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Virginia Sea Turtle & Marine Mammal Stranding Network 2018 Grant Report

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VIRGINIA
AQUARIUM
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Virginia Coastal Zone
MANAGEMENT PROGRAM



**VIRGINIA AQUARIUM
STRANDING RESPONSE PROGRAM**

**Virginia Sea Turtle and Marine Mammal Stranding Network
2018 Grant Report**

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**A Final Report to the
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The mission of the Virginia Aquarium & Marine Science Center is to inspire conservation of the marine environment through education, research and sustainable practices. The Aquarium is operated by the City of Virginia Beach in collaboration with the Virginia Aquarium Foundation (VAQF). The Virginia Aquarium Research & Conservation Section is responsible for directing the organization's efforts in these areas. With primary support from the VAQF, the Section's Stranding Response Program is dedicated to conservation of marine animal species through stranding response, research, rehabilitation and education.

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Introduction

All marine mammals and sea turtles are designated as protected species by the Marine Mammal Protection Act (1972) and/or the Endangered Species Act (1973). The Virginia Aquarium & Marine Science Center Stranding Response Program (VAQS) holds permits from state and federal authorities for all activities in this report related to marine mammal and sea turtle stranding response and research. VAQS has been responding to marine mammal and sea turtle strandings (more than 8,000) in Virginia since 1987. The Aquarium and the VAQS Stranding Center are located in Virginia Beach, VA. VAQS responds to all marine mammal strandings in Virginia and currently maintains the state marine mammal stranding database. In addition, VAQS and their cooperators coordinate the Virginia Sea Turtle Stranding and Salvage Network throughout Virginia. All sea turtle stranding data are recorded by VAQS into the state sea turtle stranding database. For the purposes of this report, VAQS uses the following definition: *Sometimes marine animals wash ashore sick, injured or dead. At other times, they become entrapped or entangled and are unable to return to their natural habitats without assistance. These events are known as Strandings.*

VAQS uses staff, volunteers and other organizations (cooperators) to report, record, document, recover and examine and/or rehabilitate stranded animals. The organization and training of primary response cooperators is crucial to the stranding network. Rapid response to strandings can result in the rescue of live animals and the collection of valuable data from dead animals that may otherwise be lost due to decomposition and/or scavenging. Formed in 1991, the VAQS Stranding Response Team (Team) is composed of staff and volunteers trained to respond to stranded animals. VAQS staff provide training programs for approximately 65 Team volunteers and personnel from cooperating agencies and organizations. Instruction in biology, ecology and both live and dead stranding response protocols are provided for marine mammal and sea turtle species found in Virginia. These cooperative training efforts have included the U.S. Coast Guard, U.S. Fish and Wildlife Service (USFWS), NOAA Fisheries Service (NMFS), The Nature Conservancy, Virginia Marine Resources Commission, Virginia Department of Game and Inland Fisheries (VDGIF), Virginia Institute of Marine Science (VIMS), state parks, national wildlife refuges, regional law enforcement authorities and lifeguards. As a result of these long-standing efforts, VAQS continues to maintain and improve statewide marine animal stranding response networks.

Marine mammal groups and species found in Virginia include cetaceans (dolphins, porpoises and whales), pinnipeds (seals) and sirenians (manatees) (Appendix V). Marine mammal strandings occur in all months of the year. During the 1990s, Virginia averaged 63 marine mammal strandings per year with a high of 106 in 1994. Since then, stranding numbers have increased dramatically. For the years 2000-2012, Virginia averaged 100

marine mammal strandings per year. This could represent increasing marine mammal mortality, though it also may partially be the result of an improved state-wide stranding response network. The years since 2012 have continued with high numbers of marine mammal strandings in Virginia, including the historic total from 2013 (427 strandings) that included a bottlenose dolphin unusual mortality event (UME), and an annual average of 96 strandings for 2014-2018 (Figure 1).

It is important for organizations such as VAQS to examine stranded marine mammals because these species are very challenging to study in the wild. Stranding trends, including probable causes of marine mammal mortalities, are monitored through stranding records. Little is known about the natural history of many marine mammal species and strandings provide a rare opportunity to thoroughly examine these animals. With the advent of new techniques such as molecular genetic analyses, stranded animals provide a wealth of information about wild populations that are difficult and very costly to study *in situ*. In some species, such as pygmy/dwarf sperm whales and beaked whales, data collected from stranded animals often provides the best and only information available on the species' natural history. Stranding records can represent viable measures of the biological diversity and the spatial and temporal changes that are occurring in adjacent waters, especially when long-term datasets are developed and maintained (Pyenson 2010; Pyenson 2011; Pikesley *et al* 2012). In addition, stranding data can indicate seasonal trends in presence and suggest areas of high concentration of marine mammal species such as bottlenose dolphin and harbor porpoise (Read and Murray, 2000). Spatial and temporal trends in marine mammal mortalities, such as those caused by unusual mortality events and/or fisheries interactions, can also be monitored from stranding records. Each stranded marine mammal is thoroughly examined, whenever possible, including body measurements, external appearance and internal condition (via necropsy). Data and tissues are collected for life history, histology, bacteriology, virology and toxicology studies. Samples are collected by VAQS and have been supplied to the Smithsonian Institution, Armed Forces Institute of Pathology, NMFS, and numerous other research organizations.

In addition to dead strandings, the VAQS Team responds to live marine mammals each year. The level of response depends on the type of animal. Sick or injured baleen whales and toothed whales larger than eight feet in length are virtually impossible for VAQS to attempt to handle and often must be humanely euthanized. Some smaller cetaceans can be relocated and released, or rescued, if found quickly and in suitable condition. They must be supported in water as soon as possible and treated for shock. Successful cetacean rehabilitation requires large tanks, experienced personnel and access to sophisticated equipment. VAQS is not equipped to conduct long-term rehabilitation of a cetacean. As soon as possible, animals that are good candidates for rehabilitation are transferred to

other qualified facilities. Pinnipeds (seals), on the other hand, are amphibious animals and can be transported in dry containers such as canine kennels. The VAQS Stranding Center has a seal holding pen adequate for short-term triage and a seal rehabilitation unit capable of holding one animal. The seal triage area includes a 4'x 4' dry pen with gated entry into a 4'x 4' pool. Following triage, animals are placed in a seal rehabilitation area (large enough for one animal) or are transferred to other facilities in the stranding network that specialize in long-term rehabilitation and release of pinnipeds. The VAQS Team also responds, upon request, to live marine mammal emergencies in northeastern North Carolina.

Five species of sea turtles (loggerhead, Kemp's ridley, green, hawksbill, and leatherback) have been recorded in Virginia (Appendix V). Sea turtle strandings occur primarily in the late spring, summer and fall. The VAQS Team responded to an average of 86 sea turtle strandings per year during the 1990s. Since then, strandings have increased dramatically. Since 2000, Virginia has recorded more than 5,000 sea turtle strandings, with an average of 247 per year for the last ten years 2009-2018.

Sea turtles are examined in much the same way as marine mammals. Data are recorded for all strandings, and necropsies are performed on many stranded carcasses. Sea turtle stranding trends, including probable causes of mortalities, are monitored through stranding records. Stranded sea turtles are checked for flipper and PIT tags and results are reported to NMFS. A small number of sea turtles nest on Virginia beaches each year, primarily loggerheads, though several green and Kemp's ridley sea turtles have been recorded nesting recently in Virginia. The VAQS Team participates in a nesting beach monitoring program in Virginia Beach with the USFWS, Back Bay National Wildlife Refuge, VDGIF and the City. Live strandings of sea turtles have also increased and the VAQS Team has successfully rehabilitated and released many of the stranded turtles. VAQS recently developed the Virginia Pier Partner Program to better respond to the large numbers of sea turtles that are incidentally caught by pier fishermen each year. This program has been very successful in promoting safe handling, recovery and rehabilitation of hooked sea turtles and providing outreach to fishermen and pier owners about proper hooked sea turtle response techniques. The program has also allowed for the collection of data on fishing practices that are associated with hooked sea turtles. As a result of its success, other stranding network organizations in the region are contacting VAQS to learn more about the program. From 2000-2012, an average of 11.5 live sea turtle strandings were recorded in Virginia each year. Since that time and the development of the Pier Partner Program, Virginia has averaged 69 live strandings per year. In addition, VAQS Team expertise in sea turtle rehabilitation has resulted in many turtles that have stranded outside Virginia being transferred to VAQS for rehabilitation and release.

In addition to stranding response, VAQS conducts research on marine mammals and sea turtles. Photo-identification is a non-invasive technique that takes advantage of naturally occurring marks on animals. Photo-ID is used to study both bottlenose dolphins and large whales, primarily humpback whales, in the nearshore waters of Virginia and North Carolina. VAQS has also been conducting research on loggerhead sea turtles since 1990. Early research involved the study of growth potentials of loggerhead hatchlings in *ex-situ* controlled environments. Post-release satellite tracking of young, aquarium-reared loggerheads was initially conducted with the help of VIMS in the 1990s and continues today under the guidance of Aquarium staff and other research collaborators. Growth and nutritional studies continue with hatchling loggerheads and non-releasable loggerhead, Kemp's ridley and green sea turtles. With the support of additional grants and donations in recent years, VAQS has been able to conduct numerous satellite and acoustic tagging projects with yearling loggerheads and rehabilitated sea turtles.

VAQS Team staff and volunteers present the results of their research at national and regional workshops, at professional meetings and in numerous publications (Appendix I). In addition, VAQS research has been presented to more than 17 million people through innovative Aquarium exhibits and public programs. In 2015, a major new exhibit area, *Stranded*, devoted to the stranding response program opened at the Aquarium. Staff and volunteers present educational programs for the public related to stranding events, on-going stranding response and research throughout the year. On a continual basis, staff provide training/assistance and gain valuable experience in live animal rehabilitation and response by cross-training and working with staff at other stranding network facilities. VAQS staff also serve on federal management and scientific teams studying the interactions of protected species with commercial fisheries and other potentially threatening human activities. They regularly use their expertise and data to comment on projects that may have an impact on regional marine mammal and sea turtle populations, including a proposed naval undersea training range off Virginia's eastern shore, the potential to open mid-Atlantic areas to offshore oil and gas drilling, and potential offshore wind energy development. Virginia stranding data has been included in the mid-Atlantic ocean data portal being developed to support the new Mid-Atlantic Ocean Action Plan. Finally, public and private organizations conducting natural resource surveys and environmental assessments routinely utilize the VAQS stranding database and expertise for information regarding protected species in Virginia.

