T. truncatus for both methods		**Möller & Beheregaray, 2001:** n=57 Population structure in SW Australia **Ansmann et al. 2012:** Population structure in Moreton Bay (QLD) **Moura et al., 2020:** RADseq phylogeny	**mtDNA cr**: **Möller & Beheregaray, 2001:** 368bps **Möller et al., 2008:** 400bps **Ansmann et al. 2012**: 403bps **Moura et al**: 500bp CR **cyt-b: Möller et al., 2008:** 1000bp mitogenome **Horreo et al., 2018**: T. australis not clustering with T.aduncus and T truncatus lineages	**msat: Möller et al., 2008**: 6 loci **Ansmann et al., 2012**: 20 loci **RADseq: Moura et al., (pers. comm.)**: 4Mb data	Maximum Parsimony, Neighbor-Joining; network; Bayesian	FST; structure	**Ross & Cockcroft, 1990:** differentiation between T. truncatus & T. aduncus, and by geography; **Hale et al., 2000** truncatus vs aduncus length		**Ross & Cockcroft, 1990:** differentiation between T. truncatus & T. aduncus, and by geography	**Hale et al., 2000** truncatus vs aduncus length											Phylogenetic relationship between T. australis and other Tursiops forms around Australis still uresolved univocally **Moller & Beheregaray, 2001:** differentiation between T. aduncus and T. truncatus; **Moller et al., 2007**: fine-scale differentiation (within bay and between in and outside the bay) - microsat FST up to 0.14 (in vs outside Port Stephens Bay). **Ansmann et al., 2012:** differentiation within and with comparisons outside Moreton Bay - FST up to 0.05. RADseq phylogeny gives well-defined lineage within T. aduncus lineage.	inshore/ offshore; Embayment/ coastal	Distinguish aduncus from truncatus - note that compared against Australian samples as well and consistent for skull length/ body length ratios.
WSP	Southern Australia & Tasmania			coastal/ offshore	**Hale et al., 2000**: 25 Body length/Skull lengh ratios truncatus vs aduncus **Ross & Cockcroft, 1990:** n=103 skulls **Charlton-Robb et al., 2011:** n=44 skulls **Jedensjö et al. 2017:** n=347 skulls **Jedensjo et al., 2020**: 264 skulls. 2-D analysis., 3DGM, tooth counts Analyses provided support for the presence of two forms, aligned to T. aduncus (Ehrenberg, 1832) and T. truncatus (Montagu, 1821), including type specimens. Tursiops australis (Charlton-Robb et al. 2011) fell well within T. truncatus for both methods		**Charlton-Robb et al., 2011:** n=35 description of '*T. australis*', genetic comparison to other Delphinids, morphological comparison to other *Tursiops* **Möller et al., 2008;** n=182 Genetic structure of 'bottlenose dolphins' in southern Australia, comparison to T. aduncus, T. truncatus, D. delphis **Moura et al., 2020:** RADseq phylogeny **Pratt et al., 2022:** n=139 T. aduncus. Rad seq. Population structure correlate to seascape analysis	**mtDNAcr: Charlton-Robb et al., 2011:** 418bps **Cytb: Charlton-Robb et al., 2011:** 1086bps mitogenome **Horreo et al., 2018:** T. australis not clustering with T.aduncus and T truncatus lineages	**msat: Möller et al., 2008:** 6 loci **RADseq Moura et al., 2020:** 4Mb data **Pratt et al., 2022:** 8,104 SNPs retained	Bayesian, Maximum likelihood; Maximum Parsimony	Factorial correspondence, Structure Admixture, PCA, FST, environmental variables	**Charlton-Robb et al., 2011:** (T. australis); **Ross & Cockcroft, 1990:** differentiation between T. truncatus & T. aduncus, and by geography; **Hale et al., 2000** truncatus vs aduncus length	**Charlton-Robb et al., 2011**	**Ross & Cockcroft, 1990:** differentiation between T. truncatus & T. aduncus, and by geography	**Charlton-Robb et al., 2011:** metrics, geo-morph - putative T. australis; clustering, DFA; **Jedensjo et al., 2017**; n=347 skulls **Kemper, 2004:** truncatus vs aduncus, cluster analyses **Hale et al., 2000** truncatus vs aduncus length		**Kemper, 2004:** truncatus vs aduncus - some overlap - aduncus more								Differentiation between putative T. australis and T. truncatus/ T. aduncus; Population differentiation along southern coast - Jedensjo thesis (for both truncatus and especially aduncus) **Cornaz thesis:** microsat and mitogenome data show structure for T. truncatus, not strongly geographically defined **Moura et al. (pers. comm):** T.australis a well defined lineage within T. aduncus lineage		**Charlton-Robb et al., 2011:** Differentiation between putative T. australis and T. truncatus/ T. aduncus **Jedensjo et al. 2017:** Grouping between T. australis and T. truncatus **Kemper, 2004:** truncatus vs aduncus
WSP	North of Australia			coastal	**Hale et al., 2000:** 25 Body length/Skull lengh ratios truncatus vs aduncus		**Cornaz 2015;** 37 genomes plus 119 previously	mitogenomes		Bayesian; BEAST		**Ross & Cockcroft, 1990**: differentiation between T.		**Ross & Cockcroft, 1990:** differentiation											cluster with western lineage - perhaps ancestral		

##	Location	Oceanographic features	Geographic / habitat break	Data for coast-al/offshore?	Materials used and quantities			Genetic markers		Genetic analysis		Morphological markers							Feeding Ecology			Parasite data	Behaviour			Overall Degree of Differentiation		
					Morphological	Biochemical	Genetic	mtDNA	nuclear	Phylogenetic	Population	Tot body length	Teeth	Coloration	Skulls	Dorsal fin	Vertebrae	Other	Stable isotop es/fatty acids	stomach contents	Other		Acoustic	Migratory	Other	Genetics	Habitat	Morphology
					Jedensjo et al., 2020: 264 skulls. 2-D analysis., 3DGM, tooth counts Analyses provided support for the presence of two forms, aligned to T. aduncus (Ehrenberg, 1832) and T. truncatus (Montagu, 1821), including type specimens. Tursiops australis (Charlton-Robb et al. 2011) fell well within T. truncatus for both methods		published Mitogenomics of Tursiops in Australasian and Indonesian waters					truncatus & T. aduncus, and by geography; **Hale et al., 2000:** truncatus vs aduncus length		between T. truncatus & T. aduncus, and by geography; **Hale et al., 2000:** truncatus vs aduncus length												
WSP	Solomon Islands, New Caledonia			coastal			**Oremus et al. 2015:**Tursiops in New Caledonia and Solomon Island	**mtDNA cr:** 700bp		Maximum Likelihood															Differentiated T. aduncus and T. truncatus forms; truncatus in broad global lineage.		
