



ARTICLE OPEN ACCESS

A Global Compilation of Blue Whale Strandings

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ABSTRACT

Marine mammal strandings are common occurrences that attract public and scientific interest. Stranding data can provide important information for rarely sighted species, but while regional and national stranding databases do exist in some areas, cross-database communication and data sharing are limited. Here, we present the first global compilation of blue whale (*Balaenoptera musculus*) strandings based on museum specimens, published research, and unpublished verified sources. The database can be visualized, explored, and downloaded using an interactive Shiny app. Out of 541 reported records, 37 were considered another species, 14 were duplicates, and 11 were non-stranding events; and only 303 have a high certainty of correct species identification based on key diagnostic features. Among the key findings were an increase in the number of reported strandings over time, especially after 2000; slightly more strandings in autumn than in other seasons; more strandings on the west side of each continent than the east; and the highest strandings in India, the USA, and Sri Lanka, while being almost completely absent from Africa. By length, 18.2% were calves; by sex, females were significantly more common (56.7%) than males. We welcome new additions to the database, which is intended to be a living resource for researchers.

1 | Introduction

Throughout recorded history, marine mammal strandings have garnered attention from the public, finding their way into art-work, journal entries, or news headlines. In the United States, when the Lewis & Clark expedition is taught in elementary school, the whale found on present-day Cannon Beach, Oregon in 1805 is still offered as an exciting anecdote. William Clark recorded the finding in his journal stating that he “proceeded

a short distance to the whale which was nothing more than the skeleton of 105 feet long” (Lewis and Clark 2002). Numerous works of art depict interesting strandings, like the Ostend whale, a blue whale (*Balaenoptera musculus*) that washed ashore in Ostend, Belgium in 1827 (Figure 1), and was recorded by numerous sources (Barnaert 1829; Dewhurst 1832; Dubar 1828; Morren 1829; Vander Linden 1828). Its skeleton toured Europe before ending up in its final resting place in St. Petersburg, Russia. More interesting, perhaps, is that the recounting of this

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FIGURE 1 | The 1829 print, designed by Jacquemain and printed by Langlumé, depicting the whale that washed up in Oostende, Belgium (Jacquemain and Langlumé 1829).

stranding goes beyond public curiosity, with care being taken in species identification and recording the details of the individual's morphology. Over time, this trend continued as these events evolved from public curiosity to scientific interest, with recordings becoming part of standardized biomonitoring programs in many places (Gulland et al. 2025).

When standardized practices are put in place, we can learn much about a species or an area from stranding data. In the United Kingdom and Ireland, records of marine mammal strandings have been systematically and continuously collected since 1913 (Harmer 1914), providing information on the diversity, past and present, of species in the area. These datasets also provide information to fit more complex models such as generalized additive models (GAMs) to predict underlying factors leading to strandings (Coombs et al. 2019). Combining stranding tissue archives with genetic tools can shed light on the distribution of cryptic or hard-to-identify species (Thompson et al. 2012, 2013), and newer molecular approaches continue to unlock fresh insights from these long-held specimens. Stranding data can be used not only to study the trend of a particular species but also to assess how species composition may have changed over time. If a stranded individual can be linked to its encounter history from prior mark-recapture studies while alive, their previous spatial habitat use can be explored alongside its stranding location to explore potential environmental changes that could be linked to mortality (McGuire et al. 2021). Stranding data can also be a viable way to understand demographic parameters when other methods, like mark-recapture, are not available. In the Mediterranean, detailed stranding data with sufficient length

and sex information were used to estimate mortality rates for calf, immature, and adult fin whales (*Balaenoptera physalus physalus*) (Arrigoni et al. 2011); these rates would be difficult to estimate otherwise as more traditional methods require an abundance of data that are hard to gather for rarely sighted species. Finally, many museum specimens of blue whales are the result of stranded individuals and can thereafter be used as a tool for public education (Grey 2022). Potential uses of stranding data multiply when combined across networks and standardized protocols, such as what data are recorded or how identity is determined.

While there is no global coordination of stranding responses for marine mammals, many regional or national networks have been established through government departments, independently funded organizations, universities, Indigenous groups, volunteer-led initiatives, and other types of collaborations (Gulland et al. 2025). Since 2016, the International Whaling Commission has developed a strandings initiative with the intent to provide expert advice, practical training, data collection, and real-time support to responders globally (IWC 2025), together with plans to coordinate a global stranding database. Within these individual networks, records can be used to understand life history parameters, spatiotemporal distribution and changes, and mortality events of species (natural vs. anthropogenic) (e.g., Thompson et al. 2013). Cetaceans are typically difficult and/or expensive to study; stranding information provides a data source at both local and regional scales that may be unobtainable through other means. However, the scientific value offered by these data is limited by the lack of

interoperability among databases. There are limited attempts to standardize the records across these networks or compile the data beyond each individual network's range, though global databases such as Global Biodiversity Information Facility (GBIF; Wieczorek et al. 2025), Ocean Biodiversity Information System (OBIS 2025), and Ocean Data and Information System (ODIS; IOC 2019) are working on achieving this for data interoperability. The Barcelona Declaration, resulting from the 2019 Society of Marine Mammalogy conference, called for enhanced international collaboration, leading to the foundation of the Global Stranding Network (Global Stranding Network 2021). The Global Stranding Network has taken the first step by listing national or regional marine mammal databases globally, and it offers the potential (as does the International Whaling Commission) to coordinate an interoperable global clearing house for publicly available strandings databases.

The disjointed nature of cetacean stranding records is especially noticeable when trying to gather information about a single species. Here, we attempt to overcome this issue for blue whales by compiling all reported strandings of blue whales; locating original references rather than relying on later compilations that may include typographic or other errors; and going beyond simple compilation by assessing the species identification certainty and location certainty. Here we present the steps undertaken to compile the database and highlight some key patterns arising from the compilation.

2 | Methods

2.1 | Data Sources

Occurrences of blue whale stranding events were sought from a variety of sources. The largest individual sources of records came from existing compilations in published work and stranding networks. In addition to existing networks, we found lists of strandings in peer-reviewed papers, newspaper articles, unpublished reports, and social media, including Facebook, Instagram, and YouTube. We attempted to include museum specimens that were stranded individuals and deposited into their collection, but we acknowledge that we may be missing some occurrences. In all cases we tracked down the original reports to avoid perpetuating errors that crept in with later compilations and to assess the validity of species identification. We have listed all stranding networks and databases with blue whale records in Table 1.

2.2 | Verification of Species Identity

Before 1900, there was some confusion about the species identification of fin and blue whales. Some of this confusion stemmed from the scientific name used for the blue whales before the end of the 19th century. True (1898) reviewed the usage of six baleen whale names given by Linnaeus and found that the name *B. musculus* was erroneously being applied to the fin whale (instead of the blue whale) while the blue whale was usually

TABLE 1 | List of databases that contain records of blue whale strandings.

Database abbreviation	Database/Organization name	Region covered
CSIP	Cetacean Strandings Investigation Programme	United Kingdom
IWDG	Ireland Whale and Dolphin Group	Ireland
MARS	Marine Animal Response Society	Canada Maritime Provinces (Nova Scotia, New Brunswick, Prince Edward Island)
MMRCNI	Marine Mammal Conservation and Research Network of India, Sightings and Strandings Database	India
MMHSRP	NOAA Marine Mammal Health and Stranding Response Program	United States of America
MMRI	Maldives Marine Research Institute	Maldives
NMNS	National Museum of Nature and Science	Japan
NZCeTA	New Zealand Cetacean Tissue Archive	New Zealand (Thompson et al. 2013)
NZWSD	New Zealand Whale Stranding Database	New Zealand
ORCA	Organization for Research and Conservation of Aquatic Animals	Peru
RNE	Réseau National Échouages	France & French Territories
RQUMM	Réseau Québécois d'Urgences pour les Mammifères Marins	Canada, Quebec
SIMMAM	Sistema de Apoio ao Monitoramento de Mamíferos Marinhos	Brazil
WRS	Whale Release and Strandings	Canada, Newfoundland and Labrador

called *Balaenoptera sibbaldii* following Gray (1847). Only after True's (1898) taxonomic revision was *B. musculus* consistently applied to blue whales. We kept this confusion in mind when reviewing older stranding records.