Stranding Response Methods

When examining dead stranded marine mammals and sea turtles, the VAQS Team follows data collection protocols developed by NMFS (Appendix IV). For marine mammals,

Level A data are collected on all strandings and recorded in the marine mammal stranding database. Level A data include:

- observer
- date
- location
- species
- total body length
- gender
- condition
- weight
- findings of human interaction *
- sample collection and dissemination
- disposition of carcass

(* Findings of human interaction consist of clues on a carcass that human activities were responsible for injuries and/or the death of the animal. The most common types of human interactions are fishery entanglements, vessel strikes and marine debris ingestion. In addition, special data collection protocols and forms have been developed by VAQS for assessing human interactions in marine mammal and sea turtle strandings).

Level B and C data are collected from fresh carcasses. Level B and C data are recorded on specialized data sheets and are often shared with other collaborating research organizations. These more involved data can include:

- age
- extensive body measurements
- descriptions and photographs of external & internal appearance
- parasite and pathology occurrence
- stomach contents
- reproductive status
- genetic information
- tissue contaminant levels
- information for specific research

In order to provide timely, accurate and usable information, VAQS compiles these data in a database. The computer system, database and software allow for analytical study of the data including GIS mapping. When combined with the extensive VAQS photo and video catalogs, the long-term marine mammal stranding database can be an invaluable tool for scientists, natural resource managers and other state and federal agencies.

Sea turtle data are collected in much the same manner as for marine mammals (Appendix IV). In addition to the Level A, B, and C data listed above, the VAQS Team also examines sea turtle carcasses for several types of tags. PIT tags and wire tags require specialized equipment in order to be detected. Fresh turtles are examined for stomach contents, gender, findings of human interaction and cause of death.

Live marine mammals and sea turtles have become an increasing part of stranding response for the VAQS Team. Live stranding response is quite different from responding to dead animals. While time is important when responding to a fresh dead stranding, timely response is crucial to the welfare and potential survival of live stranded animals. Once a live stranding is confirmed, staff and volunteers can be ready to respond in minutes. Cooperating agencies, especially on Virginia's eastern shore, have immensely improved the VAQS Team's ability to quickly respond to live strandings. Whenever possible, live stranded animals that are candidates for rehabilitation are rushed to the Stranding Center where they are immediately treated for shock and other obvious injuries. VAQS veterinary staff and live animal care managers have developed protocols and data sheets for live animal response and rehabilitation. VAQS staff have established an excellent working relationship with medical diagnostic service companies and with local vet clinics that provide valuable support services in the form of blood and sample analyses, radiograph support and supplies of less common drugs. In addition, the medical team works with several specialized veterinarians and technicians, including eye specialists and advanced diagnostic technicians, on special cases. The VAQS Team is now experienced at working with live stranded sea turtles and seals and has gained valuable experience with live cetaceans. VAQS sea turtle rehabilitation experience has been put into action on many occasions, including during response to the BP Deepwater Horizon Oil Spill in the Gulf of Mexico in 2010 and the mass cold-stun events in the northeast since 2014. VAQS staff were deployed over a total period of more than six weeks to assist sea turtle recovery and rehabilitation efforts in Louisiana and Florida from the oil spill, and for more than six weeks in Massachusetts for the 2014-15 event. In 2016, trained staff were deployed to southern California to assist with the ongoing issue of large numbers of stranded, juvenile California sea lions.

Discussion of 2018 Stranding Data

MARINE MAMMALS

Virginia stranding data are presented for the calendar year 2018. A total of 108 marine mammal strandings were recorded during 2018 (Table 1). This was one of the highest annual stranding numbers in the last 10 years, though in 2013 (n=427) Virginia experienced the greatest number of marine mammal strandings in the state's history due to a bottleneck

dolphin Unusual Mortality Event (UME). In the past ten years, the number of marine mammal strandings has varied between 77 (2012) and 110 (2009), not including the historic year of 2013 (Figure 1). Temporally, marine mammal strandings occur in all months of the year, but numbers typically drop in late fall and winter. Some marine mammal species (*i.e.* large whales, harbor porpoises, common dolphins and seals) tend to strand seasonally, while others (*i.e.* bottlenose dolphins) can occur at any time of the year (Figure 2), but peak in spring and summer. Bottlenose dolphins comprise the majority of the marine mammals that strand each year, but the Virginia stranding database is very diverse and now includes 32 species (Appendix V). 2018 was an average year for bottlenose dolphin strandings that comprised 70% of the total marine mammal strandings (Figure 3). Spatially, marine mammal strandings occur throughout Virginia's ocean and bay waters. Normally, strandings are most common along Virginia's eastern shore and the southern shore of the Chesapeake Bay mouth and southern ocean coast (Figures 4-5). 2018 was similar in those patterns, however eastern shore strandings were more focused along the southern tip of the eastern shore. Pictures and descriptions of notable marine mammal strandings from 2018 are included in Appendix II.

Marine mammals are divided into five data groups for analyses. These data groups are: (1) bottlenose dolphin – the most common marine mammal in Virginia, (2) harbor porpoise – a common small cetacean that occurs in late winter and spring, (3) large whales – primarily baleen whales such as humpback, fin, right and minke whales, (4) other cetaceans – primarily oceanic species with low stranding rates such as pilot whales, pygmy and dwarf sperm whales, pelagic dolphins and beaked whales, and (5) pinnipeds – harbor, harp, hooded and gray seals. Live stranded animals are included in these analyses and are also addressed separately below.

Live strandings

In 2018, VAQS responded to 14 live marine mammal strandings in Virginia (Table 2). These strandings occurred at various times throughout the year and consisted of eight cetaceans and six pinnipeds. The cetaceans included five bottlenose dolphins, one common dolphin, one humpback whale, and one dwarf sperm whale. Two of the cetaceans that stranded were humanely euthanized. Three of the bottlenose dolphins were entangled in crab pot lines and successful disentanglement actions were initiated for two of the cases. The humpback whale was reported as entangled in gill net and apparently was able to free itself from the encounter prior to arrival of USCG authorities. The pinnipeds included two harbor seals and four gray seals. Of the two harbor seals, one was captured on Assateague Island, stabilized at VAQ, and subsequently transferred to Marine Mammal Stranding Center (Brigantine, NJ) where it was rehabilitated and released. The second harbor seal could not

be relocated for capture and medical assessment. Of the four gray seals, one was initially reported alive but subsequently found dead the next day. Two of the gray seals had visible external injuries from either a conspecific or terrestrial canid interaction. Both died in rehabilitation, the first during its initial night in triage at VAQS, the second following transfer to the National Aquarium in Baltimore (NA), and after a period of apparent improvement. The NA gray seal subsequently tested positive for phocine distemper virus.

Bottlenose dolphin

Bottlenose dolphins (*Tursiops truncatus*) are the most common marine mammals sighted in Virginia waters. They are also the most commonly stranded marine mammal in the state. Historically, most bottlenose dolphins have stranded from April to October, which was concurrent with their seasonal appearance in Virginia coastal waters (Barco *et al.* 1999; Figure 3). In recent years and during 2018, bottlenose dolphin strandings have occurred in all months of the year. In 2018, 76 bottlenose dolphin strandings were recorded in Virginia (Figure 6). This is an average number of strandings for a single year in Virginia and significantly less than the UME years of 1987 and 2013. The UME that began in 2013 impacted bottlenose dolphins from New York to Florida and continued into 2015, officially ending in April of that year. Bottlenose dolphin strandings in 2018 occurred primarily along the Atlantic Ocean, lower Chesapeake Bay, and southern half of the eastern shore (Figure 4). Of the 76 bottlenose dolphin strandings in 2018, 38% (29) of the strandings occurred in Virginia Beach, 28% (21) on the eastern shore, 21% (16) in Norfolk/Chesapeake/ Suffolk, and 13% (10) on the western shores of Chesapeake Bay north of the James River. Gender was determined for 49 of the stranded dolphins. Females comprised 41% (20) and males comprised 59% (29) of the known gender animals. Of the 42 stranded dolphins with recorded lengths (includes estimated lengths and observer descriptions), 13 (31%) were less than 160 cm (defined as “young of the year”, YOY), the approximate size of a one-year old dolphin (Figure 6; Urian *et al.* 1996). Past examination of YOY has revealed evidence of infanticide in the form of broken bones, hemorrhaging and organ damage (Dunn *et al.* 2002). Of the dolphins that were fresh to moderately decomposed (n = 49), signs of human interaction could not be determined in 39 (80%), were positive in 8 (16%), and were not observed in two (4%). Five of the eight animals with observed human interactions were positive for fisheries interaction.

Harbor porpoise

Harbor porpoise (*Phocoena phocoena*) were observed only occasionally in Virginia stranding records during the 1980's. Increases in harbor porpoise strandings occurred along the mid-Atlantic coast in 1993-1994 and the increases were most dramatic in Virginia (Cox *et al.* 1998, Swingle *et al.* 1995). In some years, harbor porpoises have been the second most commonly stranded marine mammals in Virginia. Harbor porpoises typically strand in

late winter and early spring (Figure 2), and strandings occur along the ocean shorelines (Figure 5). During 1999, 40 harbor porpoise strandings were recorded in Virginia, but in 2000, that number dropped precipitously to only four. 2001 was another big year (30 strandings), followed by only six harbor porpoise strandings in 2002. Subsequent years have seen the numbers vary widely, from a high of 22 strandings in 2005, to a low of two strandings in 2011 and 2012. There were five harbor porpoise strandings in Virginia in 2017 (Figure 7). In 2018, only a single harbor porpoise stranded. How these stranding patterns relate to fluctuations in abundance of the population or stocks, threats that are cyclical in nature (such as potential fisheries bycatch), or other factors, is constantly under review.

Large whales

Large whales strand in Virginia on an annual basis. With the exception of the sperm whale, large whales are typically baleen whales such as humpback, fin or minke. Some of the large whales normally found in Virginia are endangered species. Because of the logistics involved in examinations of large whales, an extensive large whale response protocol was created (Blaylock *et al.* 1996). The protocol was developed in response to increased strandings of humpback whales in Virginia and North Carolina in the early 1990's (Swingle *et al.* 1993, Barco *et al.* 2002). The response protocol has since been further modified and is specifically applied to North Atlantic right whales (McLellan *et al.* 2004). During 2008, there were no large whale strandings in Virginia. In 2018, Virginia had eight large whale strandings reported. Of those, there were five humpback whales (*Megaptera novaeangliae*), one North Atlantic right whale (*Eubalaena glacialis*), one minke whale (*Balaenoptera acutorostrata*), and one unidentified large balaenopterid (likely a fin or sei whale) that was free floating and never recovered.