WSP	New Zealand			coastal **Zaeschmar et al. (2020):** suggests the occurrence of two ecotypes; coastal and oceanic. Northwest of New Zealand. Coastal/ off shore?			**Terzano-Pinto et al., 2008:** n=195 from north and south island including firodland populations	**mtDNA cr:** 647bp		Neighbour joining	FST, PhiST														T. truncatus - two ecotypes, inshore and offshore - PHIst = 0.392		
WNP	China, Korea, Japan, Taiwan, Phillipines	Kuroshio current appears to separate coastal and offshore populations off Japan, the location of Kuroshio shifts E-W over years.	Island-associated populations of T aduncus, multiple islands off Japan and off Jeju Island, South Korea, which is near northern range limit for T adu); Density gap between coastal and offshore animals off Japan where Kurosio current is.		**Wang et al., 2000:** n=57 (40 T tru, 17 T adu; from China waters) for gross morphology; **Kim et al., 2010:** 1 skull from Jeju Island, South Korea; **Kurihara & Oda, 2006:** n=27 skulls from Japanese waters; **Shirakihara et al., 2003:** 2 carcasses from Amakusa-Shimoshima Island off Japan.		**Wang et al., 1999:** n=47, aduncus from China, Taiwan and Indonesia; truncatus from Taiwan, N. Africa, Hong Kong, Brazil; **Kita et al., 2013**: 165 Ttruncatus from Taiji fishery (Eastern Japan). mtDNA 402 bp, Concluded "more similar to oceanic T tru" **Chen et al., 2017:** Tt=42 samples, Ta=7 samples compared with published data	**mtDNA cr: Wang et al., 1999**: 386 bps, 7 fixed differences between aduncus and truncatus, sequence divergence 4.4%; **Chen et al., 2017:** 388 bps, n=42 Tt from Japan, Taiwan and Phillipines, n=7 Ta from Taiwan and Japan, found mtDNA differentiation between Tt in Eastern Japan, South East China, North East China, HI, and Palmyra when combined with published data.	msat: Chen et al., 2017P: n=20 loci, n=66; evidence for three clusters: western (West coast of Japan, western and northern Taiwan and Miyazaki), East cluster - East Taiwan and Taiji, and Phillipines (but only n=2) Whole genome: **Vijay et al. 2018** MBE Genome sequencing of T. aduncus and T. truncatus (high resolution from NW Pacific), NW Atlantic and Gulf of Mexico. Observed contrasting demographic changes linked to the last glacial.	**Wang et al., 1999:** Maximum likelihood, Mimimum-spanning network **Chen et al., 2017:** Median-joining network	**Chen et al., 2017**: Factorial correspondence, Bayesian (Geneland)		**Kurihara & Oda, 2006:** Japan waters, found that aduncus generally has more teeth but ranges were overlapping		**Kim et al., 2010:** n=1 skull compared to measures for Ta and Tt; all measures within range of Ta; **Kurihara & Oda, 2006:** found separation in cranial characters in skulls from Japanese animals - identified two morphological groups corresponding to Ta (island-associated) and Tt; **Shirakihara et al., 2003:** 2 specimens from Amakusa-Shimoshima Island, most skull measures within range of Ta and outside range of Tt.			**Wang et al., 2000:** external gross morphology based on dead animals; n=40 Tt and n=17 Ta. Discriminant scores based on 8 characters non-overlapping, rostrum length as absolute measure or as proportion of total body length or snout-to-eye length non-overlapping			**Kim et al., pers.comm:** Sighting data indicates Tt found in waters along both sides of Korean Peninsula and bycatch off Jeju but unpublished data				**Wang et al., 1999:** 7 fixed differences, sequence divergence of 4.4% **Chen et al., 2017:** mtDNA differentiation between E Japan, SE China, NE China, and Palmyra, msats suggest clusters of Tt west coast of Japan and western and northern Taiwan, East Taiwan & Taiji, and Phillipines (but small sample size)		**Wang et al., 2000:** gross morphology: non-overlapping distributions of rostral length characters, discriminant scores based on 8 characters non-overlapping **Kurihara & Oda, 2006:** identified two morphological groups - skulls from Amami, Amakusa-Shimoshima, and Mikuri islands corresponding to Ta other from Japan waters corresponded to Tt **Shirakihara et al., 2003:** confirmed 2 specimens from Amakusa-Shimoshima had cranial measures within range of Ta.
MED&BS	Black Sea	Enclosed basin connected to the Med only by small strait/ not older than 10K-8K years/ low salinity, colder waters/depth variable up to 2000 mt. Northern area shallow with enclosed basin (Azov Sea)	Dardanelles/ Bosphorus Strait system; Kerch strait into Sea of Azov.	**Gol'din & Gladilin, 2015:** Some evidence of possible offshore and inshore populations (Crimea)	**Viaud et al., 2008:** 27 samples. **Gol'din & Gladilin, 2015:** 64 samples		**Natoli et al., 2005:** 16 samples **Viaud et al., 2008**: 43 samples **Moura et al., 2013**: 10 samples	**mtDNAcr: Natoli et al., 2005:** 16 samples; 630bps **Viaud et al., 2008:** 43 samples; 442bps **mitogenome:** Moura et al.,2013 n=10	**msat: Natoli et al., 2005:**16 samples; 9 loci	**Natoli et al., 2005:** Minimum spanning network **Viaud et al., 2008:** Network parsimony reconstruction, TCS 1.13 **Moura et al., 2013** BEAST analysis for node estimation age calculation and LASER	**Natoli et al., 2005:** FST, Structure, PhiST **Viaud et al., 2008:** PhiST,	**Viaud et al., 2008:** 27 individuals: 194–244 cm, **Gol'din & Gladilin, 2015:** (Crimea) 64 individuals, 43 with known sex, newborns. Adults: 10F (201-260cm, average 240.2cm; 16M (241-270cm, average:255.5cm)			**Viaud et al., 2008:** 27 skulls measured. Mean adult skull length of 452.3 mm (maximum length = 503 mm); 26 cranial measurements (following Perrin et al., 1975) PCA analysis.					**Gladilina et al., 2014**: 11 stomachs Compared with data from 1938, wider number of species and shift towards smalles species and similar to those found in Mediterranean		**Birkun, 2002**: Parasite data available from the 1960's and 1990's: no protozoa infection and external macroparasites. 6 species internal macro parasites			Tursiops in the Black Sea is considered coastal, however the occurrence of this species in deeper waters should be assessed. Some Info in **Birkun, 2002** and **Gol'din & Gladilin, 2015**	Differentiation between Tt pelagic and Tt Med supported by mt and nuclear markers analysis, from multiple authors, athough incomplete lineage sorting based on mtDNA	Drastic difference from the neighboring Med, in term of salinity and temperature, with obvious geographic barrier Within BS different habitats from oceanic to shallow waters.	Evidence of smaller total body size, by two independent works. Hypothesis of a bigger (offshore) and smaller (inshore) form.