Each stranding was given a species identification certainty ranking based on the original data source (Table 2). Species verification could be determined in several ways. When genetic analysis of tissue samples was performed, this offered a definitive source of species confirmation. If specimens were not sequenced, we used a suite of morphological features (e.g., length, shape of dorsal fin, head shape, baleen color, etc.; Table 3) to determine certainty of species identity (Leatherwood et al. 1982). We assumed that right (*Eubalaena* spp.), pygmy right (*Caperea marginata*), bowhead (*Balaena mysticetus*), gray (*Eschrichtius robustus*), humpback (*Megaptera novaeangliae*), and sperm whales (*Physeter macrocephalus*) were sufficiently distinctive to not be mistaken for blue whales, thus our effort is focused on features that differentiate blue whales from other rorquals: fin, sei (*B. borealis*), common minke (*B. acutorostrata*), Antarctic minke (*B. bonaerensis*), Bryde's (*B. brydei*), Eden's, (*B. edeni*), Rice's (*B. ricei*), and Omura's whales (*B. omurai*).

Records that could be identified without a doubt as blue whales, either due to genetic testing or expert identification, were given a certainty ranking of 5 while records that had little to no evidence in support of species identification were given a ranking of 1. In between rankings were assigned based on varying evidence and expert opinion. In instances where the record was certainly not a blue whale, we ranked it as a 0 and noted the correct species identification, if possible. After the initial compilation and ranking, we collaborated with regional experts who could provide additional information (e.g., new reports, photographs, genetic testing) and reassessed our rankings. Finally, authors K.V.R., R.L.B., and T.A.B. re-evaluated the entire database to ensure internal consistency in scores.

2.3 | Location Verification

Latitude and longitude were recorded in decimal degrees to four decimal points, together with the original description of the stranding location, and a location certainty ranking from 1 (broad region or country) to 5 (exact location provided from original source) as defined in Table 4. For decimal degrees, fewer than four decimal places were not specific enough to be placed on the shore, while additional decimal points were unwarranted given the size of blue whales. In more recent years, GPS coordinates were often provided (Code 5), but these were relocated to the nearest shoreline if the listed point (using Google Earth) was not on the shore, unless specified as a floating dead whale. If coordinates were provided to more than four decimal points, we rounded to four decimal places. When coordinates were not provided with the stranding report, we used the location description provided to select a stranding location. If the stranding record had a detailed location description (typically a beach or landmark in a town), we were able to select a relatively accurate shore location from this information (Code 4). When the location description was broad (typically the name of a town), we selected a plausible shore location (Code 3). Locations are not provided if almost no geographic information is available or the record was not a true stranding (i.e., actually a catch, non-mortality stranding, vessel strike report, etc.). When appropriate, the anglicized spelling of towns or countries discussed was used.

2.4 | Sex and Length Data

When detailed in the original report, we included reported sex (either from genetic or morphological verification) and standardized length (rounded to 0.1 m unless scientifically measured) of each stranding. Standard length measurements, from the tip of the rostrum to the notch in the flukes (e.g., Harmer 1927, Norris 1961), were not always available, and many older measurements were recorded in whole feet (1 ft = 0.3048 m). Some

TABLE 2 | Definition of each certainty level for identification certainty ranking of each strandings.

Certainty level	Definition	n
0	Conclusively not a blue whale, evidence that it was another species but no species identified.	10
1	Almost certainly not a blue whale, very little evidence it was a blue whale.	30
2	Probably not a blue whale; evidence lacking, not recorded by a marine mammal observer, some aspects of ID suggest not a blue whale.	50
3	Probably a blue whale given location and great length or from measurements of partial remains; no doubt in report but additional evidence is inconclusive or lacking.	82
4	Probably a blue whale but not absolutely conclusive (i.e., no genetic or photographic evidence to check but recorded by reputable source).	55
5	Definitely a blue whale; conclusive evidence presented, for example one or many of the following: all black baleen with black fringes, tiny dorsal fin, dorsal fin far back, mottled colors on the top and sides, dark underside, slender pectoral fins that are all white underneath and dark on top, interior of mouth and tongue all completely black, DNA sample proves species identity.	248
Duplicate	Stranding was reported by multiple sources but not immediately recognized as being the same event.	14
Non-blue whale	Stranding could be confirmed as another species, most often through photo-identification, as an alternate species.	37
Other	Record was not a stranding, often a catch, non-mortality event, or shipstrike.	11

TABLE 3 | Blue whale identification guide.

Measure	Comparison	References
Minimum length	Reported lengths under 6.5 m should be treated with skepticism given the birth length of blue whales is 7 m for Antarctic and around 6–6.5 m for pygmy blue whales. This can usually eliminate minke and pygmy right whales from consideration.	
Large size	Total length (measured from the tip of the upper snout to the notch in the flukes) of blue whales is longer than for most other rorquals. Fin whales rarely exceed 24 m, sei whales 18 m, Bryde's whales 14.6 m. In the northern Indian Ocean where fin and sei whales are absent, lengths over 18 m can be assumed to be pygmy blue whales, while shorter specimens could be Bryde's, Eden's, or possibly Omura's whales.	Best 2007
Geographic distribution	Rice's whales are found mainly in the Gulf of Mexico, where blue whales are absent (only one legitimate sighting/death in the 1920s at the entrance to the Panama Canal), and are not considered further.	
Dorsal fin height	Blue whales have the smallest dorsal fins, height of no more than 0.3 m, compared to 0.7 m for fin whales, 0.5 m for Bryde's whales, sei 0.25–0.67 m.	
Dorsal fin shape	A variety of shapes from falcate to triangular to just a nubbin, compared to strongly falcate forms for other balaenopterids.	
Dorsal fin position	Much further back on the body, around 1/4 back from the tail vs. 1/3rd for fin whales.	
Coloration of underside	Blue whales are darkly colored underneath, while fin whales and other rorquals are white underneath.	
Baleen color	Baleen including bristles is uniformly black, fin whale baleen has asymmetric coloration and is white on the front right, common minke are all white, Antarctic minke are less than half white while the majority have an outer band of black, sei whales grayish-black with white fringes, Bryde's whales are grayish black with whitish-gray bristles.	Best 2007
Ventral groove number	Very high numbers of ventral grooves (total count) in blue whales (70–118) compared to fin (68–106), sei (40–66), Bryde's/Eden's (42–54), Omura's (80–90), minke (50–70), humpback (14–22), Antarctic minke (44–76), Rice's whale (44–54).	Numbers collated by RLB, Best 2007
Ventral groove extension	End at or posterior to the umbilical scar, but in sei and minke whales end well before the umbilicus.	
Head (alive)	Rounded and U-shaped vs. V-shaped for other rorquals.	
Head (skull shape)	Distinctive wide rounded upper skull (at midpoint almost the same width as at the base) vs. V shape for fin whales.	Best 2007
Flipper color	Blue whales are dark on top and completely white underneath extending to the edge of the flipper, sei whales dark underneath.	
Flipper length	The high ratio of flipper length to body length has been used as a diagnostic, but is not as reliable of a metric given the different ways in which body length can be measured.	
Vertebrae total	Blue whales have a higher total number than other balaenopterids: blue (63–66), fin (60–63), sei (55–57), Bryde's (54–55), humpback (51–54), common minke (49), Antarctic minke (49–50), Omura's (53), Rice's (53), pygmy right (40–44). The smallest vertebrae at the end may be lost or missed.	Best 2007, Rosel et al. 2021, Wada et al. 2003
Vertebrae type	Cervical:thoracic:lumbar:caudal, blue whales 7: 14–16: 14–16: 27–29 fin whales 7: 14–16: 13–15: 24–27 sei whales 7: 13–14: 13–14: 21–23 Bryde's 7: 13: 12–13: 21–22 Omura's 7:13:12:21 Rice's 7:13:13:20	Best 2007, Rosel et al. 2021, Wada et al. 2003

Note: When genetic sampling or when local expert opinion was not available, we consider these characteristics to be diagnostic of a blue whale.

measurements may have been taken in non-standard ways from the tip of the lower jaw to the fluke tips, or over the curve of the body. In some cases, lengths are clearly exaggerated (i.e., reported as longer than any verified blue whale), reported without proper measurements, or based on skeletons. When reported, the measurement type is included in the database.