In 2017, VAQS responded to eight humpback whales, one fin whale (*Balaenoptera physalus*), and two minke whales in Virginia. That number (11) of large whale strandings represented a record year for Virginia. Until 2018, the previous high was in 2016 when six large whale strandings were recorded. As a result of the number of humpback whales stranding in 2016 and 2017, an Unusual Mortality Event was declared by NMFS. Overall, an average of 4.3 large whale strandings have occurred annually in Virginia during the last ten years (Figure 8), although the average from 2009 to 2015 was 2.6 and from 2016-2018 was 8.3. Therefore, large whale strandings in 2018 continued a concerning trend of elevated humpback whale strandings and highlighted the importance of funding for management of such costly events. While current UME funds helped offset some costs, those funds are temporary and only cover reimbursement of expenses unrelated to salary. Since large whale strandings typically require considerable human capital to manage competently, the financial and workload burden can be considerable.

In addition to the humpback whale strandings, the critically endangered North Atlantic right whale stranding led to an extensive stranding response that resulted in documentation of chronic entanglement injuries subsequently identified as part of the Canadian snow crab fishery. This case helped federal investigators link several other right whale entanglement cases. Large whale strandings also occasionally involve live, free swimming and entangled whales to which VAQS staff also respond. VAQS staff have been qualified to respond to entangled whales by the Center for Coastal Studies in MA. Specialized whale disentanglement gear and supplies are stored at the VAQS Stranding Center for use in the mid-Atlantic region. This equipment and training has been essential in the successful disentanglement of humpback whales in the waters off Virginia Beach.

Other cetaceans

“Other cetacean” species generally include pelagic delphinids, *Kogia* species and beaked whales. This group accounted for 10 strandings during 2018. These strandings typically occur along the ocean and lower bay shorelines and sometimes involve live animals. 2018 strandings for this group included two dwarf sperm whales (*Kogia sima*) that stranded together, four common dolphins (*Delphinus delphis*), and four unidentified delphinids.

Pinnipeds

Pinniped strandings have generally increased in Virginia since the early 1990s. There were seven strandings recorded in Virginia during 2018 (Figures 5 and 9) and one assisted gray seal transport from NC to MD. The pinniped species stranded in Virginia included four gray seals (*Halichoreus grypus*), and three harbor seals (*Phoca vitulina*). All gray seals stranded alive and two of the three harbor seals were also observed alive.

Regular sightings of seals in Virginia continue to be common occurrences in winter and early spring and there is current interest in studying the growing winter aggregations of pinnipeds. Improved education and training of stranding network personnel has decreased the unwarranted captures of otherwise healthy seals which have hauled-out to rest on Virginia shorelines, piers, jetties and rock islands. Harbor and gray seals are currently included in the Northeast U.S. Pinniped Unusual Mortality Event declared in 2018. The UME declaration was based in part on significantly elevated harbor and gray seal stranding numbers, as well as co-infections with distemper virus and avian influenza virus. In addition to one of the gray seals rescued in 2018 which tested positive for phocid distemper virus, three seals captured on the eastern shore for research purposes tested positive for avian influenza.

SEA TURTLES

During 2018, there were significant numbers of sea turtle strandings (274) in Virginia (Table 3). Since 2000, Virginia has experienced both extremely high (531 in 2003) and relatively low (173 in 2011) numbers of sea turtle strandings. With an average of 247 annually in the last ten years, Virginia remains an area of high sea turtle mortality as measured by strandings (Figure 10). The VAQS Team responded to 260 sea turtle strandings during the year and an additional 14 strandings were reported by stranding network cooperators trained by VAQS (Table 3). Cooperators' reports are entered into the state sea turtle stranding database and the responder's affiliation is listed. In some cases, unique numbers are sometimes provided by responding groups and these numbers are also recorded in the stranding database. Cooperator reports originate from VDGIF, Chincoteague, Eastern Shore and Back Bay National Wildlife refuges, and also from Kiptopeke and False Cape State Parks, and The Nature Conservancy.

June was the busiest month with 64 strandings (23%), followed by November – 51 (19%), May – 36 (13%), July – 28 (10%) and October – 28 (10%). This was a more normal year for strandings with very strong spring and early summer peaks, though the fall peak appeared slightly delayed, starting in October (Figure 11). Loggerheads (*Caretta caretta*, n = 149) were the primary species recorded, followed by Kemp's ridleys (*Lepidochelys kempii*, n = 101), greens (*Chelonia mydas*, n = 16), and eight individuals unidentified to species (Figure 12). The Kemp's ridley strandings were the highest recorded in recent years. The distribution of strandings was primarily along the ocean and lower bay shorelines (Figures 13, 14). The eastern shore of Virginia was the area where 25% (n=69) of the statewide sea turtle strandings were found. Accomack County accounted for 6% (n=17) and Northampton County for 19% (n=52) of the statewide total. Strandings in Virginia Beach, Norfolk and other southside counties in Hampton Roads contributed to 69% (n=190) of the total. The remainder 6% (15) originated from the western shores of the Chesapeake Bay north of the James River. For the turtles that were possible to assess for probable causes of stranding (193), there were strandings related to entanglements (67, 35%), watercraft injuries (69, 36%), cold-stunning (30, 15.5%), disease (6, 3%), other causes (1, 0.5%), and turtles with no apparent injuries (20, 10%).

Improved efforts by VAQS to recruit and train cooperators have greatly enhanced stranding response on the eastern shore. Of all the stranded turtles, 69 (25%) appeared to have been struck by vessels. In some cases, the carcasses were fresh enough to conduct thorough necropsies. Necropsies of stranded turtles sometimes reveal signs of human interaction in the form of fish lures, hooks, line and plastic debris in the gut. The fishing equipment can be from recreational or commercial (such as long-line) gear and may have

been actively fishing or was “ghost” gear. Further understanding the impacts that recreational and commercial fishing have on turtles is needed. Lastly, the VAQS Team participated in several research projects with NMFS and USFWS. Skin and muscle samples were collected for genetic studies. Live turtles rehabilitated by VAQS were used in tracking studies of post-release movements and behavior. Pictures of some of the notable sea turtle strandings in 2018 are included in Appendix III.

Live strandings

2018 was a near record-breaking year for the VAQS Team with 90 live sea turtle strandings recorded in Virginia – 52 Kemp’s ridleys, 29 loggerheads, six greens and three of unidentified species (Table 4). Forty five of these turtles were successfully recovered, rehabilitated and released by VAQS, while another 11 are still undergoing rehabilitation at VAQS or were transferred to a collaborating rehabilitation facility. Of the total live sea turtle strandings, 10 were recovered but died during early stages of rehabilitation due to the severity of their injuries or general debilitation. Seventeen unrecovered live sea turtles were incidentally hooked by recreational fishers and were subsequently released by the fishers or broke free of the gear before they could be brought to land. In addition, 19 sea turtles that stranded in 2017 were released (15 by cooperating rehabilitation centers and 4 by VAQS) in 2018 after completing rehabilitation. Many of these turtles were recovered through the successful Virginia Pier Partner Program. Throughout the year, the VAQS Team spent many hours responding to, treating and feeding sea turtles. Some of the sea turtles had stranded in previous years and had been in rehabilitation for many months prior to release. When the year ended, there were eight sea turtles in rehabilitation at the VAQS Stranding Center.

VAQS Activities During 2018

VAQS conducted trainings on biology, ecology and stranding response protocols for sea turtles and marine mammals during the entire year. These trainings provide important information to Virginia Aquarium outreach instructors, VAQS Team volunteers and to other cooperators in the state stranding network including: Back Bay National Wildlife Refuge, Eastern Shore National Wildlife Refuge, Chincoteague National Wildlife Refuge; Kiptopeke and False Cape State Parks; Virginia Beach police, animal control, beach maintenance personnel and lifeguards; U.S. Coast Guard; Dam Neck and other military base natural resources personnel; personnel from VMRC and VDGIF; The Nature Conservancy and other natural resources groups. Additionally, lectures were presented on the topics of: marine mammal and sea turtle necropsies, stranding response, marine mammal anatomy, forensics of watercraft-induced wounds in marine mega-vertebrates, sea turtle rehabilitation,

findings from sea turtle and marine mammal research, large whale status in ocean waters off Virginia, conservation biology and federal efforts to manage and protect marine mammals. The aforementioned presentations were given to extremely diverse audiences ranging from K-12 groups, to graduate and undergraduate students, church groups and professional and social groups. VAQS staff attended numerous conferences and workshops and shared knowledge of sea turtle and marine mammal biology, strandings, ecology and life history. Conferences and workshops included local, national and international venues on sea turtle biology, marine mammal stranding biology, marine mammal anatomy, sea turtle and marine mammal conservation planning meetings, STEM career development workshops and numerous other meetings. In 2018 alone, VAQS staff led training workshops related to forensics of vessel interactions with marine mammals, gave marine mammal anatomy and sea turtle biology lectures for graduate student classes (e.g. Old Dominion University), and provided consultations for sensitive investigations related to human interactions and large whales, Florida manatees, and CA sea otters. VAQS staff taught international workshops on marine mammal stranding response and necropsy, and served on graduate student committees. VAQS staff also provided expert opinion and supported advocacy efforts in opposition to Atlantic offshore fossil fuel exploration (e.g. geophysical surveys) and in support of offshore renewable energy development (e.g. wind energy). VAQS staff also continue to participate as stranding network liaisons and investigative team members on four separate federally managed marine mammal unusual mortality events.

Educational programs were presented at many local and regional environmental festivals, to school groups and civic organizations, as well as during special Aquarium events. VAQS outreach volunteers utilized a portable exhibit to present the activities of the Virginia stranding network, and promoted conservation of marine animal species and their habitats. Significantly, the permanent exhibition, *Stranded*, remains one of the most popular exhibits at the Virginia Aquarium. The exhibit tells the story of the Virginia marine mammal and sea turtle stranding networks through expansive graphics, videos and interactive experiences – including a live look at patients in the stranding center. The exhibit experience has already reached more than 2 million visitors since it opened in September 2015. A complete list of all professional, education and training activities is included in Appendix I of this report.

Grant funds were used in conjunction with funds from the Virginia Aquarium Foundation to staff the Aquarium's Stranding Center with a full-time stranding response coordinator, live animal care manager, husbandry manager, necropsy manager, volunteer manager, stranding response technician, and several part-time stranding assistants. Aquarium research staff also assisted with stranding response as needed and in support of research projects. The VAQS Team completed another calendar year using an on-call system developed to ensure that volunteers were available for stranding response seven days per

week and all 365 days of the year. Additional specialty responders were trained to provide support and enhance response to special, predictable stranding events with increased logistical demands, such as live sea turtles caught by recreational anglers at fishing piers. Created and managed by volunteer team response leaders and the volunteer manager, the on-call system greatly enhances the Team's readiness and rapid response. VAQS Team volunteers logged more than 19,258 hours during 2018.