MED&BS	Mediterranean	Enclosed basin with different habitats . Inside, partially enclosed seas (Adriatic, Aegean).	Strait of Gibraltar considered as physical boundary. Almeria Oran Front divides Oran Sea from western Mediterranean, identified as likely habitat/population break. Sicily Channel shallow plateau divides east from west		Viaud et al., 2008: 27 samples Sharir et al., 2011: 86 samples for total length and 82 skulls **Duras et al. 2014**: 95 skulls measured. **Ayas, et al. 2020**: 1 sample of T. truncatus vertebrate.		**Natoli et al., 2005:** 74 samples **Viaud et al.,2008:** 31 samples **Moura et al., 2013:** 10 samples **Gaspari et al., 2015:** 192 samples **Moura et al., 2020**: RADseq phylogeny	**mtDNA cr: Natoli et al., 2005:** 62 samples; 630bps **Viaud et al., 2008:** 43 samples; 442bps **Gaspari et al., 2015:** 192 samples for 920bps **mitogenome: Moura et al., 2013:** 10 samples	**msat: Natoli et al., 2005:** 74 samples; 9 loci **Gaspari et al., 2015:** 192 samples for 12 loci	**Natoli et al., 2005:** Minimum spanning network **Viaud et al., 2008:** network parsimony reconstruction, TCS 1.13 **Moura et al., 2013:** BEAST analysis for node estimation age calculation and LASER	**Natoli et al., 2005:** Structure, FST, PhiST **Viaud et al., 2008:** Phist **Gaspari et al., 2015:** Structure, FST	**Viaud et al., 2008:** 27 individuals 220–315 cm and 246–320 cm for the Mediterranean and Atlantic respectively. **Sharir et al., 2011:** 26 eastMed vs 64 westMed. Significat difference between the means			**Viaud et al., 2008:** 27 skulls measured, 26 cranial measurements (according to Perrin et al., 1975), mean lengths of 520.3 mm and 537.4 mm in the Mediterranean and the Atlantic Ocean. PCA analysis **Sharir et al., 2011:** CBL of 42 from eastMed vs 40 from westMed. Significantly		**Ayas, et al. 2020:** 1 sample of T. trunactus vertebrate. Total body length = 185 cms.			**Blanco et al., 2001:** 6 stomach contents from Western Med. Different main prey compared ENA Tursiops						Msat: strong population structure between BS/Med/ENA but no mtDNA lineage sorting (Natoli et al, 2005 & Moura et al 2013). Likely colonization from the west towards the east.	A variety of different habitats from Scotland throughout the Black Sea. Habitat boundaries appear to coincide with population boundaries	**Viaud et al., 2008:** Evidence of not overlapping cluster PCA analysis of 26 cranial measurements. Within Med dwarfism suggested in the eastern Med population (Israel) supporting evidences of population differentiation. Different populations in different basins

##	Location	Oceanographic features	Geographic / habitat break	Data for coast-al/offshore?	Materials used and quantities			Genetic markers		Genetic analysis		Morphological markers							Feeding Ecology			Parasite data	Behaviour			Overall Degree of Differentiation		
					Morphological	Biochemical	Genetic	mtDNA	nuclear	Phylogenetic	Population	Tot body length	Teeth	Coloration	Skulls	Dorsal fin	Vertebrae	Other	Stable isotop es/fatty acids	stomach contents	Other		Acoustic	Migratory	Other	Genetics	Habitat	Morphology
															smaller. **Duras et al. 2014**: 95 skulls analyzed. 53 cranial measurements. Data shows that Atlantic Ocean skulls > MED skulls > Adriatic Sea skulls												
ENA	Eastern North Atlantic	Warm Gulf Stream coming form the Western side of the basin and keeping water warmer than avearge temperature at same latitude, Canary current heading south. Estuaries and oceanic islands = specific coastal habitats	Coastal areas of shallow waters or estuaries likely habitats released after the last Glacial Maxima	Yes: coastal populations present in many areas (Moray Firth, Shannon estuary etc.) and pelagic population **Van Waerebeek 2016:** evidence of Tursiops turncatus occurrence in pelagic and coastal waters is reported along all the African west coastline.	**Louis et al., 2014:** coastal= 12 samples and pelagic = 27 samples (females = 20; males= 18; undetermined = 1) **Hohl et al 2020:** 2-D Geometric Morphometric analysis: 23 from ENA out of 201 skulls.		**Louis et al., 2014a:** 381 samples **Louis et al., 2014b:** 355 samples from different regions from Scotland to Mediterranean. **Queroil et al., 2007**: 86 samples from Azores & 28 from Madeira **Mirimin et al., 2011:** 98 samples from North, center and South Ireland **Nichols et al., 2007:** 58 archeological samples **Hoelzel et al., 1998:** 2 samples from Senegal compared with broad dataset.	**mDNAcr: Louis et al., 2014b:** 681bps **Louis et al., 2014a:** 369 samples 681bps **Queroil et al., 2007:** 604bp **Mirimin et al., 2011:** 544bp. **Nichols et al., 2007:** 171bp **Hoelzel et al., 1998:** 297bp **mitogenomes: Nykanen et al. 2019:** 30 samples including 19 coastal and 11 offshore	**msat:** Louis etal, 2014b: 25 loci, 355 samples **Louis et al., 2014a**: 355, 25 msat loci **Queroil et al 2007**: 86 samples from Azores & 28 from Madeira 10 msat **Mirimin et al., 2011:** 15 loci **Nichols et al., 2007:** 5 loci **Hoelzel et al., 1998:** 5 loci **Nykanen et al, 2018**: added 12 new samples to Mirimin et al. 2011 - including 10 coastal (biopsies), and 2 stranded/bycaught **Nykanen, Louis et al. 2019:** no new data but integration of the data of Mirimin et al. 2011, Louis et al. 2014a Nykanen et al. 2018 after data calibration	**Louis etal 2014b:** DIYABC **Hoelzel et al., 1998:** Neighbour joining	**Louis et. al., 2014a:** Sructure & TESS: 4 populations identified: Med&pelagic, coastal north and south. Msat FST, mtDNA FST & PhiST. **Mirimin et al., 2011 and Fernandez et al 2011:** Fine scale pop analysis in Irelan and Iberia. **Queroil et al., 2007:** STRUCTURE FST, PhiST **Nichols et al., 2007:** FST, PhiST, Structure	**Louis et al., 2014b:** 39 samples (12 coastal, 27 pelagic)				**Hohl et al 2020:** Difference observed across oceans; ENA, ESA, WSA, ENP.				**Louis et al., 2014b:** 40 samples: coastal=14, pelagic= 26. No difference in the C13 but difference in S34 and N15 **Fernandez et al., 2011**: 43 samples from Galicia, differences between North and South Galicia **Louis et al. 2018:** 88 coastal samples from Normandy for C, S and N **Gimenez et al. 2017:** Gulf of Cadiz (n= 46) and the Strait of Gibraltar (n= 29) - little niche overlap between area. Stable isotope values suggest a more coastal habitat for tjhe Gulf of Cadiz than the Strait of Gibraltar	**Louis et al., 2014b**: coastal=6, pelagic=24. Diet varies in the type of dominat fish prey (Niche overlap: Pianka index= 0.11)				**Dinis et al. 2021:** Photo-ID catalogue comparison between the Canaries, Madeira and the Azores. 26matches, between Madeira and the Canary Islands (n = 23, distance between island around 500 km), and between Azores and Madeira (n = 3, distance around 1000km).		Clear strong differentiation between coastal and pelagic. Coastal populations suggested to have originated from pelagic in the last Glacial Maxima 10 320 yrBP. Divergence between pelagic Atlantic and West Mediterranean populations occurred later (7580 yrBP). Coastal north and south likely to be recently originated or results of fragmentation of metapopulation. Within pelagic, no differentiation even across long distances (see **Queroil et al., 2007**). Fine population structure across the range in coastal estuaries habitats and evidences of extinct populations that have not been replaced at least in the last 100 years (**Nichols et al., 2007**). No data for the Atlantic North African coast except for occurrence and 2 samples of Tt from Senegal that fall in the broad tursiops truncatus lineage.	Clear niche separation between coastal and pelagic both from Stable isotopes and stomach contents. Oceanic deep waters environment likely to define pelagic population widely homogeneous throughout the Atlantic (no difference between Azores samples and pelagic ENA)	No significant difference betweeen coastal and pelagic based on external morphology, no skull comparison hase been carried out between ecotypes
ESA	Eastern South Atlantic			**Van Waerebeek, 2016:** evidence of Tursiops occurrence in pelagic and coastal waters is reported along all the African west coastline.	**Hohl et al 2020:** 2-D Geometric Morphometric analysis: 20 from ESA out of 201 skulls.		**Hoelzel et al., 1998:** 4 samples from Namibia	**Hoelzel et al., 1998:** 297bp	**Hoelzel et al., 1998:** 5 loci	**Hoelzel et al., 1998:** Neighbour joining					**Hohl et al 2020:** Difference observed across oceans; ENA, ESA, WSA, ENP.										Only analysed samples are 4 Tt from Namibia that fall in the broad Tt lineage.		