2.5 | Data Analysis

We conducted some data analyses, all in R (R Core Team 2024). The compiled data were analyzed to report sex composition, age composition (calf vs. non-calf based on length at weaning), length composition, and seasonality, regionally and globally when appropriate. All summaries are based on high identification certainty (Code 4 or 5) strandings unless otherwise specified. In determining age composition, we considered a specimen to be a calf or non-calf based on age at weaning. For pygmy blue whales, weaning occurs at 15m (Sazhinov 1980) and for non-pygmy blue whales, weaning occurs at 16m (Mackintosh and Wheeler 1929). We consider pygmy blue whales to be those strandings found in and around the Indian Ocean, Indonesia, Australia, and Aotearoa/New Zealand (Branch et al. 2025). The hemisphere where the stranding took place was considered when determining season (i.e., summer strandings occurred in June–August in the Northern Hemisphere or December–February in the Southern Hemisphere). We considered seasons as autumn, winter, spring, and summer in three-month blocks (e.g., autumn is September–November in the Northern Hemisphere and March–May in the Southern Hemisphere).

TABLE 4 | Definition of each certainty level for location certainty ranking.

Certainty Level	Definition	<i>n</i>
0	Almost no location information is given or was not a stranding (i.e., catch, ship strike, etc.)	10
1	Position highly uncertain, listed only as a country or large province or region	4
2	Position quite uncertain, just a general region, province, or state, position location only given to whole degrees	44
3	Position to within 10 km, location listed as the name of a town or city	135
4	Position to within 1 km, based on specific location (e.g., name of a beach), or position location to degrees and minutes, or position to 2 or 3 decimal places	196
5	Exact position to within 0.1 km, based on photos linked to Google Earth locations, or exact location to at least 4 decimal places reported in original document	152

2.6 | Spatial Clusters of Strandings

We identified spatial clusters in strandings using the density-based spatial clustering of applications with noise (DBSCAN) algorithm (Ester et al. 1996), implemented in the R package *db-scan* (Hahsler et al. 2019). The algorithm groups points based on their closeness while identifying low-density areas as noise. The algorithm starts from core points and finds clusters around these points. We set the radius length to 1.5 degrees (searching across latitude and longitude points, equivalent to an average of about 150 kms) to match country-scale levels of clusters and set the minimum number of points that identify a cluster to five.

2.7 | Shiny App

We created a publicly available platform for interaction with the stranding data using the Shiny package (Chang et al. 2024), which displays stranding data using an interactive map built with leaflet (Cheng et al. 2024).

3 | Results

3.1 | Data Summary

We compiled 541 total records (Table S1), most of which were unique stranding events ($n=516$), after removing duplicates ($n=14$) and non-strandings ($n=11$). The earliest stranding dates to a few hundred years BCE, with more consistent records beginning in the 1600s. Some records ($n=11$) were presented as strandings in compilations but were determined to be other events (i.e., a vessel strike, a catch, a non-mortality); some strandings were the result of a vessel strike but did not result in an individual being stranded on shore. Fourteen entries were duplicates listed under multiple dates due to errors in compilations. Just over half of the total records ($n=303$) are “high species certainty” (Code 4 or 5) records. It is likely that many ranked as a 3 ($n=82$) are in fact blue whales, but insufficient information exists to confirm species identity. Most of the unique records have both high species certainty and high location certainty (Table 5).

Strandings were distributed widely, with some areas very highly represented (Figure 2, Table 6). We found that species

TABLE 5 | The number of strandings by each species and location certainty.

Location certainty	Species certainty				
	1	2	3	4	5
0	1	0	2	0	0
1	1	0	3	0	0
2	8	10	8	1	8
3	7	27	20	16	41
4	8	13	31	22	100
5	5	3	18	16	99

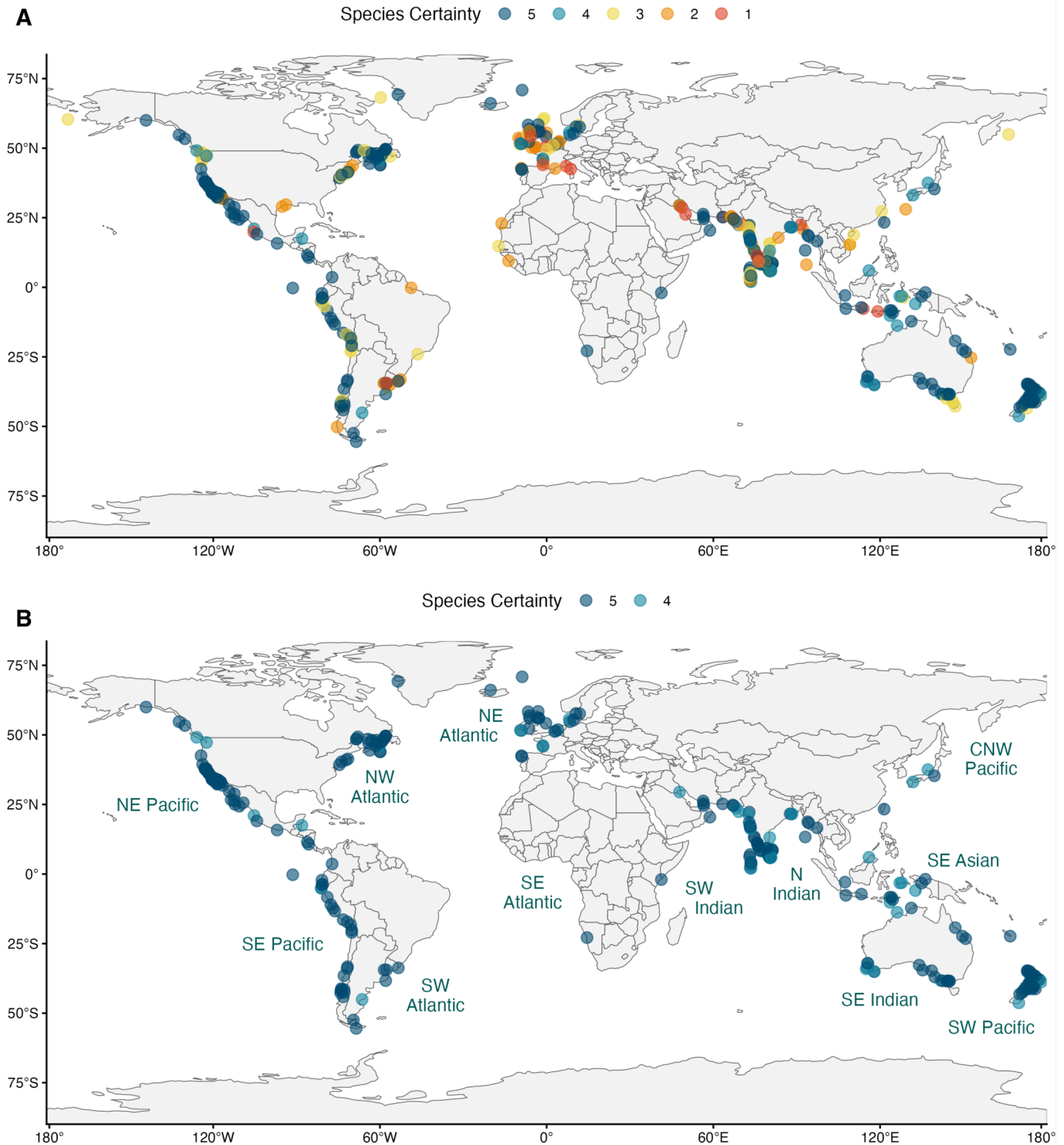


FIGURE 2 | Map of (A) all blue whale strandings, colored by identification certainty, and (B) high certainty (Code 4 and 5) strandings. Strandings that do not fall within the 1–5 ranking scale are excluded.