VAQS continued several research projects that have been ongoing for many years. A 15 year synthesis of aerial survey and research vessel effort summarized seasonal occurrence and species-specific distribution patterns of baleen whales off Virginia's coast. Staff participated in photo-identification and stock-ID research on bottlenose dolphins and humpback whales. Photo-ID catalogs contain sighting records of individuals, some of which are regular visitors to Virginia and have been observed in multiple years. VAQS continued to curate the Mid-Atlantic Humpback Whale Photo-Identification Catalog (MAHWC), which contains images and sighting histories from stranded and live whales. VAQS and collaborators are developing a web-based MAHWC to streamline submissions and exchange of sighting data, from researchers and whale watch operators between New York and Florida. Results of long-term matching efforts between the MAHWC and others from the western North Atlantic continues to provide new data about movement patterns and feeding ground origin of many whales observed in Virginia (Barco *et al.* 2002). The catalog contains images from stranded and live whales observed in coastal waters from New Jersey through North Carolina.

VAQS staff continue to conduct advanced necropsies on fresh-dead sea turtles and marine mammals to investigate causes of mortality and to determine baseline health information for regional populations. Sea turtle and marine mammal diet studies continued in 2018 as part of grant funded projects. Satellite and acoustic tracking of individual sea turtles were also conducted in VA waters. Live seal captures were conducted in collaboration with the U.S. Navy, NMFS and other collaborators in order to begin to understand the movement and residency patterns of harbor seals on the Eastern Shore of Virginia. Captured seals were also sampled for diagnostic tests and biomedical research into the health parameters of wild pinnipeds in Virginia. Diagnostic tests have already provided insights related to the 2018 Northeast Coast Pinniped (harbor and gray seal) Unusual Mortality Event (UME) and showed that some infected individuals from the northeast are overwintering in Virginia. For more information about the UME, go to <https://www.fisheries.noaa.gov/new-england-mid-atlantic/marine-life-distress/2018-pinniped-unusual-mortality-event-along-northeast>.

Summary

Data collected by VAQS and the Virginia stranding network continue to be critical to the long-term monitoring efforts for sea turtle and marine mammal populations in the mid-Atlantic region. Fresh-stranded cetaceans continue to be extensively sampled as part of cooperative research (involving the University of North Carolina at Wilmington, Duke University and the NC State Vet School) to better assess marine mammal health. These studies are crucial to developing a better understanding of the overall health status of marine mammal populations in the wild. Stranding response and data collection from Virginia were crucial to the identification and response to the bottlenose dolphin UME that began in July 2013 along the east coast. Virginia also experienced the highest number of dolphin mortalities (345) associated with the UME and had a record number of strandings for a non-UME year in 2015. Studies associated with the vast amount of data and samples collected will continue to help researchers better understand the impact of these mortalities on coastal bottlenose dolphin stocks. In addition, the unprecedented levels of mortalities have also provided a wealth of potential data for further understanding many aspects of the life history of these iconic regional marine mammals.

Marine mammal strandings, particularly bottlenose dolphins and humpback whales, remain very high and a significant percentage of the mortalities are related to human activities such as commercial fishing and shipping. Beginning in 2016, VAQS staff noticed previously undescribed internal lesions in bottlenose dolphins. Owing to the dedicated efforts and staff expertise, VAQS have now begun to identify novel lesions related to entanglement of bottlenose dolphins in fishing gear. These lesions have been combined with other pathologic findings to compose a forensic matrix for increasing confidence in fisheries interaction identification and historic data from 2016 and 2017 have been analyzed to examine prevalence of such findings in fisheries interaction cases. Results will be presented at national stranding and marine mammal biology conferences in 2019. For these and other reasons, VAQS staff serve as expert members on three federal Take Reduction Teams working to reduce the incidental mortalities of marine mammals in commercial fishing operations. The changes to the rules regulating pound net leaders, supported by VAQS research efforts, are reducing the incidental takes of dolphins and sea turtles in Chesapeake Bay. One staff member is also one of only three federally recognized large whale necropsy team leaders on the Atlantic and Gulf coasts of the U.S and is currently serving as an investigative team member and stranding network liaison for National Marine Fisheries Service on all currently open unusually mortality events (UMEs) (e.g. North Atlantic right whale, minke whale, humpback whale, and seal UMEs).

Sea turtle strandings remained elevated (n=274) in 2018, continuing a trend seen since 2012. Monitoring Virginia sea turtle strandings in 2019 should continue to provide valuable information to help understand the causes of sea turtle mortalities and whether the increasing numbers represent a significant and predictable trend, or only a temporary change. The VAQS continues to work closely to monitor and investigate the high rates of sea turtle strandings on Virginia's eastern shore. An alarming trend of early fall loggerhead strandings continued in 2018 as in 2017. These cases do not represent normal cold-stun stranding patterns and frequently present with neurologic symptoms. The cause(s) of these unusual presentations are under investigation.

Data collected from strandings provide excellent information on life histories of the many species of marine mammals and sea turtles that inhabit Virginia waters. Stranded animals are the only source of this type of scientific information for most species of marine mammals. The True's beaked whale stranding in 2003, the melonheaded whale strandings in 2008, the Sowerby's beaked whale strandings in 2009, and the pygmy killer whale strandings in 2013 provide excellent examples of the unique opportunities that strandings provide to study rare and previously unknown species from Virginia. Additionally, the January 2018 stranding of a critically endangered North Atlantic right whale resulted in documentation of a fisheries interaction mortality linked to Canadian snow crab fisheries, highlighting the importance of such investigations.

The VAQS Stranding Center has increased its role in the response, rescue and rehabilitation of sea turtles and seals. The high level of live stranding responses continued in 2017 and 2018, and VAQS is working with the City of Virginia Beach to develop a fully functional response and rehabilitation facility. VAQS is planning to continue its efforts on behalf of live stranded sea turtles and marine mammals in Virginia and northeastern North Carolina and construction has begun on a new 18,000 sq. ft. marine animal conservation center with expected completion in 2020.

Marine mammal and sea turtle strandings in Virginia were once again at high levels during 2018. As a result, managing the Virginia stranding networks for these federally and state protected species continues to be a priority for VAQS and is vitally important for the state and federal agencies who depend on this information. At the same time, federal funding from NOAA Fisheries for the marine mammal stranding network through the Prescott Stranding Grant Program continues to be challenged and is constantly under threat of elimination. It is possible that this Program will disappear unless Congress and NOAA continue to act to maintain the only federal funding available to the national marine mammal stranding network. At a time when marine mammal strandings are at record levels, and stranding data are crucial to monitoring ocean health and supporting fishery management and ocean resource-use planning efforts, stranding network organizations like

VAQS are trying to operate with the continuing threat of declining or eliminated federal financial support. There remains much work to do and it is hoped that management efforts informed by quality stranding data will begin to reduce the high levels of sea turtle and marine mammal mortalities related to human activities in Virginia and elsewhere in the region. Continued monitoring and reporting of trends in strandings of protected species will be priorities for the Virginia stranding network in 2019.

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Tables

Table 1: Marine mammal strandings in Virginia during 2018, n = 108.

(Data from VAQS marine mammal stranding database)

[Length = cm; * indicates estimated length; ND = no data; U = unknown]

FieldNumber	StrandDate	CommonName	CityCounty	Latitude	Longitude	Condition	Sex	Length
VAQS20181001	1/7/2018	Bottlenose dolphin	Virginia Beach	36.9029	-76.057888	dead	F	205
VAQS20181002	1/7/2018	Humpback whale	Northampton	37.124171	-75.969376	dead	M	896
VAQS20181003	1/9/2018	Bottlenose dolphin	Virginia Beach	36.88827	-76.083393	dead	U	ND
VAQS20181004	1/18/2018	Bottlenose dolphin	Northampton	37.21519	-76.01271	dead	F	196*
VAQS20181005	1/22/2018	Northern right whale	Virginia Beach	36.703167	-74.849983	dead	F	1200*
VAQS20181006	1/22/2018	Humpback whale	Virginia Beach	36.696667	-75	dead	U	ND
VAQS20181007	2/11/2018	Humpback whale	Accomack	37.853154	-75.393012	dead	F	905*
VAQS20181008	2/19/2018	Harbor seal	Accomack	37.881571	-75.347745	live	M	102.5
VAQS20181009	2/23/2018	Harbor porpoise	Virginia Beach	36.91136	-76.10448	dead	F	115
VAQS20181010	3/2/2018	Bottlenose dolphin	Chesapeake	36.722474	-76.211444	dead	U	ND
VAQS20181011	3/4/2018	Bottlenose dolphin	Virginia Beach	36.697173	-75.924126	live	M	326
VAQS20181012	3/14/2018	Unknown delphinid	Virginia Beach	36.8419	-75.9711	dead	U	ND
VAQS20181013	3/20/2018	Common dolphin (short-beaked)	Virginia Beach	36.69445	-75.92293	dead	M	211
VAQS20181014	3/22/2018	Bottlenose dolphin	Virginia Beach	36.67337	-75.91255	dead	F	211
VAQS20181015	3/29/2018	Bottlenose dolphin	Virginia Beach	36.7394	-75.9408	dead	M	ND
KLC299	4/3/2018	Gray seal	Currituck	36.490935	-75.85513	live	M	109
VAQS20181016	4/3/2018	Gray seal	Virginia Beach	36.6658	-75.9081	live	F	97*
VAQS20181018	4/8/2018	Unknown pinniped	Norfolk	36.960915	-76.260896	dead	M	106
VAQS20181019	4/11/2018	Bottlenose dolphin	Virginia Beach	36.88658	-75.98387	dead	M	192
VAQS20181020	4/11/2018	Gray seal	Virginia Beach	36.906862	-75.988649	live	F	98.5
VAQS20181021	4/17/2018	Bottlenose dolphin	Virginia Beach	36.565362	-75.870484	dead	M	272
VAQS20181017	4/21/2018	Bottlenose dolphin	Virginia Beach	36.913889	-76.112778	dead	M	104
VAQS20181022	4/22/2018	Bottlenose dolphin	Northampton	37.15901	-75.85695	dead	U	ND
VAQS20181023	4/22/2018	Bottlenose dolphin	Northampton	37.15086	-75.86509	dead	U	276
VAQS20181026	4/22/2018	Unidentified delphinid	Northampton	37.215468	-76.012636	dead	U	ND