WNA	Western North Atlantic	Multiple habitats: deep offshore temperate waters, continental shelf and nearshore coastal waters, bays, sounds and estuarine waters, Western North Atlantic, Gulf of Mexico, Caribbean	**Rosel & Wilcox, 2016 SC66b/SM/16:** Estuarine/nearshore and shelf waters versus continental slope and deeper, Cites Kenney 2000 **Vollmer & Rosel, 2017:** Habitat break in north central Gulf of Mexico for shelf and offshore populations	Yes, morphological (cranial and vertebral morphometrics, body size) and genetic data. **Shintaku 2021.** MSc Thesis. North Carolina USA, Inshore/ offshore populations	**Costa et al., 2016 SC/66b/ SM11:** 101 skulls (44 offshore, 57 coastal adult skulls based on a priori identification). 34 vertebra counts, of those 16 measured. Compared with 78 skulls from WSA (coastal and offshore) **Mead and Potter, 1995:** 33 offshore, 72 coastal. Three basic measurements, condylobasal length, zygomatic width and internal nares width **Costa et al., 2022**: 147 skulls (45 offshore, 102 coastal), 43 vertebras. Of those 16 skulls were from known location, used as reference. T. erebennus holotype (only vertebras), female syntype T. subridens, holotype T. truncatus. 90 out of the 147 skulls were used in 3D geometric morphometrics (33 offshore; 57 coastal) - 23 landmarks (left side	**Duffield, 1987, Duffield et al., 1983**: present differences in hematological parameters	**Rosel et al., 2009:** 481 samples. mtDNA control region, microsatellites **Rosel & Wilcox, 2016 SC66b/SM/16:** 766 samples, 354 bps, fixed nucleotide differences **Vollmer & Rosel, 2017:** 563 samples, mtDNA control region, microsatellites, SNPs **Kingston et al., 2009**: mtDNA control region, AFLP markers **Moura et al., 2020**: RADseq phylogeny **Shintaku, 2021.** RADseq markers	**mtDNA cr: Rosel et al., 2009:** 451, 354 bp. **Rosel & Wilcox, 2016 SC66b/SM/16:** 766 samples, 19 microsatellite loci: distinct allele frequency distributions, high number of private alleles **MHC complex** (genes DQB and DRB) sequences: Morphotypic specific alleles see n (8 for DQB and 14 for DRB) **SNPs: Vollmer & Rosel, 2017:** 52 SNPs on 563 samples **AFLP: Kingston et al., 2009:** 418 polymorphic AFLP markers total. n= 5 offshores and n=15 coastals	**msat: Rosel et al., 2009:** 431 samples for 18 loci **Rosel & Wilcox, 2016 SC66b/SM/16:** 766 samples, 19 microsatellite loci: distinct allele frequency distributions, high number of private alleles **MHC complex** (genes DQB and DRB) sequences: Morphotypic specific alleles see n (8 for DQB and 14 for DRB) **SNPs: Vollmer & Rosel, 2017:** 52 SNPs on 563 samples **AFLP: Kingston et al., 2009:** 418 polymorphic AFLP markers total. n= 5 offshores and n=15 coastals	**Rosel et al., 2009:** Bayesian analysis **Vollmer & Rosel, 2017:** Bayesian analysis: two well supported clusters offshore /coastal **Kingston et al., 2009:** AFLP tree reciprocal monophyly for coastal and offshore animals. mtDNA tree unresolved **Costa et al., 2022:** Median Joining Network, Maximum Likelihood	**Rosel et al., 2009:** Structure, FST, Migrate, mismatch distribution. Distinct coastal populations; No evidence of male dispersal. Gulf of Mexico most distinct. **Vollmer & Rosel, 2017:** Structure, DPCA, FST, PhiST, Migrate **Shintaku 2021.** Illumina Platform, GStack, Stack populations and FeeeBayes, Structure, DAPC **Costa et al., 2022:** TESS, Structure, BayesAss (microsatellites), F-statistics (micros and mtDNA), Nei dA and Percent diagnosble (mtDNA)	**Mead and Potter, 1995.** Modal length of offshores (n=33)=290cm, modal length of coastals (n=72) = 250-260cm. But total length did overlap to some degree **Costa et al., 2016 SM/66b/SM11:** Offshores in wNA significant longer than coastals in WNA **Costa et al. 2022:** Info about total body length was available from field measurements for 142 out 147 samples used in the morphological analyses. Offshore dolphins are significantly longer than coastals in WNA	**Costa et al. 2022**: tooth/alveolus counts for each tooth row in the maxilla (TUL: N = 147; TUR: N = 145) and mandible (TLL and TLR: N = 143). Coastal samples tend to have one more tooth (N = 23) than offshore samples (N = 22) in the mandible, but no significant differences were observed in the maxilla between ecotypes. Overall, coastal (mean, 6.3 mm) and offshore (mean, 6.1 mm) dolphins presented similar tooth width.		**Costa et al., 2016 SC/66b/ SM11:** 101 skulls (44 offshore, 57 coastal based on a priori identification). 19 measurements. PCA and DFA analyses.Two well divided groups. When compared with WSA skulls: three groups (WNA coastal, WSA offshore &WNA offshore, WSA coastal) **Mead and Potter, 1995**: No overlap in three skull measurements for coastal and offshore animals in wNA **Costa et al., 2022:** Comparative anatomy of the skull initially using 16 skulls of	**Morteo et al., 2017**: 3,655 Photo-ID from Gulf of Mexico Contrasts GoM with Gulf of California + Pacific coast specimens, dendrogram shows clustering by geographic region. **Niño-Torres et al., 2022:** Dorsal fin pictures from Mexico, Belize, Panama, and Dominican Republic. Considered 11 dorsal fin measurements. Little dorsal fin morphological variation among individuals from the Caribbean Sea was detected, but variation in triangularity	**Costa et al., 2016 SC/66b/ SM11:** 34 vertebra counts, of those 16 fully measured. PCA analysis. Two clear divided groups.Offshores (n=23): 63-65 vertbrae; Coastals (n=9): 59-60 vertebrae **Costa et al., 2022:** 21 vertebra columns measured (physically mature specimens). Multivariate analyses (Random Forest; Density Clustering)		**Barros et al., 2009:** n=82 and three isotopes. **Knoff, 2004**: n=267 dolphins from wNA and three isotopes	**Mead and Potter, 1995:** 18 offshore stomaches and 117 coastal stomachs. Different feeding habits with different prey species observed		**Mead and Potter, 1995:** Offshore individuals infected with Phyllobothrium, Monorhygma and the nematode Crassicauda. Crassicauda lesions in74% of 38 offshore skulls, 1.6% of 183 coastal skulls analysed. Coastal individuals infected with trematode Braunina **Costa et al., 2016 SM/66b/SM11:** 57% of offshore skulls have Crassicauda scars while only 3.5% of coastal skulls have scars **Costa et al., 2022:** 46.67% (N = 21) of samples classified as offshore by RF analyses (N = 45) have Crassicauda				Clear differentiation between WNA offshore and coastal ecotype in mtDNA, microsatellites and AFLP markers. Also clear population structure within coastal ecotype across the range. Nuclear AFLP markers separate the coastal and offshore form in the WNA in a phylogenetic (Bayesian) analysis. They show reciprocal monophyly Reciprocal monophyly confirmed: 3 fixed differences in mtDNA control region. msat & mtDNA - FST > 0.18 (significant); mtDNA - PHIST > 0.7 (significant). Nei's dA > 0.02. Percent	Offshore habitat seems similar across the range. Coastal habitat characteristics vary among areas. This is likely driving the fine population structure observed. Stable isotopes indicate habitat partitioning between offshore and coastal forms	Clear evidence of morphological differentiation between coastal and offshore populations with the latter being bigger. Differentiation confirmed by both skulls measurements and vertebra counts, total body length Confirmed clear differences between WNA coastal and offshore in traditional morphometrics (skull and vertebra column), 3D geometric morphometrics (skull), comparative anatomy (skull and vertebral column) and body length. WNA coastal are small than WNA offshore (smaller skull and body size, lower number of vertebrae and smaller vertebrae). Skulls can be visually differentiated in WNA coastal and offshore when using 5 morphological characters (see Costa et al. 2022)

##	Location	Oceanographic features	Geographic / habitat break	Data for coastal/offshore?	Materials used and quantities			Genetic markers		Genetic analysis		Morphological markers							Feeding Ecology			Parasite data	Behaviour			Overall Degree of Differentiation		
					Morphological	Biochemical	Genetic	mtDNA	nuclear	Phylogenetic	Population	Tot body length	Teeth	Coloration	Skulls	Dorsal fin	Vertebrae	Other	Stable isotop es/fatty acids	stomach contents	Other		Acoustic	Migratory	Other	Genetics	Habitat	Morphology
					of the skull). A worldwide comparison (skull morphology; 18 cranial measurements) was also made with 169 samples (including T. truncatus holotype) from several different regions: WSA (gephyreus-type: N = 75; truncatus-type: N = 25); ENA (N = 19); ETP (nuuanu-type: N = 15); Japan (N = 4); ESP (N = 4); CA (N = 8); GOM (N = 18).		**Costa et al., 2022:** WNA comparison - 345 bp mtDNA control region, 115 samples; 18-19 microsatellite loci , 104 samples. Worldwide comparison: 311 bp mtDNA control region, 249 samples		**RADseq: Shintaku 2021**: 14,783 SNPs considered. n= 63 offshore and n= 33 inshore **Costa et al., 2022:** 18-19 microsatellite loci , 104 samples (WNA ecotypes only)					known ecotype (9 coastal; 8 offshore), which allow defining 5 cranial markers for visual inspection and assigning of the remaining 142 skulls to an ecotype. Multivariate analyses were conducted using 147 skulls measured for 25 cranial variables, Random Forest Analysis, Density Clustering, PCA. 3D geometric morphometrics using 23 landmarks and 90 skulls, ANOVA, PCA, Random Forest. Worldwide comparisons: 18 cranial measurements, 316 skulls, PCA, Density Clustering. Significative differences observed between coastal WNA and other T. truncatus for all morphological analyses.	and curvature of the dorsal fin was detected between coastal and offshore individuals.					marks against only 1.96% (N = 2) of the samples classified as coastal (N = 102).				Diagnosable (PD) = 100%. Gene flow estimated with msat (less than 1% of migrants per generation).		