identification varied geographically; strandings in places historically devoid of blue whales are less certain, as are species identifications from many older records in northern Europe. More recent strandings, and those occurring in countries with dedicated stranding networks, are generally more certain in their identification. The north Indian Ocean has the most strandings, but only about half these are high certainty, compared to other regions such as the northeast and southeast Pacific Ocean where most strandings are high certainty (Figure 3). The northwest Atlantic Ocean has a high

proportion of lower identification certainty strandings; many of the strandings from that region are pre-1900 and lack detailed information.

3.2 | Demographic Variability in Stranding Data

Species identity certainty also varies for lengths longer than 16 m (Figure 4). The frequency of low certainty identifications (Code 1 and 2) increases below 16 m, where smaller baleen

whale species can be more easily confused for blue whale calves. Exaggerated lengths are found in older records, particularly in older newspaper articles, either due to improper measurement or potential exaggeration for shock value. In most regions, the most common misidentifications were strandings reported as blue whales that were actually fin whales ($n=13$), except in the northern Indian Ocean where confusion with Bryde's whales ($n=15$) was common.

TABLE 6 | The top 10 countries and their number of total strandings and high certainty strandings.

Country	Total	High certainty
India	87	31
USA	70	47
Sri Lanka	51	27
New Zealand	48	40
Australia	31	22
Canada	27	23
Chile	24	14
Indonesia	15	11
Maldives	15	9
Peru	15	11

For high certainty strandings with sex information ($n=157$), the database included 68 males and 89 females (Figure 5). This sex ratio (56.7% female) is not representative of the overall sex ratio in blue whale catches of 47.9% (95% CI 47.7%–48.0%) female (Branch and Monnahan 2021). Assuming a binomial distribution with an expected ratio of 0.479, there is only a 1.1% probability of observing 89 or more females out of 157, suggesting that there is a female bias in the stranding data.

The average length across all high certainty individuals with length information ($n=247$) was 19.6 m. We classified 202 of these as non-calves and 45 (18.2%) as calves based on length at weaning. For high certainty strandings with both length and sex information ($n=145$), the distribution of stranding lengths is similar between sexes: median length is 20.4 m for females ($n=83$) and 20.0 m for males ($n=62$). The means, 19.4 for males and 20.2 for females, are not significantly different ($p>0.05$, two-sample t -test), even though female blue whales are longer than male blue whales (Mackintosh and Wheeler 1929).

3.3 | Temporal Variability in Stranding Data

We found evidence of some seasonality in the occurrence of strandings ($\chi^2=9.06$, $df=3$, $p=0.028$, Figure 6), with more strandings occurring in autumn ($n=89$) than other seasons (60 to 81). We looked at seasonality for the north Indian Ocean and northeast Pacific Ocean regions, where there was sufficient data for some patterns to stand out. In the north Indian

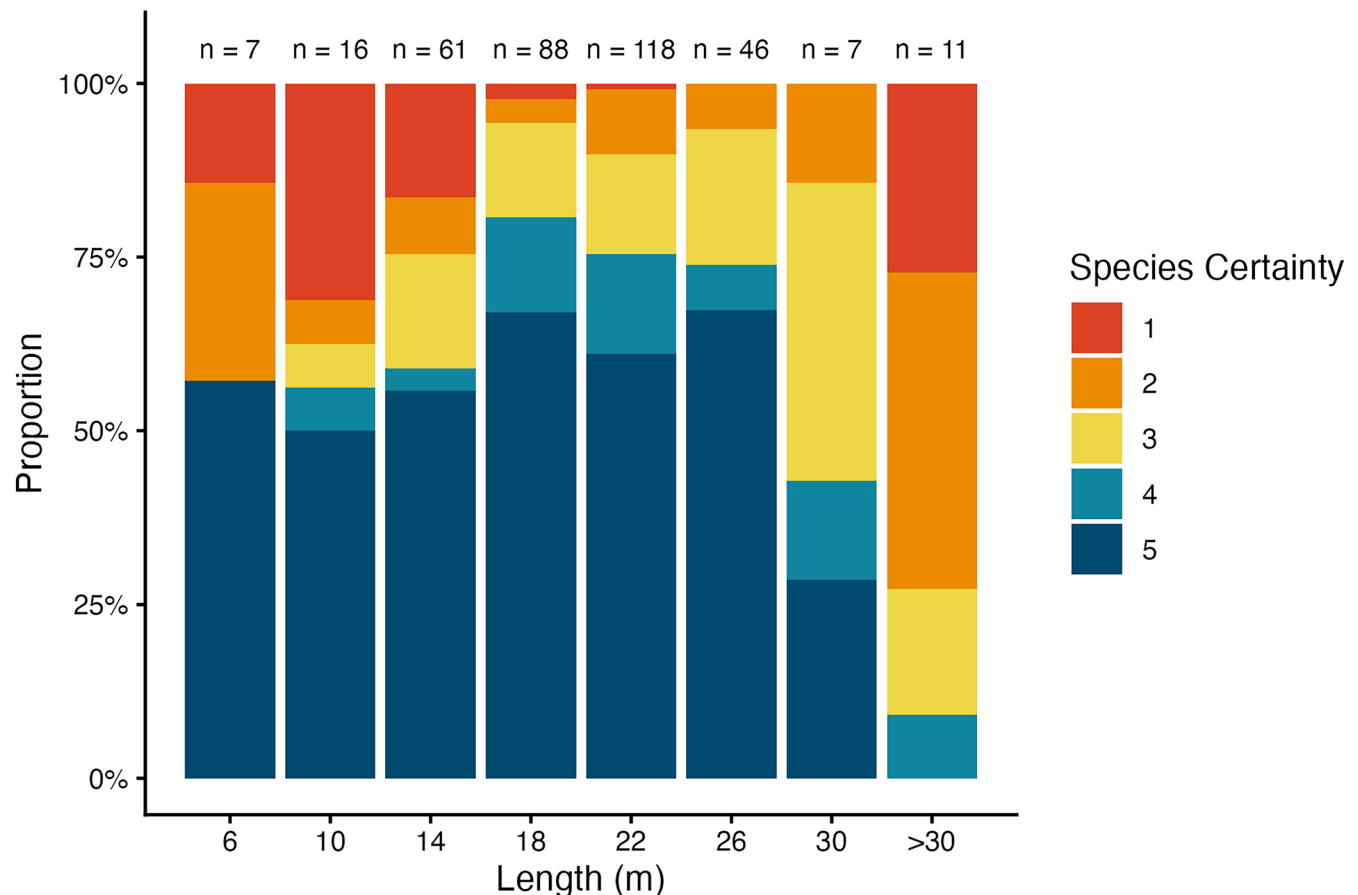


FIGURE 3 | Count of blue whale strandings colored by identification certainty 1 through 5 ($n=468$) across each region.