VAQS20181024	4/23/2018	Unidentified delphinid	Norfolk	36.95994	-76.259267	dead	U	ND
VAQS20181025	4/25/2018	Bottlenose dolphin	Virginia Beach	36.8483	-75.973	dead	M	266
VAQS20181027	4/27/2018	Bottlenose dolphin	Accomack	37.867587	-75.435696	dead	M	227
VAQS20181028	4/30/2018	Bottlenose dolphin	Northampton	37.1698	-75.8425	dead	M	ND
VAQS20181029	5/1/2018	Bottlenose dolphin	Northampton	37.26589	-75.79551	dead	U	ND
VAQS20181030	5/2/2018	Bottlenose dolphin	Poquoson	37.129771	-76.301575	dead	M	ND
VAQS20181031	5/2/2018	Bottlenose dolphin	Poquoson	37.133974	-76.306558	dead	U	ND
VAQS20181032	5/2/2018	Bottlenose dolphin	Poquoson	37.147692	-76.335589	dead	U	ND
VAQS20181033	5/8/2018	Bottlenose dolphin	Virginia Beach	36.57191	-75.87209	dead	U	ND
VAQS20181034	5/9/2018	Bottlenose dolphin	Norfolk	36.93523	-76.20758	dead	M	98.8
VAQS20181037	5/10/2018	Bottlenose dolphin	Northampton	37.2029	-76.0108	dead	M	271.7*
VAQS20181035	5/11/2018	Harbor seal	Northampton	37.27157	-75.79563	dead	U	ND
VAQS20181036	5/11/2018	Bottlenose dolphin	Northampton	37.08311	-75.95229	dead	U	ND
VAQS20181038	5/17/2018	Bottlenose dolphin	Lancaster	37.62383	-76.34029	dead	M	298
VAQS20181039	5/18/2018	Bottlenose dolphin	York	37.24283	-76.506483	dead	U	ND
VAQS20181040	5/20/2018	Bottlenose dolphin	Hampton	37.037	-76.33871	dead	F	182.8*
VAQS20181041	5/20/2018	Bottlenose dolphin	Virginia Beach	36.58625	-75.8754	dead	F	260.5
VAQS20181042	5/21/2018	Bottlenose dolphin	Virginia Beach	36.74539	-75.9428	dead	M	171
VAQS20181043	5/22/2018	Bottlenose dolphin	Virginia Beach	36.92073	-75.99552	dead	M	119.5
VAQS20181044	5/22/2018	Bottlenose dolphin	Accomack	37.725867	-75.830627	dead	U	278*
VAQS20181045	5/23/2018	Bottlenose dolphin	Hampton	37.003124	-76.357249	dead	U	267
VAQS20181047	5/24/2018	Bottlenose dolphin	Northampton	37.3167	-76.0184	dead	U	271*
VAQS20181046	5/25/2018	Bottlenose dolphin	Accomack	37.933381	-75.3138	dead	U	188
VAQS20181048	5/26/2018	Bottlenose dolphin	Northampton	37.437	-75.97945	dead	M	312
VAQS20181049	5/31/2018	Humpback whale	Accomack	37.735151	-75.53617	dead	U	ND
VAQS20181050	6/1/2018	Bottlenose dolphin	Hampton	37.104922	-76.289279	dead	M	ND
VAQS20181052	6/3/2018	Bottlenose dolphin	Northampton	37.29133	-76.0147	dead	U	ND
VAQS20181051	6/4/2018	Bottlenose dolphin	Virginia Beach	36.786111	-75.9575	dead	F	258
VAQS20181054	6/4/2018	Unidentified delphinid	Northampton	37.111896	-75.922825	dead	U	ND

VAQS20181053	6/5/2018	Bottlenose dolphin	Middlesex	37.53598	-76.32884	dead	M	107
VAQS20181055	6/6/2018	Bottlenose dolphin	Northampton	37.252893	-75.804789	dead	U	272
VAQS20181056	6/6/2018	Bottlenose dolphin	Virginia Beach	36.87321	-75.98041	dead	M	275*
VAQS20181057	6/15/2018	Bottlenose dolphin	Virginia Beach	36.92018	-76.13238	dead	U	108.4
VAQS20181058	6/16/2018	Bottlenose dolphin	Norfolk	36.94046	-76.225	dead	F	122.8
VAQS20181059	6/17/2018	Bottlenose dolphin	Virginia Beach	36.868056	-75.978889	dead	M	124.5
VAQS20181060	6/23/2018	Bottlenose dolphin	Westmoreland	38.148056	-76.705	dead	F	207*
VAQS20181061	6/25/2018	Bottlenose dolphin	Accomack	37.852268	-75.466402	dead	U	ND
VAQS20181062	6/28/2018	Bottlenose dolphin	Hampton	37.013056	-76.319167	dead	F	102
VAQS20181063	6/28/2018	Bottlenose dolphin	Gloucester	37.354005	-76.433588	dead	U	ND
VAQS20181064	6/29/2018	Bottlenose dolphin	Northampton	37.50076	-75.9158	dead	M	ND
VAQS20181065	6/29/2018	Bottlenose dolphin	Hampton	37.046963	-76.329866	live	U	ND
VAQS20181066	7/3/2018	Unidentified delphinid	Northampton	37.187983	-75.998068	dead	U	ND
VAQS20181067	7/3/2018	Bottlenose dolphin	Virginia Beach	36.91258	-76.0805	dead	M	180
VAQS20181068	7/10/2018	Common dolphin (short-beaked)	Newport News	37.002386	-76.450011	live	U	ND
VAQS20181069	7/10/2018	Bottlenose dolphin	Norfolk	36.934133	-76.204117	live	M	209
VAQS20181070	7/11/2018	Unidentified delphinid	Virginia Beach	36.600833	-75.879444	dead	U	ND
VAQS20181071	7/16/2018	Bottlenose dolphin	Hampton	37.09251	-76.273173	dead	M	110.8
VAQS20181072	7/27/2018	Unidentified delphinid	Northampton	37.217382	-76.012229	dead	U	193*
VAQS20181073	7/28/2018	Humpback whale	Northampton	37.028917	-76.040483	live	U	ND
VAQS20181074	8/1/2018	Common dolphin (short-beaked)	Northampton	37.20074	-75.818233	dead	U	208.9
VAQS20181075	8/3/2018	Bottlenose dolphin	Virginia Beach	36.699514	-75.924191	live	U	ND
VAQS20181076	8/9/2018	Bottlenose dolphin	Northampton	37.08508	-75.97448	dead	U	254.5*
VAQS20181077	8/9/2018	Bottlenose dolphin	Virginia Beach	36.918927	-76.063595	dead	U	260
VAQS20181078	8/11/2018	Bottlenose dolphin	Hampton	37.040545	-76.28963	dead	F	240*
VAQS20181079	8/17/2018	Bottlenose dolphin	Virginia Beach	36.981812	-76.107222	dead	M	ND
VAQS20181080	8/17/2018	Bottlenose dolphin	Virginia Beach	36.9234	-75.9485	dead	M	142

VAQS20181081	8/19/2018	Bottlenose dolphin	Northampton	37.21111	-76.013261	dead	F	131.8
VAQS20181082	8/24/2018	Bottlenose dolphin	Northumberland	37.937378	-76.322269	dead	M	214*
VAQS20181083	8/25/2018	Bottlenose dolphin	Norfolk	36.95156	-76.24493	dead	F	252
VAQS20181084	8/26/2018	Bottlenose dolphin	Virginia Beach	36.75834	-75.94766	dead	M	91
VAQS20181085	8/28/2018	Bottlenose dolphin	Virginia Beach	36.944683	-75.96285	dead	M	ND
VAQS20181086	8/31/2018	Bottlenose dolphin	Norfolk	36.942787	-76.23008	dead	F	156.2
VAQS20181087	9/12/2018	Bottlenose dolphin	Norfolk	36.94963	-76.2421	dead	F	234
VAQS20181088	9/19/2018	Bottlenose dolphin	Virginia Beach	36.7175	-75.9319	dead	U	270*
VAQS20181089	9/20/2018	Bottlenose dolphin	Norfolk	36.851181	-76.298925	live	U	ND
VAQS20181090	9/27/2018	Bottlenose dolphin	Virginia Beach	36.8772	-75.98149	dead	F	218
VAQS20181091	10/1/2018	West Indian manatee	Chesapeake	36.723233	-76.246735	dead	M	289.3
VAQS20181092	10/4/2018	Bottlenose dolphin	Virginia Beach	36.996067	-76.0792	dead	F	ND
VAQS20181093	10/4/2018	Bottlenose dolphin	Northumberland	37.87833	-76.24059	dead	F	188.2
VAQS20181094	10/6/2018	Gray seal	Virginia Beach	36.871	-75.98	live	F	120
VAQS20181095	10/15/2018	Dwarf sperm whale	Virginia Beach	36.59386	-75.877492	dead	F	156.1
VAQS20181096	10/15/2018	Dwarf sperm whale	Virginia Beach	36.5864	-75.87539	live	F	182
VAQS20181097	10/17/2018	Bottlenose dolphin	Norfolk	36.92984	-76.179334	dead	F	180*
VAQS20181098	10/19/2018	Common dolphin (short-beaked)	Northampton	37.100567	-75.979203	dead	U	ND
VAQS20181099	10/19/2018	Bottlenose dolphin	Virginia Beach	36.922084	-76.13876	dead	U	ND
VAQS20181100	10/22/2018	Bottlenose dolphin	Accomack	37.6889	-75.86759	dead	U	ND
VAQS20181101	10/26/2018	Unidentified fin/sei whale	Virginia Beach	36.866667	-75.784167	dead	U	ND
VAQS20181102	10/28/2018	Bottlenose dolphin	Northampton	37.248203	-76.021008	dead	M	290
VAQS20181103	10/29/2018	Bottlenose dolphin	Virginia Beach	36.923	-76.1402	dead	F	165
VAQS20181104	11/7/2018	Minke whale	Accomack	37.832459	-75.996903	dead	F	570
VAQS20181105	11/12/2018	Unidentified delphinid	Newport News	36.9893	-76.4458	dead	U	ND
VAQS20181106	11/13/2018	Bottlenose dolphin	Northampton	37.38177	-75.98598	dead	F	190*
VAQS20181107	12/23/2018	Harbor seal	Northampton	37.3259	-76.0161	live	U	ND

Table 2: Live stranded marine mammals recorded by VAQS in Virginia in 2018, n = 14.