WSA	Western South Atlantic	Tropical, subtropical, and temperate coastal and offshore waters. Mainly driven by the warm, southerly flowing Brazil current, but also influenced by the colder northerly flowing Malvinas Current, with the two mixing around the northern border of Argentina	Geographic range of papers reviewed: North and northeast Brazil to Tierra del Fuego. Habitat discontinuities invoked: currents and water temperature, coastal v. offshore, coastal v. estuarine, continental shelf width	Yes. morphological (coloration, dorsal fin shape, skull) and genetic evidence of offshore (truncatus-type) and inshore (gephyreus-type) forms	**Barreto 2000:** n=68 (max. adult skulls 14 from north and 54 from south) **Hohl et al., 2016:** 135 adult skulls **Costa et al., 2016:** 78 adult skulls **Wickert et al., 2016:** 139 samples in the final analysis **Barreto 2016**: 53 Skull & teeth samples measured - ALL T.t.gephyreus **Costa et al. 2021**: 106 skulls - congruence among the data sets, reinforces the presence of two distinct ecotypes. The divergence may be relatively recent, however, given the moderate values of mtDNA nucleotide divergence (dA = 0.008), presence of one shared mtDNA haplotype and possibly low levels of gene flow (around 1% of migrants per generation). Results suggest the ecotypes may be in the process of speciation and reinforce they are best described as two different subspecies until the degree of nuclear genetic divergence is thoroughly evaluated" 2-D Geometric Morphometric Analysis: **Hohl et al 2020**: 128 Skulls - confirm difference between T. truncatus and T. gephyreus as well as with other oceanic regions support the separation of animals from Southern Brazil, Uruguay, and Argentina (WSAO—g, T. gephyreus) from specimens of NE/SE/S Brazil (WSAO—t, T. truncatus).		**Barreto 2000:** 16 samples, 338bp of control region **Fruet et al., 2014:** 124 samples (coastal) **Costa et al., 2015:** 41 (coastal) **Costa et al. 2021:** 208 samples (131 coastal; 64 offshore; 13 unknown ecotype) **Fruet et al., 2017**: 127 coastal and 45 offshore samples Our results from both molecular marker types were congruent and revealed strong levels of structuring (microsatellites FST = 0.385, p < .001; mtDNA FST = 0.183, p < .001; ΦST = 0.385, p < .001) and much lower genetic diversity in the coastal than the offshore ecotype, supporting patterns found in previous studies elsewhere. Despite the opportunity for gene flow in potential "contact zones", we found minimal current and historical connectivity between ecotypes, suggesting they are following discrete evolutionary	mtDNA cr: **Barreto 2000:** n=16, 338bp; **Fruet et al., 2014**: 124 samples, 457bp; **Costa et al., 2015:** 41 samples, 316bp; **Fruet et al., 2017:** 45 samples, 457bp; **Oliveira et al., 2019**: 109 samples at mtDNA and 9 microsatellites **Costa et al. 2021:** 208 samples, 353 bp (also aligned these 208 mtDNA CR sequences with 72 mtDNA CR sequences of coastal and offshore bottlenose dolphins of the WNA) **Loizaga et al., 2020**: 10 samples. 457bp "Three haplotypes were recovered for the species along the coast, and two new haplotypes were more closely related to the oceanic than to the remaining coastal morphs defined by Fruet et al. (2017). Those were observed in three individuals from BSA and one from GN. All those	**msat:** **Fruet et al., 2014:** 124 samples, 15 loci; **Costa et al., 2015:** 37 samples, 5 loci; **Fruet et al., 2017:** 48 samples, 11 loci; **Oliveira et al., 2016**: 102 samples, 7 loci **Costa et al. 2021**: 168 samples, 10 loci (also compared these 168 wSA samples to 37 offshore bottlenose dolphins of the western North Atlantic)	**Costa et al. 2021:** maximum likelihood tree (mtDNA); **Oliveira et al 2019:** maximum parsimony tree (mtDNA)	**Fruet et al., 2014** **Costa et al., 2015**; **Costa et al. 2021** **Fruet et al., 2017** **Oliveira et al., 2016** All did FST and PhiST	**Ott et al., 2016:** 87 - 384 From Otts (literature review); **Costa et al., 2016** has table with measurements of body lengths from four geographic regions. Coastal form in WSA significantly longer than offshores from WSA	**Costa et al., 2016:** 18-26 total tooth range, significant but small difference in # of teeth in maxilla **Wickert et al., 2016:** no significant difference in tooth counts between offshore and coastals **Barreto, 2000:** suggests difference in # of teeth in N and S animals	**Ott et al., 2016:** literature review of Brazilian and Argentinian color patterns **Costa et al., 2016:** suggests difference in coloration between offshore and coastals **Fruet et al., 2017:** suggests difference between offshore and coastals **Simões-Lopes et al., 2019:** Suggests difference between the two ecotypes. Pale gray (gephyreus). Darker brownish gray (truncatus).	**Costa et al., 2016:** 100 mature, 78 used in full PCA, DFA; t-test, MANOVA , 21 measurements **Hohl et al., 2016:** 135 from WSA (also has 31 ENP, 23 ENA, and 20 ESA), 2D geometric morphometrics (62 landmarks, 12 semilandmarks), PCA, DFA **Ott et al., 2016:** 486-621cm from (literature review) **Barreto, 2000:** 81(?) samples, 58 measurements and 17 meristic measures **Wickert et al., 2016:** 280 skulls (total n= 144 truncatus:136 gephyreus; 139 complete adult skulls for PCA; 14 characters, 29 measurements, PCA, CVA **Hohl et al 2020:** Difference observed across oceans; ENA, ESA, WSA, ENP. **Costa et al. 2021:** 106 mature; 100 used in PCA and Random Forest analysis, 21 measurements (28 out of 106 specimens with skulls were also used in the genetic analyses)	**Costa et al., 2016** **Fruet et al., 2017** **Simões-Lopes et al., 2019:** offshore (truncatus) shows a more falcate dorsal fin shape in comparison to coastal (gephyreus)	**Costa et al., 2016:** 35 vertebral columns, measurements and counts, (truncatus) 62-68, (gephyreus) 57-59 **Wickert et al., 2016:** 62-64 (truncatus), 57-59 (gephyreus)		Ott et al., 2016: (literature review) **Paschoalini & Santos, 2020:** 35 skin samples (likely all offshore animals, no genetic typing) **Pereira et al. 2020:** Carbon and nitrogen isotopic values (d13 C and d15 N) of dentin growth layer groups in teeth of Tursiops truncatus truncatus and Tursiops truncatus gephyreus small overlap in resource use between subspecies was observed. Individual specialization was evident in both subspecies suggesting temporal consistency in resource use and indicating they forage upon various preys			**Costa et al., 2016:** No significant difference in Crassicauda scars between truncatus and gephyreus **Ott et al., 2016** (literature review)	**Ott et al., 2016:** (literature review) coastal and offshore differ. But very little information here. See also **Fruet, 2017** workshop report **Lima et al., 2020**: results show large differences between truncatus whistles and the ones of Lahille's bottlenose dolphins, in different frequency parameters.			