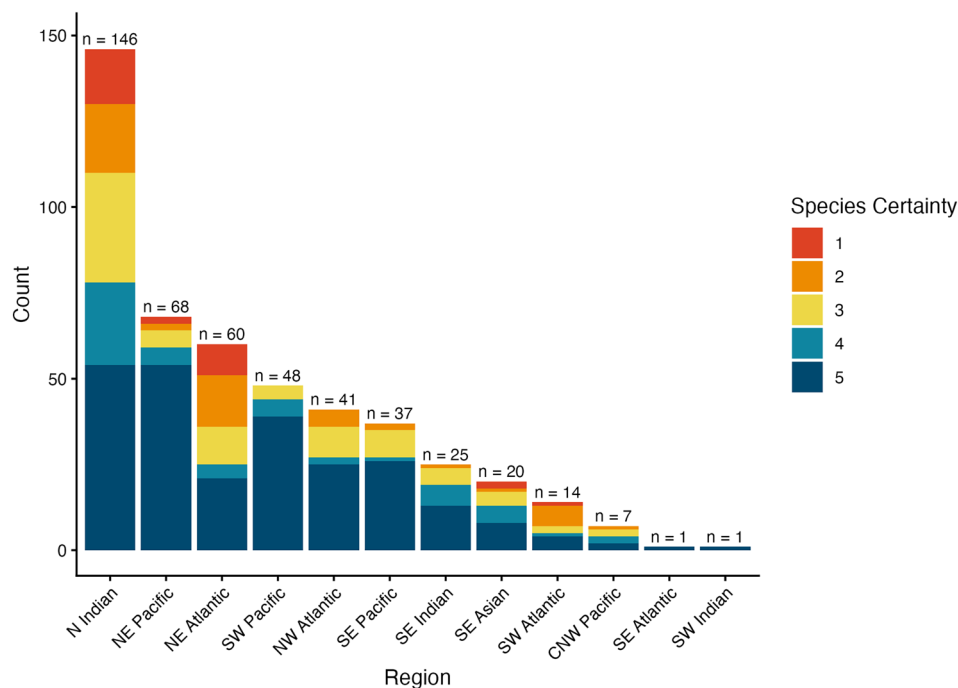


FIGURE 4 | Percentage of species identification certainty 1 through 5 across the lengths of stranded blue whales ($n = 354$). The sample size for each length range is included. All strandings above 30m have been combined into a single category since these are unlikely to correctly measured lengths.

Ocean, there was no evidence of seasonality in strandings ($\chi^2 = 3.11$, $df = 3$, $p = 0.375$). In the northeast Pacific, however, there was strong evidence of seasonality in strandings ($\chi^2 = 26.63$, $df = 3$, $p < 0.001$), with autumn and summer, 22 and 27 strandings respectively, far outweighing spring and winter, with strandings each, perhaps reflective of migration patterns.

The number of reported strandings increased over time (Figure 7), particularly into the 2010s and 2020s. This increase likely represents improved reporting thanks to the establishment of more monitoring programs and the rise of social media allowing information to be easily and rapidly spread.

3.4 | Spatial Variability in Stranding Data

Looking at the global distribution of strandings (Figure 2), several patterns immediately stand out. Globally, more strandings tend to occur on the west side of major landmasses than the east side, including on the Indian subcontinent. India has a dedicated stranding network which covers both coasts; thus, it is unlikely to be solely a reporting issue. Africa as a continent has just five strandings, only two of which are of high certainty, one in Kenya and one in Namibia.

We identified 11 geographic clusters in the distribution of high certainty strandings, including from 5 to 28 strandings each (Figure 8). These clusters include almost half of all high certainty strandings ($n = 149$ of 303), and were found in Australia, New Zealand, Ecuador and Peru (on the border), Chile, Canada, the Maldives, India, and the west coast of North America. Both

the USA and India have multiple clusters, while some areas with a high total number of stranding records, such as the northeast Atlantic, are not represented by clusters. No clusters were identified in Africa or east Asia.

3.5 | Interactive Display of Database

The Shiny app is hosted at https://krandrup.shinyapps.io/blue_whale_global_database/ for public use, including visualization, query interaction, and data download for filtered results. If data are being downloaded for analysis, we require an initial check with the corresponding author to minimize overlaps with ongoing projects. The data are plotted as a zoomable global map, with filters for sex, age class, length range, year range, identification certainty, and broad region. Clicking on a stranding provides detailed information from the database for that stranding. Filtered data are available for download and include the specifics of our sources for each entry, and methods for selecting location and identification. The Shiny app provides a means for others to easily and quickly identify missing strandings and those with missing or incorrect data, so that the database can continue to expand.

4 | Discussion

Here, we document the first global database of blue whale strandings, which provides a detailed account of recorded blue whale strandings gathered from peer-reviewed papers, gray literature, unpublished data, and expert communication through collaboration with national stranding database holders. While we were able to gather high-quality information for many of the records,