FieldNumber	Species	Strand Date	State	Final Disposition
VAQS20181008	Harbor seal	2/19/2018	VA	Released by MMSC
VAQS20181011	Bottlenose dolphin	3/4/2018	VA	Euthanized, full necropsy
VAQS20181016	Gray seal	4/3/2018	VA	Died naturally at site prior to recovery, minimal Nx (mostly scavenged)
KLC299	Gray seal	4/3/2018	VA	Died naturally in rehab
VAQS20181020	Gray seal	4/11/2018	VA	Transferred to NAIB, died naturally in rehab
VAQS20181065	Bottlenose dolphin	6/29/2018	VA	Monitored, not recovered, disposition unknown
VAQS20181068	Common dolphin (short-beaked)	7/10/2018	VA	Free swimming, left at site (reported as entangled but wasn't)
VAQS20181069	Bottlenose dolphin	7/10/2018	VA	Euthanized, full necropsy
VAQS20181073	Humpback whale	7/28/2018	VA	Entangled and free swimming, not recovered (unsuccessful tagging attempt)
VAQS20181075	Bottlenose dolphin	8/3/2018	VA	Free swimming, monitored, left at site
VAQS20181089	Bottlenose dolphin	9/20/2018	VA	Released (disentangled by public from crab pot)
VAQS20181094	Gray seal	10/6/2018	VA	Transferred to NAIB, died naturally in rehab
VAQS20181096	Dwarf sperm whale	10/15/2018	VA	Euthanized, full necropsy
VAQS20181107	Harbor seal	12/23/2018	VA	Monitored, not recovered, disposition unknown

*Key to other organizations listed:

NAIB = National Aquarium, Baltimore, MD

MMSC = Marine Mammal Stranding Center, Brigantine, NJ

Table 3: Sea turtle strandings in Virginia during 2018, n = 274.

(Data from VAQS sea turtle stranding database)

[Length = cm, straight carapace length notch to tip; * indicates estimated length; ND = no data;

U = unknown]

Field Number	Date	Species	County	Latitude	Longitude	Condition	Sex	Length
VAQS20182001	1/1/2018	Kemp's ridley	Virginia Beach	36.559205	-75.869488	live	U	44.1
VAQS20182002	1/3/2018	Kemp's ridley	Northampton	37.28203	-76.01024	dead	U	49.4
VAQS20182003	1/11/2018	Kemp's ridley	Northampton	37.09564	-75.98043	dead	U	ND
VAQS20182005	1/12/2018	Kemp's ridley	Accomack	37.71258	-75.83345	dead	U	42.2
VAQS20182004	1/13/2018	loggerhead	Northampton	37.3844	-75.9736	dead	F	74.8
VAQS20182006	1/21/2018	Kemp's ridley	Northampton	37.33633	-76.00996	dead	F	49.5
VAQS20182007	1/23/2018	green	Virginia Beach	36.769015	-75.952162	dead	U	27.8*
VAQS20182008	2/3/2018	Kemp's ridley	Suffolk	36.883053	-76.46618	dead	U	45*
VAQS20182009	2/11/2018	Kemp's ridley	Northampton	37.308889	-76.020278	dead	U	40.6
VAQS20182010	2/10/2018	Kemp's ridley	Northampton	37.10081	-75.97916	dead	U	41.8
VAQS20182011	2/16/2018	loggerhead	Accomack	37.868333	-75.372778	dead	U	ND
VAQS20182012	2/25/2018	Kemp's ridley	Virginia Beach	36.880916	-75.983112	dead	U	ND

VAQS20182013	3/15/2018	Kemp's ridley	Virginia Beach	36.873056	-75.98	dead	M	49.2
VAQS20182014	4/18/2018	loggerhead	Northampton	37.2126	-75.8222	dead	U	ND
VAQS20182015	4/26/2018	loggerhead	Northampton	37.08503	-75.97362	dead	U	71.3
VAQS20182016	4/27/2018	loggerhead	Northampton	37.19151	-75.8215	dead	F	ND
VAQS20182017	5/10/2018	Kemp's ridley	Norfolk	36.962168	-76.259158	live	U	42.6
VAQS20182018	5/10/2018	Kemp's ridley	Virginia Beach	36.843676	-75.970524	live	U	44.3
VAQS20182019	5/10/2018	Kemp's ridley	Virginia Beach	36.843744	-75.970344	live	U	38.9
VAQS20182020	5/13/2018	Kemp's ridley	Virginia Beach	36.843757	-75.969755	live	U	39.6
VAQS20182021	5/13/2018	Kemp's ridley	Virginia Beach	36.8438	-75.9698	live	U	48.9
VAQS20182022	5/13/2018	Kemp's ridley	Virginia Beach	36.8436	-75.9705	live	U	41.8
VAQS20182023	5/14/2018	Kemp's ridley	Hampton	37.036344	-76.290556	live	U	36.6
VAQS20182024	5/14/2018	Kemp's ridley	Virginia Beach	36.694373	-75.921946	live	U	46.4
VAQS20182025	5/14/2018	Kemp's ridley	Hampton	37.036064	-76.289535	live	U	ND
VAQS20182026	5/14/2018	Kemp's ridley	Hampton	37.036411	-76.290763	live	U	43.7
VAQS20182027	5/16/2018	Kemp's ridley	Virginia Beach	36.8437	-75.9698	live	U	30.6
VAQS20182028	5/16/2018	Kemp's ridley	Virginia Beach	36.8437	-75.97	live	U	ND
VAQS20182029	5/16/2018	Kemp's ridley	Hampton	37.0363	-76.2905	live	U	32.8
VAQS20182030	5/16/2018	Kemp's ridley	Hampton	37.0363	-76.2905	live	U	ND
VAQS20182031	5/20/2018	Kemp's ridley	Hampton	37.035917	-76.28963	live	U	42
VAQS20182032	5/21/2018	Kemp's ridley	Hampton	37.0359	-76.2894	live	U	35.9
VAQS20182033	5/21/2018	Kemp's ridley	Virginia Beach	36.843737	-75.969906	live	U	ND
VAQS20182034	5/21/2018	Kemp's ridley	Virginia Beach	36.9035	-76.0732	dead	U	46.7
VAQS20182035	5/21/2018	Kemp's ridley	Virginia Beach	36.843749	-75.969787	live	U	30.9
VAQS20182036	5/22/2018	Kemp's ridley	Virginia Beach	36.694246	-75.922442	live	U	38.2
VAQS20182037	5/22/2018	Kemp's ridley	Virginia Beach	36.694246	-75.922442	live	U	32
VAQS20182038	5/22/2018	Kemp's ridley	Virginia Beach	36.76977	-75.95225	dead	U	52.3*
VAQS20182039	5/22/2018	Kemp's ridley	Hampton	37.035969	-76.289535	live	U	30.7
VAQS20182040	5/23/2018	Kemp's ridley	Hampton	37.036458	-76.290848	live	U	39.8
VAQS20182041	5/23/2018	Kemp's ridley	Hampton	37.036379	-76.290639	live	U	35.9
VAQS20182042	5/24/2018	Kemp's ridley	Virginia Beach	36.694275	-75.922249	live	U	31.4
VAQS20182043	5/24/2018	loggerhead	Hampton	37.036131	-76.289953	live	U	ND
VAQS20182044	5/25/2018	loggerhead	Norfolk	36.94054	-76.22487	dead	F	72.1
VAQS20182045	5/25/2018	Kemp's ridley	Hampton	37.036021	-76.289462	live	U	36.6
VAQS20182046	5/27/2018	loggerhead	Lancaster	37.619974	-76.303223	dead	U	ND
VAQS20182047	5/28/2018	loggerhead	Northampton	37.187968	-75.998058	dead	U	ND
VAQS20182048	5/29/2018	Kemp's ridley	Virginia Beach	36.84371	-75.97014	live	U	26.9
VAQS20182049	5/29/2018	loggerhead	Portsmouth	36.878333	-76.35	dead	U	ND
VAQS20182050	5/29/2018	loggerhead	Northampton	37.3231	-76.0167	dead	U	ND
VAQS20182051	5/31/2018	Kemp's ridley	Hampton	37.017967	-76.34035	dead	F	43.8
VAQS20182052	5/31/2018	loggerhead	Hampton	37.036409	-76.290729	live	U	ND
VAQS20182053	6/1/2018	loggerhead	Accomack	37.93291	-75.31386	dead	U	86

VAQS20182054	6/1/2018	loggerhead	Accomack	37.76907	-75.54284	dead	U	ND
VAQS20182055	6/1/2018	loggerhead	Virginia Beach	36.78607	-75.95768	dead	F	67.1*
VAQS20182056	6/1/2018	Kemp's ridley	Virginia Beach	36.843771	-75.969928	live	U	ND
VAQS20182057	6/1/2018	Kemp's ridley	Hampton	37.036128	-76.290019	live	U	37.1
VAQS20182058	6/2/2018	loggerhead	Mathews	37.4112	-76.2503	dead	U	ND
VAQS20182059	6/3/2018	loggerhead	Norfolk	36.963685	-76.257742	live	U	ND
VAQS20182060	6/4/2018	green	Northampton	37.13685	-75.97214	dead	M	35*
VAQS20182061	6/4/2018	loggerhead	Norfolk	36.948889	-76.364167	dead	U	ND
VAQS20182062	6/4/2018	loggerhead	Virginia Beach	36.64243	-75.89637	dead	U	ND
VAQS20182066	6/4/2018	loggerhead	Accomack	37.143476	-75.871709	dead	U	ND
VAQS20182063	6/5/2018	Kemp's ridley	Virginia Beach	36.843736	-75.970129	live	U	36.6
VAQS20182064	6/5/2018	Kemp's ridley	Virginia Beach	36.7586	-75.9479	dead	U	19.3
VAQS20182067	6/5/2018	loggerhead	Mathews	37.312617	-76.223483	dead	U	ND
VAQS20182069	6/6/2018	Kemp's ridley	Virginia Beach	36.843667	-75.970654	live	U	ND
VAQS20182070	6/6/2018	Kemp's ridley	Virginia Beach	36.88273	-75.98339	dead	M	37
VAQS20182071	6/6/2018	green	Northampton	37.278972	-76.01349	dead	U	22.5
VAQS20182065	6/8/2018	loggerhead	Virginia Beach	36.64417	-75.89694	dead	U	ND
VAQS20182068	6/8/2018	loggerhead	Virginia Beach	36.904247	-76.095354	dead	U	ND
VAQS20182072	6/8/2018	Kemp's ridley	Virginia Beach	36.843645	-75.970602	live	U	23.2
VAQS20182073	6/8/2018	loggerhead	Hampton	37.03606	-76.28944	live	U	ND
VAQS20182074	6/8/2018	loggerhead	Northampton	37.38256	-75.98553	dead	F	84.5
VAQS20182075	6/9/2018	loggerhead	Hampton	37.000956	-76.306591	dead	U	ND
VAQS20182076	6/10/2018	Kemp's ridley	Norfolk	36.9632	-76.2582	live	U	ND
VAQS20182079	6/11/2018	loggerhead	Virginia Beach	36.72258	-75.9341	dead	U	ND
VAQS20182077	6/12/2018	loggerhead	Hampton	37.065924	-76.280836	dead	U	60.8
VAQS20182078	6/12/2018	loggerhead	Middlesex	37.54612	-76.33468	dead	U	76*
VAQS20182080	6/12/2018	loggerhead	Virginia Beach	36.895	-75.98583	dead	U	75*
VAQS20182081	6/13/2018	loggerhead	Norfolk	36.963958	-76.257462	live	U	ND
VAQS20182082	6/13/2018	loggerhead	Norfolk	36.887742	-76.316032	dead	U	66.8
VAQS20182083	6/13/2018	Kemp's ridley	Norfolk	36.9617	-76.2596	live	U	32.5
VAQS20172160	6/13/2018	loggerhead	Norfolk	36.962231	-76.259079	live	U	60.4
VAQS20152190	6/14/2018	loggerhead	Norfolk	36.963951	-76.25743	live	U	69.1
VAQS20182084	6/15/2018	loggerhead	Middlesex	37.544246	-76.332221	dead	U	ND
VAQS20182085	6/16/2018	Kemp's ridley	Norfolk	36.962388	-76.259086	live	U	ND
VAQS20182086	6/16/2018	loggerhead	Mathews	37.516112	-76.28128	dead	U	ND
VAQS20182087	6/16/2018	loggerhead	Accomack	37.886	-75.3463	dead	U	55.5
VAQS20182088	6/16/2018	Kemp's ridley	Norfolk	36.9615	-76.259773	live	U	33.1
VAQS20182089	6/16/2018	loggerhead	Hampton	37.036779	-76.291853	live	U	44.4
VAQS20182090	6/17/2018	Kemp's ridley	Hampton	37.085708	-76.272171	live	U	30.3
VAQS20182091	6/17/2018	Kemp's ridley	Norfolk	36.960107	-76.260698	live	U	ND
VAQS20182092	6/17/2018	loggerhead	Norfolk	36.962633	-76.2004	live	F	100*