**Costa et al., 2015**: coastal, S. Brazil - 3 nuclear clusters, significant difference between northern (Laguna) and southern regions **Fruet et al., 2017**: coastal vs. offshore S. Brazil, Uruguay - msat FST = 0.35 significant, mtDNA FST/PhiST = 0.2 significant, offshore and coastal vs. BSA, Argentina = 0.37 (msat FST) & 0.4 (mtDNA FST, PhiST) significant; No shared haplotypes between the 2 ecotypes in Brazil, but no reciprocal monophyly either **Oliveira et al., 2016**: Saint Paul's rocks, NE Brazil, mid-southern Brazil (BC/BS) distinct groups, mtDNA FST/PhiST = 0.3, msat FST = 0.09. But Structure analysis (with location priors) indicates a number of admixed individuals of the two subspecies for some animals that had been identified to subspecies based on skull morphology **Costa et al. 2021:** coastal vs. offshore - samples biopsied in coastal waters or with coastal skull morphology clustered together (coastal cluster), whereas samples biopsied in offshore waters or with offshore skull morphology clustered together	**Hohl et al., 2016:** Unclear the amount of sympatry between truncatus (offshore) and gephyreus (coastal) forms between 25.6S and 31S **Wickert et al., 2016:** gephyreus type more restricted in range - coastal waters of southern Brazil, Uruguay, northern Argentina **Costa et al., 2016**: suggest coastal shelf habitat and warmer water for gephyreus. gephyreus range suggested to be limited in south by cold Malvinas current **Pereira et al. 2020:** Results of isotope analyses indicate a clear habitat partitioning between the wSA subspecies and only a small overlap on resource use within the area, reinforcing the hypothesis of a parapatric distribution with very occasional contacts in southern Brazil. **Simões-Lopes et al. 2019:** Detected	**Barreto, 2000**: Significant difference North and South of Santa Caterina State, explained by different current preferences. i.e. proposing N/S split of the two forms as subspecies **Costa et al., 2016**: Concludes subspecies for offshore and coastal clusters w/distinct characteristics, offshore: shorter skulls, more vertebrae, no PCA overlap for skulls or skeletons. Offshore individuals are smaller and have more, smaller vertebrae. Suggests parapatric coastal/offshore distributions for truncatus and gephyreus **Hohl et al., 2016**: diagnostic differences in maxillae shape between truncatus and gephyreus - conclude valid PSC species; But 2D geomorphometric analysis of truncatus versus gephyreus had overlap of the two groups for all three views (dorsal, ventral, lateral) **Wickert et al., 2016:** No PCA overlap between truncatus and gephyreus, 6 diagnostic characters. Concludes species-level differences for truncatus versus gephyreus based on Phylogenetic Species concept: 1 diagnostic character of skull separated them, plus vertebral count **Simões-Lopes et al. (2019):** Found significant differences in external morphology based on dorsal fin shape and colloration pattern. The coastal subspecies (T. t. gephyreus) has a more triangular dorsal fin, whereas the offshore subspecies (T. t. truncatus) has a more falcate one. The offshore (truncatus-type) individuals have a darker color pattern, while coastal dolphins (gephyreus-type)

##	Location	Oceanographic features	Geographic / habitat break	Data for coast-al/offshore?	Materials used and quantities			Genetic markers		Genetic analysis		Morphological markers							Feeding Ecology			Parasite data	Behaviour			Overall Degree of Differentiation		
					Morphological	Biochemical	Genetic	mtDNA	nuclear	Phylogenetic	Population	Tot body length	Teeth	Coloration	Skulls	Dorsal fin	Vertebrae	Other	Stable isotop es/fatty acids	stomach contents	Other		Acoustic	Migratory	Other	Genetics	Habitat	Morphology
					Venuto et al. 2020: 120 teeth samples & body length measured.		trajectories. Based on our molecular findings, which seem to be consistent with morphological differentiations recently described for bottlenose dolphins in our study area, we recommend recognizing the offshore bottlenose dolphin ecotype as an additional Evolutionarily Significant Unit (ESU) in the SWA **Oliveira et al., 2019:** 109 samples at mtDNA and 9 microsatellites	individuals showed falcate dorsal fins. Moreover, the presence of those oceanic haplotypes in live animals sampled from the Argentine coast suggests that both morphs co-occur more frequently than expected.".																in another cluster (offshore cluster). There was at least one shared mtDNA CR haplotype between coastal and offshore. msat & mtDNA - FST > 0.2 (significant); mtDNA - PHIST > 0.3 (significant). No reciprocal monophyly. Nei's dA = 0.008. Percent Diagnosable (PD) = 98.44%. Possibly low levels of gene flow estimated with msat (around 1% of migrants per generation).	differential habitat use between the wSA subspecies. The coastal subspecies (T. t. gephyreus) inhabits shallow waters (up to 18 m deep) close to the shore (up to 3 km). The offshore subspecies (T. t. truncatus) has a wider distribution and more flexible habitat use. It was usually found in coastal and deeper waters (maximum depth of 758 m and >200 km from the coast). A small area of overlap in the distribution of the two subspecies was observed in southern Brazil, but both forms were not seen together (parapatric distribution)	show two wider striped bands at the throat region and a longer rostrum. These findings reveal that the subspecies can be well distinguished in the field. **Costa et al. 2021:** The results suggest the wSA ecotypes are in the process of ecological divergence leading to speciation, although it may be incomplete since we cannot currently rule out the possibility of some gene flow. The results support the description of the wSA ecotypes as the subspecies Tursiops truncatus gephyreus (wSA coastal ecotype) and T. t. truncatus (offshore ecotype, which includes the wSA and wNA offshore dolphins) - in advanced stage of speciation. Habitat preferences and low dispersal rates may be the potential primary drivers of the reproductive isolation between these ecotypes.