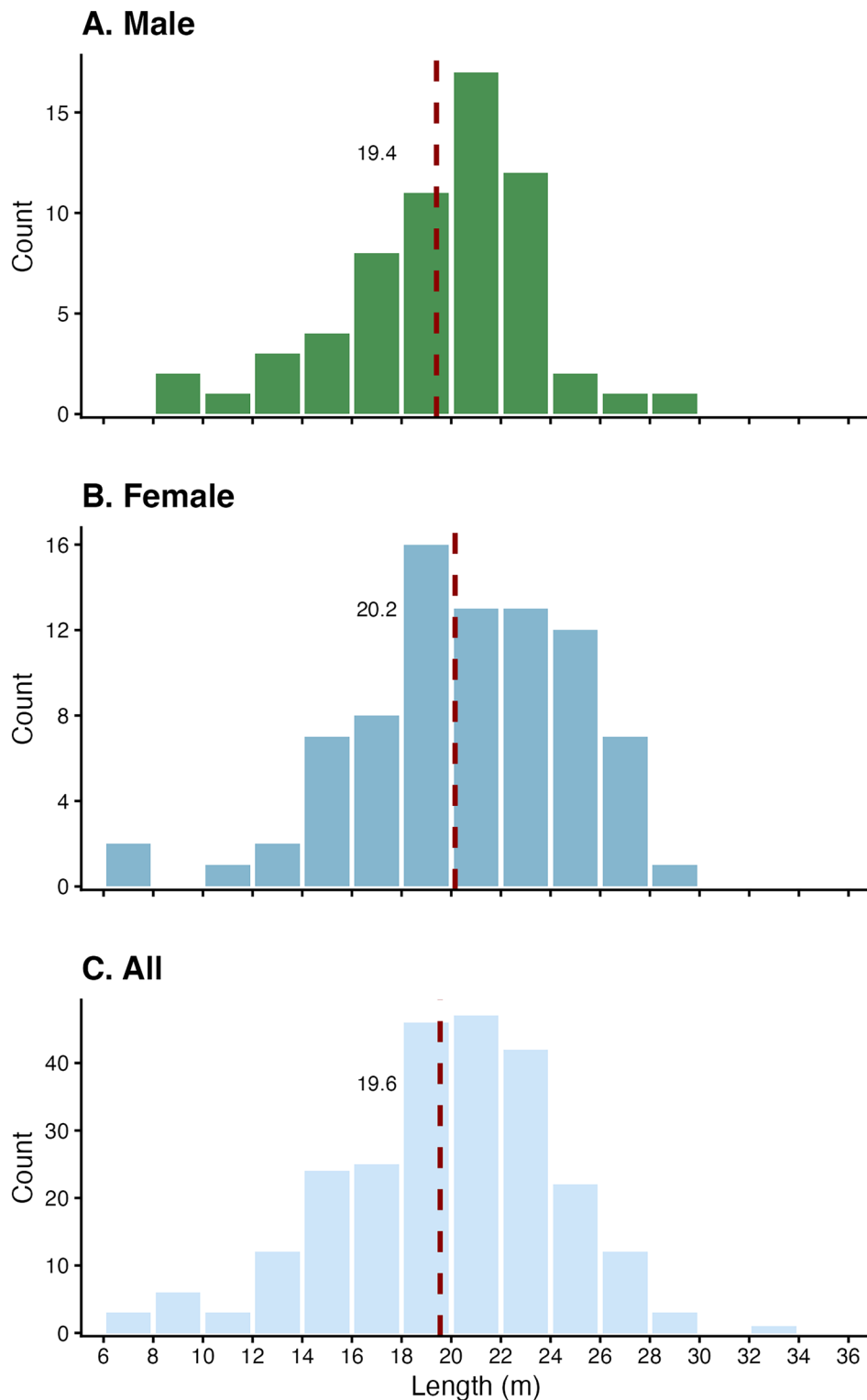


FIGURE 5 | Length frequency histograms of blue whale strandings with high identification certainty (Code 4 and 5) and known lengths for males (A) ($n = 62$), females (B) ($n = 83$), and all strandings (C) ($n = 247$). The mean length for each group is shown by the red dashed line.

the information collected and shared is highly variable between events. We welcome additions and corrections to the database.

The increased volume of reported strandings over time is largely thanks to the continued establishment and operation of regional or national stranding networks with consistent internal practices (Gulland et al. 2025). Not all regions exhibited

increasing strandings over time (Figure 9). The northeast Atlantic, for example, has a slight decrease in strandings over time, possibly due to depletion from whaling in the late 1800s and 1900s. The opposite occurred along the west coast of India and around Sri Lanka and the Maldives, which has many blue whale strandings despite catches, nearly all in the 1960s, of an estimated 2572 individuals, 2023 in the central Indian Ocean

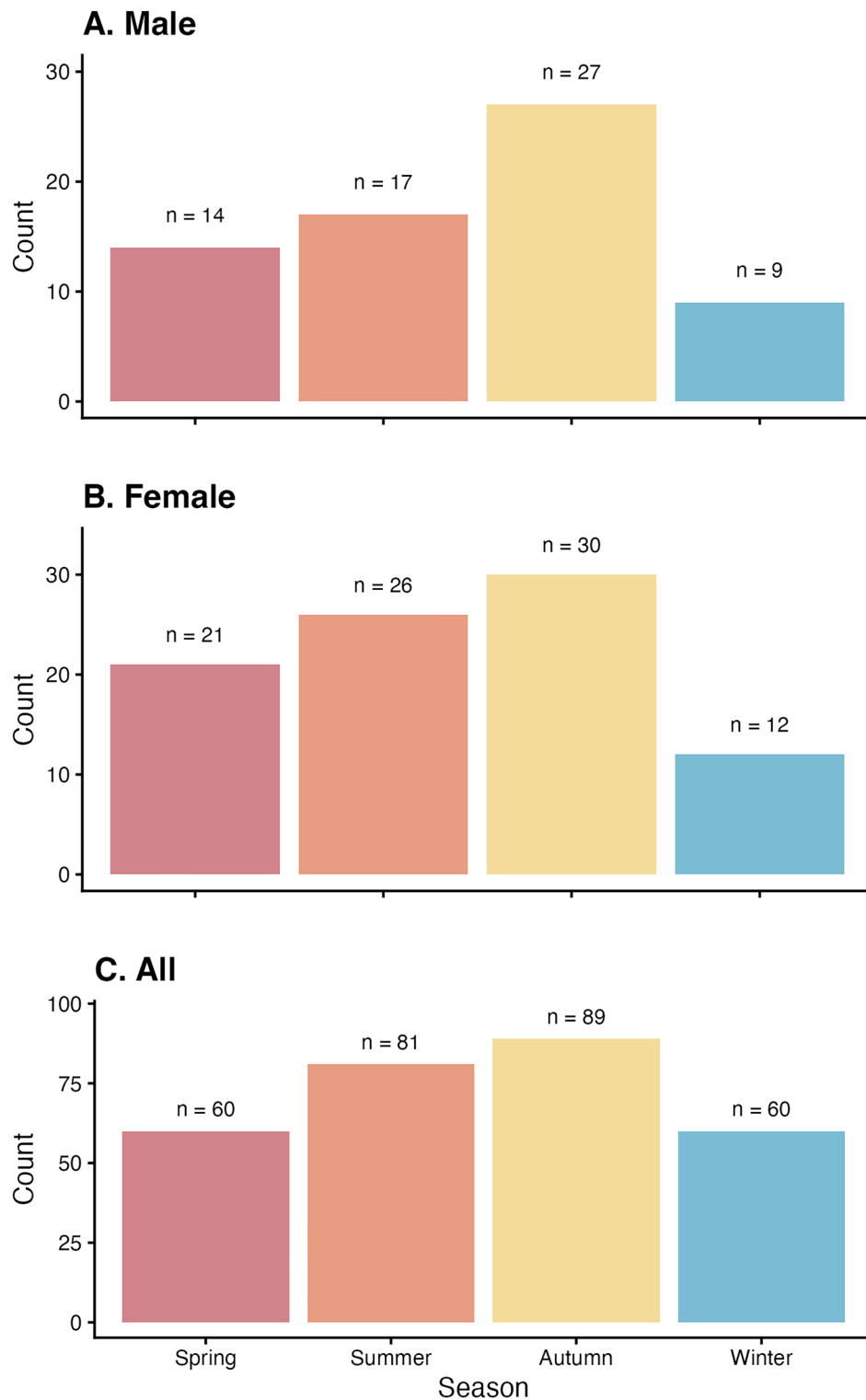


FIGURE 6 | Number of high certainty (Code 4 and 5) blue whale strandings by season for males (A) ($n = 67$), females (B) ($n = 89$), and all strandings (C) ($n = 290$); records for which the season is unknown have been removed.

population and 549 in the northwest Indian Ocean population (Branch et al. 2025). There are few blue whales present in the northeast Atlantic today after whaling but our recorded strandings in that region come prior to that depletion. In contrast, in the Indian Ocean, we have no records prior to whaling, but blue whales are still documented in the area. Some factors driving the observed increase in strandings records

potentially include increasing human population size (i.e., increased number of potential observers), increasing scientific interest in evaluating strandings, the rise of social media and ease of digital photography, and the recovery of some blue whale populations after the end of whaling (e.g., Monnahan et al. 2015). We are unable to establish the true sources of the increase, which likely are some combination of blue whale