VAQS20182093	6/17/2018	Kemp's ridley	Norfolk	36.9372	-76.2163	dead	F	38*
VAQS20182094	6/18/2018	loggerhead	Northampton	37.2439	-76.0185	dead	U	ND
VAQS20182095	6/20/2018	Kemp's ridley	Virginia Beach	36.84364	-75.97065	live	U	27.2
VAQS20182096	6/20/2018	green	Northampton	37.18349	-75.83273	dead	U	26.5*
VAQS20182097	6/20/2018	Kemp's ridley	Hampton	37.093291	-76.273617	dead	U	ND
VAQS20182098	6/20/2018	green	Virginia Beach	36.583284	-75.874826	dead	U	ND
VAQS20182099	6/21/2018	Kemp's ridley	Virginia Beach	36.843693	-75.97013	live	U	29
VAQS20182100	6/21/2018	loggerhead	Northampton	37.714246	-75.601497	dead	U	78.7*
VAQS20182101	6/21/2018	Kemp's ridley	Virginia Beach	36.843607	-75.97097	live	U	26.3
VAQS20182102	6/22/2018	loggerhead	Virginia Beach	36.89253	-75.98538	dead	M	81.4
VAQS20182103	6/24/2018	Kemp's ridley	Virginia Beach	36.8317	-75.9739	dead	U	ND
VAQS20182104	6/24/2018	loggerhead	Hampton	37.00057	-76.30691	live	U	ND
VAQS20182105	6/25/2018	loggerhead	Accomack	37.867978	-75.434308	dead	U	ND
VAQS20182106	6/25/2018	loggerhead	Virginia Beach	36.92549	-76.04819	dead	M	63.7
VAQS20182107	6/26/2018	loggerhead	Accomack	37.87173	-75.35647	dead	U	52.5
VAQS20182108	6/28/2018	Kemp's ridley	Newport News	36.999165	-76.451811	dead	M	46.9
VAQS20182109	6/28/2018	Kemp's ridley	Hampton	37.036379	-76.290749	live	U	30.1
VAQS20182110	6/28/2018	loggerhead	Virginia Beach	36.843552	-75.971095	live	U	ND
VAQS20182111	6/29/2018	loggerhead	Norfolk	36.968587	-76.288108	dead	U	ND
VAQS20182114	6/29/2018	unidentified	Norfolk	36.968625	-76.287034	dead	U	ND
VAQS20182112	6/30/2018	unidentified	Virginia Beach	36.673549	-75.912844	dead	U	ND
VAQS20182113	6/30/2018	loggerhead	Virginia Beach	36.894484	-75.985635	dead	M	63.9*
VAQS20182115	7/2/2018	loggerhead	Northampton	37.162435	-75.980778	dead	U	85*
VAQS20182116	7/3/2018	loggerhead	York	37.186	-76.204	live	U	74.4
VAQS20182117	7/4/2018	loggerhead	Hampton	37.04925	-76.28594	dead	M	67.6
VAQS20182118	7/4/2018	Kemp's ridley	Virginia Beach	36.91916	-76.130043	live	U	ND
VAQS20182119	7/4/2018	Kemp's ridley	Gloucester	37.3625	-76.4072	live	U	52.7
VAQS20182120	7/5/2018	loggerhead	Virginia Beach	36.89237	-75.98529	dead	M	73.5*
VAQS20182121	7/5/2018	loggerhead	Northampton	37.015717	-75.939367	dead	U	101.2*
VAQS20182122	7/5/2018	loggerhead	Virginia Beach	36.60511	-75.880706	dead	U	ND
VAQS20182123	7/7/2018	Kemp's ridley	Virginia Beach	36.911667	-76.084444	dead	M	25.3
VAQS20182124	7/9/2018	loggerhead	Hampton	37.0884	-76.2708	dead	F	100.9*
VAQS20182125	7/9/2018	loggerhead	Virginia Beach	36.852222	-75.975556	dead	U	94*
VAQS20182126	7/12/2018	unidentified	Virginia Beach	36.8361	-75.9698	dead	U	ND
VAQS20182127	7/13/2018	Kemp's ridley	Hampton	37.036088	-76.289852	live	U	26.9
VAQS20182128	7/13/2018	Kemp's ridley	Virginia Beach	36.843771	-75.969788	live	U	25
VAQS20182129	7/13/2018	loggerhead	Virginia Beach	36.92113	-76.05218	dead	U	78.4
VAQS20182130	7/14/2018	loggerhead	Norfolk	36.943056	-76.231111	dead	F	73.2*
VAQS20182131	7/14/2018	loggerhead	Accomack	37.904388	-75.3328	dead	U	79
VAQS20182132	7/15/2018	loggerhead	Accomack	37.5898	-75.6195	dead	U	ND
VAQS20182133	7/21/2018	loggerhead	Accomack	37.822158	-75.497639	dead	U	79.8*

VAQS20182134	7/21/2018	loggerhead	Norfolk	36.985	-76.1683	dead	U	ND
VAQS20182136	7/21/2018	unidentified	Hampton	37.014968	-76.339023	live	U	ND
VAQS20172172	7/22/2018	loggerhead	Norfolk	36.962055	-76.259313	live	U	52.2
VAQS20182135	7/22/2018	Kemp's ridley	Virginia Beach	36.69436	-75.92194	live	U	24.2
VAQS20182138	7/26/2018	loggerhead	Hampton	37.0041	-76.33133	dead	M	72.4*
VAQS20182139	7/26/2018	loggerhead	Virginia Beach	36.75839	-75.94775	dead	M	94.0*
VAQS20182140	7/27/2018	loggerhead	Lancaster	37.62322	-76.34782	dead	U	69.8*
VAQS20182137	7/29/2018	loggerhead	Hampton	37.10658	-76.28982	dead	U	ND
VAQS20182141	7/29/2018	loggerhead	Northampton	37.475516	-75.954713	dead	M	98.4
VAQS20182142	8/4/2018	kemp's ridley	Virginia Beach	36.843666	-75.970686	live	U	26.6
VAQS20182143	8/5/2018	Kemp's ridley	Virginia Beach	36.694281	-75.922177	live	U	22.8
VAQS20182144	8/7/2018	loggerhead	Hampton	37.036	-76.2895	live	U	59.7
VAQS20182145	8/9/2018	Kemp's ridley	Norfolk	36.960944	-76.260487	live	U	30
VAQS20182146	8/14/2018	loggerhead	Virginia Beach	36.921516	-76.05188	dead	F	72.0*
VAQS20182147	8/15/2018	loggerhead	Norfolk	36.9331	-76.1989	dead	F	105.8*
VAQS20182190	8/15/2018	loggerhead	Accomack	37.931456	-76.031584	dead	U	ND
VAQS20182148	8/16/2018	unidentified	Virginia Beach	36.925644	-76.154561	dead	U	ND
VAQS20182149	8/17/2018	loggerhead	Northampton	37.08416	-75.98388	dead	U	ND
VAQS20182150	8/18/2018	Kemp's ridley	Hampton	36.98806	-76.4833	live	U	19.8
VAQS20182151	8/22/2018	Kemp's ridley	Gloucester	37.254899	-76.444205	dead	U	ND
VAQS20182152	8/23/2018	loggerhead	Accomack	37.85534	-75.37422	dead	U	76.7*
VAQS20182153	8/26/2018	loggerhead	York	37.2161	-76.265	live	U	ND
VAQS20182154	8/28/2018	Kemp's ridley	Northampton	37.427423	-75.981526	live	U	40.5
VAQS20182156	8/28/2018	unidentified	Hampton	37.0005	-76.307	live	U	ND
VAQS20182155	8/29/2018	loggerhead	Virginia Beach	36.90668	-76.03176	dead	U	ND
VAQS20182157	8/29/2018	loggerhead	Virginia Beach	36.98352	-76.11031	dead	U	ND
VAQS20182158	8/31/2018	loggerhead	Northampton	37.314167	-76.018889	dead	U	ND
VAQS20182159	8/31/2018	loggerhead	Virginia Beach	36.74416	-75.94222	dead	U	103*
VAQS20182160	9/3/2018	green	Hampton	37.036178	-76.290151	live	U	31.7
VAQS20182161	9/5/2018	loggerhead	Virginia Beach	36.64333	-75.89666	dead	U	83.5*
VAQS20182162	9/8/2018	loggerhead	Norfolk	36.963	-76.2583	live	U	ND
VAQS20182164	9/10/2018	Kemp's ridley	Virginia Beach	36.9036	-76.072701	dead	U	ND
VAQS20182163	9/11/2018	loggerhead	Hampton	37.017954	-76.296415	dead	U	ND
VAQS20182165	9/13/2018	loggerhead	Virginia Beach	36.7369	-75.9406	dead	U	77.5*
VAQS20182166	9/13/2018	loggerhead	Norfolk	36.9675	-76.27472	dead	F	80.4*
VAQS20182167	9/15/2018	loggerhead	Virginia Beach	36.751579	-75.945243	dead	M	67.5
VAQS20182168	9/16/2018	loggerhead	Virginia Beach	36.666861	-75.908889	dead	U	ND
VAQS20182169	9/20/2018	loggerhead	Virginia Beach	36.923399	-75.998595	dead	U	68.2*
VAQS20182170	9/25/2018	loggerhead	Virginia Beach	36.9103	-75.9891	live	U	71.4
VAQS20182171	9/26/2018	loggerhead	Northampton	37.26712	-75.79557	dead	U	104*
VAQS20182172	9/29/2018	Kemp's ridley	Virginia Beach	36.76484	-75.95046	dead	U	57*