ENP	US and Mexico west coasts, Gulf of California	Narrow continental shelf in ENP, broad shelf in Gulf of Mexico; coastal dolphins generally <1km from shore, offshore >=4km from shore (overlap possible in some areas?)		**Perrin et al., 2011:** Coastal and offshore populations identified, **Lowther-Thieleking et al., 2015:** difference between main coast and Gulf of California. Coastal population in ocenaic Islands (Hawaii)	Perrin et al., 2011: 139 skulls; study expanded from Walker 1981; Morteo et al., 2017: 533 dorsal fins **Hohl et al., 2020**: 2-D Geometric Morphometric analysis: 30 from ENP out of 201 skulls. **Esteves et al., 2022**: 47 skulls "Considering 27 lineal measures, the analysis of canonical variables indicated significant differences between the coastal and oceanic dolphins (Wilks lambda = 0.06, p = 0.03)... Considering 141 photographs obtained from three planes (dorsal, ventral and lateral) of the skull, the analysis of geometric morphometry using canonical variables also indicated significant differences between the coastal and oceanic dolphins" **Costa et al., 2023:** 135 skulls, considering 20 measurements: study using samples from CA (N = 75; 33 CA coastal; 14 CA offshore; 28 unknown ecotype - identified based on mtDNA results from Perrin et al. 2011), GOC (N = 4); ETP (N = 30); ESP (N = 4); WNP/Japan (N = 19), and 3 from Baja California/Mexico (museum records). Main focus were cranial comparisons between CA, ETP (Eastern Tropical Pacific) and WNP/Japan. Skull measurements of holotypes T. nuuanu (skull), T. gilli (mandible), T. truncatus (skull) and T. aduncus (skull) were also used	**Segura et al., pers.comm.:** 60 samples for stable isotopes	**Lowther-Thieleking et al., 2015**: 64 coastal and 69 offshore samples, mtDNA and microsats; **Segura et al., pers. comm**: 250 samples for mtDNA, n=246 microsatellites	**mtDNA cr: Lowther-Thieleking et al., 2015:** 402 bp differentiation between coastal and offshore South California Bligh (SCB). Also SCB differs from coastal and offshore and Gulf of California coastal and offshore; 1 shared haplotype between coastal and offshore SCB. **Segura et al., 2006 & pers.comm.:** 480bps significant differences between most strata representing offshore v. coastal ecotype; also some differences between strata within ecotype	**msat: Lowther-Thieleking et al., 2015:**15 loci, significant differentiation between CA offshore and CA coastal. **Segura et al., pers.comm.:** 8 loci, genetic differentiation between most strata of coastal v. offshore; general separation in assignment and ordination analysis		**Lowther et al., 2015:** FST, PhiST, median joining network, Structure. **Segura et al., 2006 & pers.comm.:** FST, PhiST, Structure, PCA	**Walker, 1981:** sexually mature males in offshore populations have smaller body length than coastal dolphins from CA and Mexico (no sexually mature female in coastal). But sample sizes inadequate to assess and within offshore SCB sample there was selection for smaller animals during live-capture efforts **Costa et al. 2023:** total body length was examined for CA (N = 63), ETP (N = 28), WNP/Japan (N = 19). Information was also available for the holotype T. nuuanu (~221 cm). ETP dolphins are significantly smaller than CA and WNP/Japan dolphins. There is indication of sexual dimorphism in body length within each geographic group.	**Perrin et al., 2011**: 61 coastal, 21 offshore, differences in upper and lower toothcounts between coastal and offshore; **Walker, 1981:** tooth width best character to separate coastal from both (SCB and ETP) offshore		**Perrin et al., 2011:** (builds on Walker 1981): mature 34 coastal, 21 offshore, 23 of 28 measurements differed between coastal and offshore, most differences were in characters associated with feeding, offshore skulls larger in 16 of 30 measures, diagnosability of adult skulls based on cranial characters = 96.4% **Walker, 1981:** cranial measures were more similar among the offshore ETP and the offshore SCB dolphins than either was to the CA and Mexico coastal dolphins **Hohl et al 2020:** Difference observed across oceans; ENA, ESA, WSA, ENP. **Esteves et al. 2022**: 47 skulls. Reported difference between oceanic and coastal. **Costa et al. 2023:** No significant morphological differences were found within the CA group - both ecotypes were placed together the same cluster based on Random Forest and Density Cluster analyses. WNP/Japan dolphins were also placed on	**Morteo et al., 2017:** 30 each from Pacific, Gulf of California and Gulf of Mexico. Variation in dorsal fin shape but appeared clinal **Morteo et al., 2017**: 1,998 Photo-ID from pacific and Gulf of California		**Esteves et al. 2022:** 24 coastal, 18 oceanic. Reported difference between coastal and oceanic.	**Walker, 1981:** different prey composition SCB coastal v ETP offshore. Coastal - croakers and perches, offshore - epipelagic fish and cephalapods		**Walker, 1981:** Differences in the incidence of 5 common marine mammal parasites between coastal and offshore	**Rio et al., 2022:** Revillaligedo archipelago. Signature wisthles recorded. Authors suggest differences of SW between pelagic and coastal populations			Significant differentiation between offshore and coastal at both mtDNA and msats		**Perrin et al., 2011:** PCA ellipses non-ovelappping for coastal vs. offshore; diagnosability of adult skulls based on cranial characters = 96.4%; P<0.05 for dorsal fins between 3 areas (Pacific coast, Gulf of California, Gulf of Mexico) **Costa et al. 2023:** No significant morphological differences were found within the CA group - both ecotypes were placed together the same cluster indicating possibly early stage of differentiation; but due to genetic and habitat differences should remain managed as separate stocks. WNP/Japan dolphins were also placed on the same morphological cluster as CA. The few GOC and ESP samples were placed on the same cluster as CA and WNP/Japan samples. ETP dolphins were classified in a separated cluster than the other skulls, and they were diagnosably smaller and narrower than CA and WNP/Japan skulls. Some of the CA, ETP and WNP/Japan samples were also used in the worlwide morphological comparison in Costa et al (2022) [see info for WNA], and while CA and WNP/Japan were palced among the other T. truncatus skulls, ETP formed a separated cluster. ETP (offshore) dolphins are possible one of the smallest bottlenose dolphins in the Americas.

##	Location	Oceanographic features	Geographic / habitat break	Data for coast-al/offshore?	Materials used and quantities			Genetic markers		Genetic analysis		Morphological markers							Feeding Ecology			Parasite data	Behaviour			Overall Degree of Differentiation		
					Morphological	Biochemical	Genetic	mtDNA	nuclear	Phylogenetic	Population	Tot body length	Teeth	Coloration	Skulls	Dorsal fin	Vertebrae	Other	Stable isotop es/fatty acids	stomach contents	Other		Acoustic	Migratory	Other	Genetics	Habitat	Morphology
															the same morphological cluster as CA. ETP dolphins were classified in a separated cluster than the other skulls, and there diagnosably smaller and narrower than CA and WNP/Japan skulls													