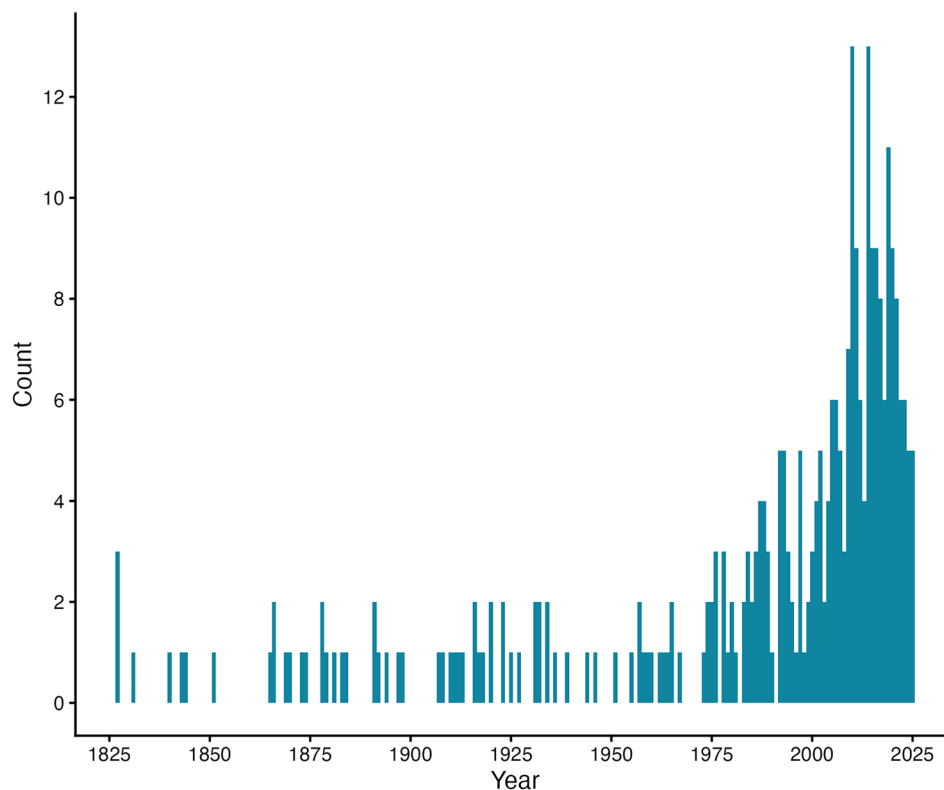


FIGURE 7 | Blue whale strandings per year for high certainty (Code 4 and 5) strandings ($n = 299$) from 1800 to the present (2025). The maximum number of strandings recorded in a single year is thirteen.

population recovery and range shifts, and increases in human search effort and reporting.

We have completed a simple summary for mapped high density areas of blue whale strandings, with some clusters corresponding to distinct, previously characterized blue whale populations (e.g., Chile and New Zealand, Barlow et al. 2018, Galletti Vernazzani et al. 2026). More in-depth spatio-temporal analyses could be performed at a country level or across entire blue whale populations if the data is sufficiently representative. For example, thanks to the database presence and consistent genetic testing, the New Zealand cluster may be representative of the southwest Pacific blue whale population.

The striking finding that there are more strandings on the west side of the large landmasses is likely explained by greater upwelling on the west side of continents, with associated high productivity and more plentiful blue whale food, resulting in higher densities of blue whales. In addition, prevailing winds and ocean current patterns may drive carcasses to shore. In India specifically, the west coast is notably more productive with more fisheries and increased accessibility and use of beaches, while blue whales are likely far less abundant on the Bay of Bengal side, though survey effort and data collection differ substantially. Although these differences are perhaps at least partially a result of reporting rates. Dudhat et al. (2022) provided a spatio-temporal analysis of all strandings from India's Marine Mammal Stranding Database (MMRCNI 2024); similar analyses could be performed at a species level that also incorporates any strandings not present in the database. Alvarado-Rybak et al. (2020) identified spatial and temporal

hotspots in Chile to try to understand causes of increasing cetacean strandings. In Anderson et al. (1999, 2012), they used stranding data in mapping blue whale migrations in south Asia. A more fine-scale approach has the potential to uncover additional factors influencing the frequency or location of strandings.

Some areas with historically high catch rate throughout modern whaling, between 1904 and 1973 (Branch et al. 2025) are also well represented by strandings while others are not. The central western North Pacific population was hunted around northern Japan and the Aleutian Islands, yet there are only three strandings recorded in Japan and one in Alaska. Similarly, many blue whales were captured off the coasts of Yemen, Somalia, and Madagascar, yet there are no strandings recorded in any of these countries, likely at least partially a result of low reporting rates. Most notably, the heaviest whaling occurred in the Antarctic across the entire whaling period, yet there are zero recorded strandings along the continent, no doubt largely due to the negligible human presence in this region. Finally, large numbers of blue whales were caught off Angola, Namibia, and South Africa, but only one stranding has ever been recorded in the southeast Atlantic. Some of this disparity can be attributed to depletion of blue whales due to whaling, but there are also effects of human population density, the presence of a stranding network or interested cetacean researchers, and prevailing currents and winds on whether a stranding occurs and is recorded. South Africa has had a dedicated stranding network since the late 1960s (e.g., Bannister et al. 2015; Plön et al. 2017, 2023), so the absence of blue whale stranding records may be more reflective of an absence of strandings than for Angola and Namibia,

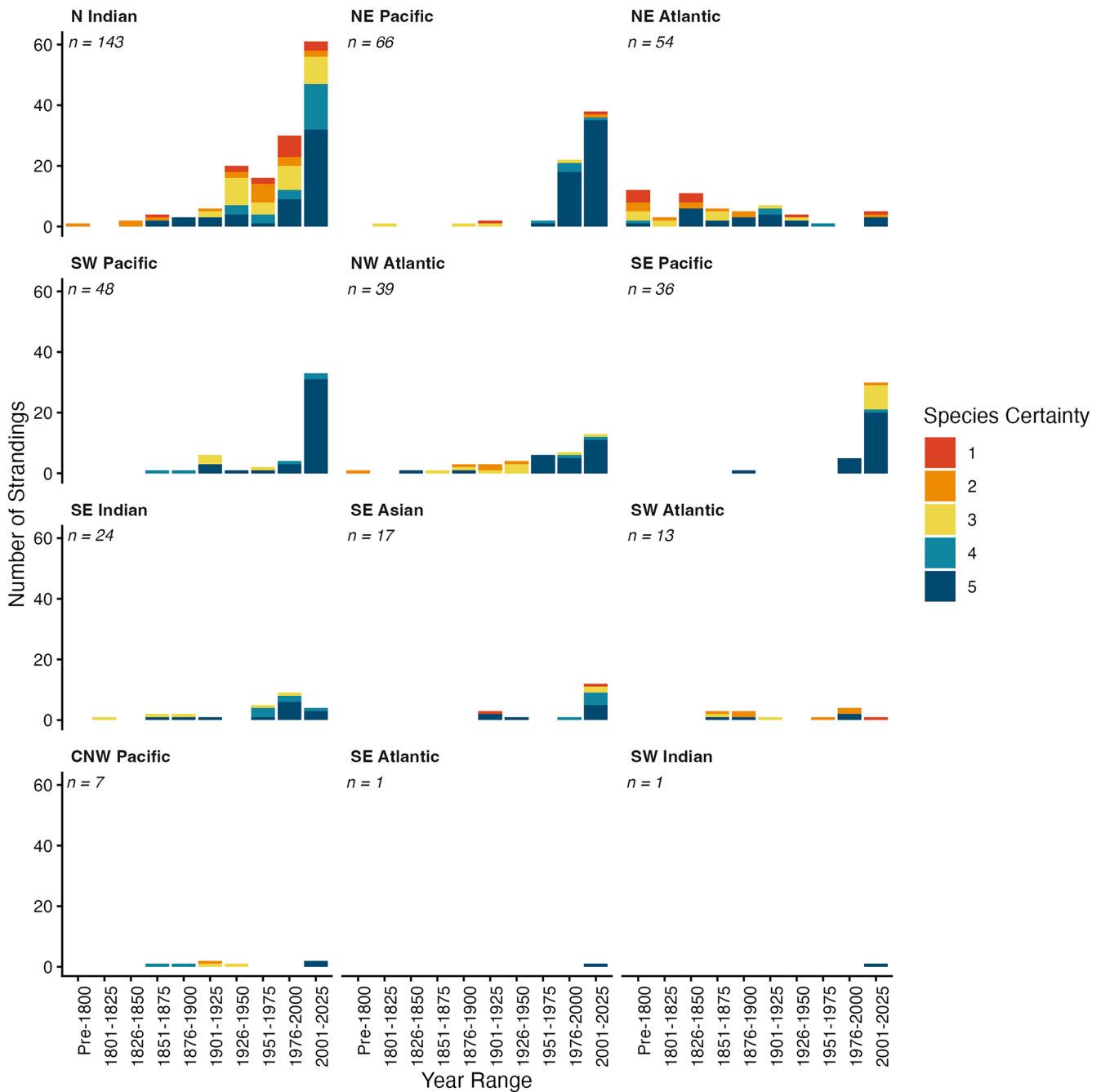


FIGURE 8 | Count of blue whale strandings by year range, differentiated by region, according to identification certainty. All strandings occurring before 1800 are grouped together.

at least in more populated areas. However, the opposite is true at least for Sri Lanka, the Maldives, and the west coast of India where whaling still occurred in the late 1960s but the number of strandings is still high even after this period. We are currently working on an analysis to identify the most important factors that predict the number of reported strandings by region and country, potentially including season or presence of a dedicated stranding network.

There were more strandings in autumn than in other seasons (Figure 6), which coincides with the end of the main feeding period in blue whales and migration or dispersion to breeding

and calving regions. It is possible that poor feeding conditions in some years might lead to starvation and strandings at this time of the year, but it would be more expected at the end of winter after a long period of energetically expensive nursing (for mothers) in addition to low food intake (for all individuals). In some regions, seasonal monsoons or directional wind patterns may increase strandings in autumn, resulting in higher rates of carcasses beaching on land. In the north Indian Ocean, the relatively even spread of strandings throughout the year may be reflective of year-round presence being more important than monsoon patterns versus the strong seasonality in the northeast Pacific when blue whales are not present part of the year. Further in-depth

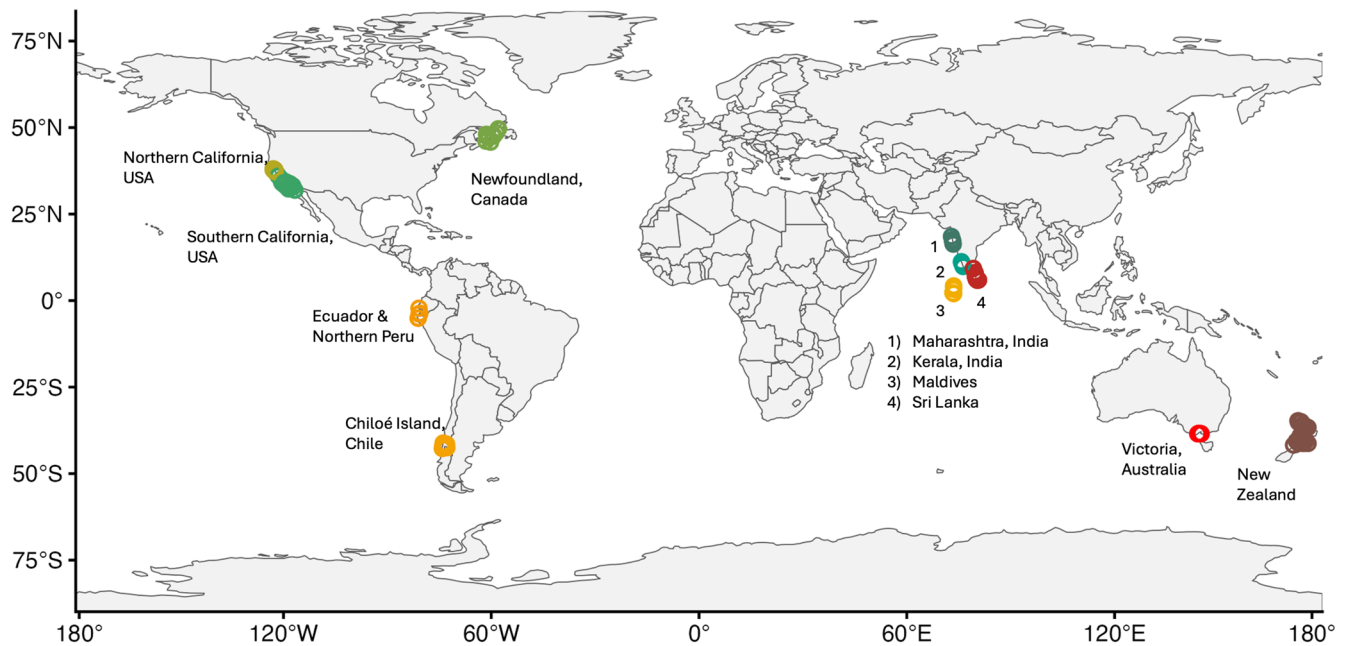


FIGURE 9 | Spatial clusters of blue whale strandings, each represented by a different color, as identified by the DBSCAN algorithm. Only high certainty (Code 4 and 5) strandings ($n = 303$) were included in this analysis. Points that were identified as “noise” ($n = 154$) and not included in any cluster have been removed from the map.

analyses for each of these regions could provide a more detailed view on the inter-annual variability in strandings.

Concerning the higher female proportion in strandings than in the population as a whole (56.7% vs. 47.9%), it is possible that lactating mothers are more likely to strand, given how energetically expensive it is to wean a calf in baleen whales (e.g., Lockyer 1981) or perhaps moving closer to shore while in a mother-calf pair which increases the risk of anthropogenic threats such as nearshore fishing gear and coastal shipping.

Stranding networks are critical tools in examining every facet of the lives of marine animals. Data from stranded animals have proven valuable for examining demographics, biology, distribution, ecology, and lethal and non-lethal impacts from human activities, especially if organizations and networks are consistently well-funded and have sufficient resources. For example, juvenile and calf survival rates were estimated from fin whale strandings in the Mediterranean (Arrigoni et al. 2011); we plan to apply a similar method to estimate blue whale calf survival using this database.

Our global database of blue whale strandings will facilitate the evaluation of demographic, geographic, and temporal patterns in blue whale strandings that should provide insight on trends in both the ecology of blue whales and anthropogenic impacts. As the database grows through continued global collaboration and contributions, we anticipate increased resolution and power to detect patterns important to the ecology and conservation of this species.

Further, our study provides a framework for developing future stranding databases for other baleen whales or marine mammals, supporting the collaborative management of those species

as well. Our database is exclusive to blue whales, but a global compilation of strandings for another large whale species would be meaningful as well. We have focused on the potential uses of the data in terms of blue whales, but suggestions apply to other baleen whales if the data are compiled similarly. We might expect that global temporal trends for another large whale might be similar to blue whales as they face a similar history with whaling and are subjected to the same increase in reporting, but the volume and spatial trends of strandings would be highly species-specific.

Author Contributions

K.V.R. completed the data analysis, wrote the manuscript, prepared all figures, and designed the Shiny app. T.A.B. completed the initial compilation of stranding data and spearheaded the effort to create this global dataset. R.L.B. assisted in checking species ID for every entry in the database. R.C.A. provided data and species ID verification for the Maldives. E.L.C., R.C., and H.H. provided data and species ID verification for New Zealand. B.G.V. provided data and species ID verification for Chile. A.D.I. provided data and species ID verification for Sri Lanka. D.P. and D.S. provided data and species ID verification for India. K.V.W. provided data and species ID verification for Europe and Peru. S.M.W. provided data and species ID verification for the United States. T.W. provided data and species ID verification for eastern Canada. All authors reviewed and contributed to the revision of the manuscript.

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The final dataset is available in the [Supporting Information](#).

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Supporting Information

Additional supporting information can be found online in the Supporting Information section. **Table S1:** All blue whale strandings as compiled, reviewed, and analyzed by the authors. We consider this table the database of all known strandings at the time of publishing.