ESP	Colombia, Ecuador, Peru, Chile	Humboldt Current flows north along the western coast of South America, and extend 500-1,000 km (310-620 mi) offshore. The current extends from southern Chile to northern Peru where cold, upwelled waters intersect warm tropical waters to form the Equatorial Front. Three notably productive upwelling subsystems are produced by this current: i) seasonal upwelling in Chile, ii) upwelling "shadow" (less productive, but still large) in northern Chile and Southern Peru, and iii) year-round upwelling in Peru.		yes	**Van Waerebeek et al., 1990:** skulls: 15 offshore, 4 coastal; tooth width averages: 7 inshore, 22 offshore **Felix et al., 2018** Ecuador: 129 coastal, 34 offshore; Peru: 9 coastal, 51 offshore; Chile (PodR) 25 coastal **Santillan et al., 2005:** Ecuador=12, Peru=39		**Sanino et al., 2008**: samples from Chile offshore (8), Peru offshore (12), Peru inshore (3), PodR-Chile (8); **Bayas-Rea et al., 2018** Ecuador: 31 biopsy (inner Gulf of Guayaquil), 1 biopsy (Galapagos), 22 stranded specimens (outer coast), Gulf of Guayaquil	**Sanino et al., 2008:** 331 bp control region; **Bayas-Rea et al., 2018:** 5237 bp from 7 mtDNA loci		**Sanino et al., 2008:** phylogenetic tree not specify protocol.	**Sanino et al., 2008** no analysis **Bayas-Rea et al., 2018** only inner Gulf of Guayaquil compared: no resolution between sites, inner estuary somewhat distinct mtDNA sequences		**Van Waerebeek, 1990:** average tooth width inshore (n=7) 8.65-9.6, offshore (n=22) 6.55-8.55		**Van Waerebeek, 1990:** number too small for statistical analysis of skulls **Santillan et al., 2005:** PCA: very weak support for difference between Ecuador, Peru inshore, Peru offshore (note IWC paper only, never published)	**Felix et al., 2018:** PodR and offshore - tall, falcate fins; coastal - short, triangular fins; some evidence for difference between offshores						**Santillan et al., 2005:** Crassicauda lesions Ecuador (0%), Peru/inshore (4.8%), Peru/offshore (52.8%); **Van Bressem et al., 2007, 2015:** Lobomycosis-like disease (Parracoccidioides brasiliensis) found in coastal but not in offshore specimens (Peru, Columbia, Ecuador), pale dermititis in coastal but not offshore specimens (Peru)		**Van Waerebeek, 1990:** coastal group size average ~6.5, offshore group size average ~25		Peru/inshore no shared haplotypes; Peru/offshore 1 shared haplotype; Chile/inshore no shared haplotypes; Chile/offshore 1 shared haplotype; **Bayas-Rea et al., 2018**: single clade for all inner/some outer Gulf of Guayaquil (GG) plus published Peru sequence, another clade for single Galapagos plus one inner GG within worlwide clade of published T truncatus sequences. only inner Gulf of Guayaquil compared. No resolution between sites, inner estuary somewhat distinct from mtDNA sequences		

Appendix 4

Tursiops data sample availability from data deficient areas

Geographic regions	Location	Species/form reported	Background information	Contact availability	Samples available/type of samples	Notes
WIO	Mozambique	T.*truncatus* & aduncus?	*Aduncus* is known in coastal waters whereas *truncatus* offshore is not everywhere confirmed	Contact		
	Madagascar			Contact	A handful of samples and some teeth from Madagascar (north and south). Sequences from Mayotte.	Working on different manuscripts on the genetic population structure of *T. aduncus* in the western Indian Ocean region, including samples from Zanzibar, Oman, Madagascar, Mayotte, La Réunion, Mauritius
	Tanzania	*T. aduncus* and *truncatus* confirmed		Contact	4 *aduncus* skulls and 14 *truncatus* skulls **Mapunda *et al.*, 2017:** 21 samples analysed for heavy metal concentration	
	Kenya			Contact		
	Somalia					
	Yemen					
	Oman			Contact	Published	
	Djibuti					
	Pakistan	*T. aduncus* and *T. truncatus* confirmed		Contact	5-7 skulls plus some samples in University Laghari *et al.* 2022 - 10 skulls analysed (University of Karachi)	
	India			Contact	Two skulls	Checked two universities and Museum of Chennai, Bhubhaneswar and Mumbai
	Sri Lanka			Contact	None	
WIO (Red Sea)	Eritrea	*T. aduncus* and *truncatus*?				
	Egypt			Contact		
	Saudi Arabia					
WIO (Arabian/ Persian Gulf)	United Arab Emirates	T.aduncus	Unconfirmed *truncatus* offshore	Contact	Skin samples, two skulls	
	Saudi Arabia					
	Qatar					
	Kuwait			Contact	No samples available	
	Iraq			Contact	No samples or information available	
	Iran			Contact		
EIO	Myanmar					
	Thailand	*T. aduncus*		Contact?	30 samples from strandings	ISSR markers utilised
	Malaysia					
	Indonesia					
WSP	Indonesia					
	Papua New Guinea					
	Polynesia					
	Melanesia					
	Micronesia					

Geographic regions	Location	Species/form reported	Background information	Contact availability	Samples available/type of samples	Notes
WNP	Vietnam Philippines China (north) Japan South Korea			 Contact? Contact?		
ENP	Oregon USA Mexico Guatemala El Salvador Costa Rica Nicaragua Panama Colombia	*T. truncatus* inshore/offshore?	 Limited information in Gulf of California only; high level bycatch in upper Gulf	 Contact Contact Contact Contact Contact	 Esteves and Costa, 2021. 41 skulls, Maybe 2-3 skulls	 samples from different scientific collections in Mexico: Osteological Collec- tion of the Pinniped Ecology Laboratory "Burney J. Le Boeuf," from the Centro Interdisciplinario de Ciencias Marinas (CICIMAR- IPN), La Paz, BCS (n = 20); Whale Museum of La Paz, BCS (n = 10); Natural History Museum of the Universidad Autonoma de Baja California Sur (UABCS), Mexico (n = 11);
ESP	Equador Peru Chile			Contact Contact Contact	**Bayas-Rae *et al.* 2018**: 31 skin samples, and 38 museum samples (Salinas Whale Museum) Several dozen + few tissues samples left Very few specimens, scattered geographically and all held in private hands	 Skulls in two private collections (CEPEC) and (Acorema)
WNA	Throughout the Caribbean Panama Costa Rica Colombia Venezuela Guyana Suriname	*T. truncatus*	Need skulls	Contact? Contact Contact Contact Contact		
WSA	Brazil Argentina	*T. truncatus* and *T. t. gephyreus*	Need to better define limits to distribution of *T. t. gephyreus* by sampling in Argentina and in Brazil in north Santa Catarina and Parana states. Coastal and offshore waters should be sampled (Fruet *et al.*, 2017 workshop report)	Contact Contact	**Barreto (2016)**: 53 Skull samples **Paschoalini & Santos, 2020**: 35 skin samples **Costa *et al.* 2021**: 106 skulls, 208 samples, 353 bp, 10 loci	**Barreto 2016**; Some in Southern Brazil and others in Northern Argentina, and Uruguay

Geographic regions	Location	Species/form reported	Background information	Contact availability	Samples available/type of samples	Notes
ENA	Morocco	*T. truncatus*				
	Mauritania			Contact	Skulls are available in Nouadhibou, Mauritania at the Institut Mauritanien de recherche océanographique et des Pêches (IMROP), 1 skull with Aguilar	
	Senegal			Contact	Senegal Stranding Network, periodic surveys, genetic samples collected, collaborations with Smithsonian Institute and prior 2017 University of Western Brittany. If skulls in good condition stored at the museum of Cheikh Anta Diop, University in Dakar.	
	Gambia					
	Guinea Bissau			Contact		
	Liberia					
	Cote D' Ivoire					
	Ghana			Contact		
	Nigeria			Contact		
	Guinea				Few skull samples	
	Camerooon			Contact		
ESA	Gabon	*T. truncatus* coastal		Contact	10 biopsy samples + 1 skull	
	Republic of Congo	*T. truncatus* coastal			5 skin samples stranding + 3 skulls and bones	
	Democratic Republic of Congo				At least 2 skin samples from bycatch	
	Angola			Contact		
	Namibia			Contact	Few skull specimens, check also Cape Town Peter Best "collection"	
	South Africa (Atlantic)					
MED/BS	Georgia	*T.truncatus ponticus*	Information is limited to the analysis of samples from Azov Sea. Indications of offshore/inshore populations and other areas of BS would help	Contact	31 + 5 skulls	31 samples from BS + 45 from other easter MED regions in process for mtDNA. Intention to run ddRAD. Skull number to determined.
	Ukraina	*T.truncatus ponticus*		ACCOBAMS has created a network across Mediterranean, contacts may be available through them		
	Russia	*T.truncatus ponticus*				
	Georgia	*T.truncatus ponticus*				
	Romania	*T.truncatus ponticus*				
	Bulgaria	*T.truncatus ponticus*				
	Turkey	*T.truncatus ponticus/ T.truncatus*				
	Morocco	*T. truncatus*				
	Algeria	*T. truncatus*				
	Tunisia	*T. truncatus*				
	Libia	*T. truncatus*				
	Egypt	*T. truncatus*				
	Israel	*T. truncatus*				

Geographic regions	Location	Species/form reported	Background information	Contact availability	Samples available/type of samples	Notes
	Lebanon	*T. truncatus*				
	Syria	*T. truncatus*			Saad *et al.*, 2022. stranding data published. Check if samples have been preserved.	
	Cyprus	*T. truncatus*				
	Greece (Aegean)	*T. truncatus*				