VAQS20182173	9/29/2018	loggerhead	Virginia Beach	36.83168	-75.96888	dead	F	100*
VAQS20182174	9/29/2018	Kemp's ridley	Virginia Beach	36.91392	-76.11458	dead	M	44.1*
VAQS20182175	9/29/2018	loggerhead	Norfolk	36.956111	-76.316944	dead	U	67.3
VAQS20182176	9/30/2018	loggerhead	Virginia Beach	36.71789	-75.9324	dead	F	64.4*
VAQS20182177	9/30/2018	loggerhead	Northumberland	37.802	-76.29465	live	U	ND
VAQS20182178	9/30/2018	Kemp's ridley	Virginia Beach	36.67428	-75.91314	dead	U	63.8
VAQS20182179	10/1/2018	Kemp's ridley	Virginia Beach	36.736405	-75.93935	dead	U	58.7
VAQS20182180	10/1/2018	loggerhead	Virginia Beach	36.584118	-75.875173	dead	U	ND
VAQS20182181	10/2/2018	loggerhead	Hampton	37.020652	-76.29659	dead	U	ND
VAQS20182182	10/2/2018	loggerhead	Northampton	37.4473	-75.96733	dead	M	ND
VAQS20182183	10/4/2018	loggerhead	Virginia Beach	36.782358	-75.956453	dead	U	ND
VAQS20182184	10/4/2018	loggerhead	Accomack	37.85305	-75.37722	dead	U	64.4
VAQS20182185	10/5/2018	loggerhead	Virginia Beach	36.781842	-75.956361	dead	M	ND
VAQS20182186	10/5/2018	loggerhead	Norfolk	36.963822	-76.25761	live	U	ND
VAQS20182189	10/5/2018	loggerhead	Virginia Beach	36.81417	-75.95488	dead	U	ND
VAQS20182187	10/6/2018	loggerhead	Mathews	37.50227	-76.27775	dead	U	78.9*
VAQS20182188	10/7/2018	loggerhead	York	37.207894	-76.404781	dead	U	ND
VAQS20182191	10/10/2018	unidentified	Hampton	36.989629	-76.387634	dead	U	ND
VAQS20182192	10/12/2018	Kemp's ridley	Virginia Beach	36.7277	-75.93616	dead	U	28.8
VAQS20182193	10/14/2018	loggerhead	Virginia Beach	36.6675	-75.90916	dead	U	85*
VAQS20182194	10/16/2018	green	Gloucester	37.30809	-76.38728	live	U	29.6
VAQS20182195	10/18/2018	Kemp's ridley	Accomack	37.876158	-75.387083	dead	U	37.2
VAQS20182196	10/19/2018	Kemp's ridley	Virginia Beach	36.69183	-75.92203	dead	F	50.9*
VAQS20182197	10/19/2018	loggerhead	Virginia Beach	36.624599	-75.888338	dead	U	ND
VAQS20182198	10/21/2018	loggerhead	Northampton	37.2469	-76.0201	dead	U	ND
VAQS20182199	10/22/2018	loggerhead	Northampton	37.272806	-76.021584	live	F	87.5
VAQS20182200	10/26/2018	green	Norfolk	36.900175	-76.290789	live	F	38.1
VAQS20182201	10/27/2018	loggerhead	Virginia Beach	36.66186	-75.90641	dead	M	70.7
VAQS20182202	10/27/2018	Kemp's ridley	Norfolk	36.933516	-76.20274	dead	U	ND
VAQS20182210	10/28/2018	loggerhead	Northampton	37.41706	-75.98232	dead	F	78.1
VAQS20182203	10/29/2018	Kemp's ridley	Portsmouth	36.8462	-76.3039	dead	U	28
VAQS20182204	10/31/2018	Kemp's ridley	Norfolk	36.932488	-76.197636	dead	U	27
VAQS20182205	10/31/2018	loggerhead	Northampton	37.09508	-75.98026	dead	U	ND
VAQS20182206	10/31/2018	Kemp's ridley	Virginia Beach	36.809083	-75.964517	dead	U	40.1
VAQS20182207	11/1/2018	Kemp's ridley	Northampton	37.08929	-75.97879	dead	U	55.2
VAQS20182208	11/1/2018	Kemp's ridley	Northampton	37.09447	-75.9803	dead	U	ND
VAQS20182209	11/1/2018	loggerhead	Northampton	37.383605	-75.976067	live	U	73.7
VAQS20182211	11/4/2018	Kemp's ridley	Virginia Beach	36.84413	-75.9718	dead	F	45.3
VAQS20182212	11/4/2018	Kemp's ridley	Northampton	37.19727	-76.008209	dead	U	ND
VAQS20182213	11/5/2018	Kemp's ridley	Virginia Beach	36.88025	-75.98226	dead	F	28.7

VAQS20182214	11/5/2018	Kemp's ridley	Virginia Beach	36.66143	-75.90586	dead	M	52.8
VAQS20182215	11/5/2018	Kemp's ridley	Virginia Beach	36.66143	-75.90586	dead	M	43.0*
VAQS20182216	11/5/2018	Kemp's ridley	Virginia Beach	36.76049	-75.94854	dead	F	54.3
VAQS20182217	11/7/2018	loggerhead	Virginia Beach	36.91965	-76.05466	dead	U	56.5*
VAQS20182218	11/7/2018	loggerhead	Virginia Beach	36.800844	-75.962081	dead	U	ND
VAQS20182219	11/8/2018	loggerhead	Virginia Beach	36.605	-75.8803	dead	U	ND
VAQS20182220	11/8/2018	Kemp's ridley	Virginia Beach	36.628333	-75.89	dead	U	ND
VAQS20182223	11/8/2018	loggerhead	Virginia Beach	36.733437	-75.938377	dead	U	70.2*
VAQS20182225	11/8/2018	loggerhead	Northampton	37.4229	-75.98287	dead	F	84.2
VAQS20182221	11/9/2018	loggerhead	Hampton	37.0706	-76.2797	dead	M	88.9
VAQS20182222	11/9/2018	loggerhead	Virginia Beach	36.6475	-75.899167	dead	M	74.7
VAQS20182224	11/9/2018	green	Virginia Beach	36.92111	-76.13551	dead	F	33
VAQS20182226	11/9/2018	Kemp's ridley	Virginia Beach	36.635	-75.893056	dead	U	ND
VAQS20182227	11/9/2018	Kemp's ridley	Virginia Beach	36.81695	-75.96657	dead	M	38.3
VAQS20182228	11/11/2018	loggerhead	Virginia Beach	36.844259	-75.971956	live	M	87.4
VAQS20182229	11/11/2018	Kemp's ridley	Norfolk	36.9489	-76.2398	dead	F	35.7
VAQS20182230	11/11/2018	loggerhead	Northampton	37.44406	-75.97615	dead	M	74.5
VAQS20182231	11/11/2018	loggerhead	Northampton	37.43944	-75.97852	dead	F	74.8
VAQS20182232	11/11/2018	loggerhead	Northampton	37.20376	-76.01237	dead	U	72.5
VAQS20182233	11/11/2018	Kemp's ridley	Virginia Beach	36.72995	-75.93709	dead	U	43.5*
VAQS20182234	11/12/2018	Kemp's ridley	Northampton	37.19719	-76.00813	dead	U	48
VAQS20182235	11/12/2018	green	Norfolk	36.93862	-76.22037	dead	M	29.2
VAQS20182236	11/13/2018	loggerhead	Hampton	37.037389	-76.291475	live	U	77.3
VAQS20182237	11/13/2018	loggerhead	Virginia Beach	36.80163	-75.96246	dead	U	68.6
VAQS20182239	11/13/2018	unidentified	Northampton	37.3303	-76.01342	dead	U	50*
VAQS20182238	11/14/2018	Kemp's ridley	Virginia Beach	36.9138	-76.0723	dead	M	49.6
VAQS20182240	11/15/2018	loggerhead	Virginia Beach	36.910961	-76.10372	live	U	74.4
VAQS20182241	11/16/2018	loggerhead	Virginia Beach	36.671389	-75.910833	live	U	69
VAQS20182242	11/16/2018	loggerhead	Virginia Beach	36.667159	-75.909517	live	M	93.9
VAQS20182243	11/16/2018	loggerhead	Virginia Beach	36.674639	-75.913227	live	U	67.4
VAQS20182244	11/16/2018	loggerhead	Virginia Beach	36.7206	-75.93318	dead	F	61.3
VAQS20182245	11/17/2018	loggerhead	Virginia Beach	36.552889	-75.868163	live	U	74.2
VAQS20182246	11/17/2018	loggerhead	Northampton	37.32197	-76.0169	dead	F	85.2
VAQS20182247	11/17/2018	loggerhead	Norfolk	36.9221	-76.1879	live	U	83.5
VAQS20182248	11/17/2018	loggerhead	Northampton	37.30822	-76.02042	dead	U	42.0*
VAQS20182249	11/17/2018	loggerhead	Northampton	37.3107	-76.01992	dead	U	80*
VAQS20182250	11/17/2018	loggerhead	Northampton	37.49217	-75.95995	dead	F	78.2
VAQS20182254	11/17/2018	loggerhead	Northampton	37.08825	-75.97808	dead	U	83.4
VAQS20182251	11/18/2018	loggerhead	Northampton	37.24376	-76.01823	dead	U	69.0*
VAQS20182252	11/20/2018	loggerhead	Northampton	37.29088	-76.01521	dead	F	74.1*
VAQS20182253	11/21/2018	loggerhead	Virginia Beach	36.74495	-75.94226	dead	U	ND

VAQS20182255	11/25/2018	loggerhead	Virginia Beach	36.6156	-75.8847	dead	F	86.3
VAQS20182256	11/29/2018	loggerhead	Norfolk	36.931432	-76.189873	dead	M	68
VAQS20182257	11/29/2018	loggerhead	Accomack	37.556334	-75.917963	dead	U	ND
VAQS20182258	11/30/2018	green	Accomack	37.84654	-75.67815	dead	U	ND
VAQS20182259	12/1/2018	green	Northampton	37.09654	-75.9801	dead	U	30.6
VAQS20182260	12/10/2018	green	Northampton	37.13188	-75.97064	dead	U	ND
VAQS20182261	12/10/2018	green	Norfolk	36.9525	-76.2471	live	U	28.5
VAQS20182262	12/16/2018	green	Norfolk	36.8429	-76.2919	live	U	29.6
VAQS20182263	12/17/2018	loggerhead	Norfolk	36.95183	-76.32867	live	U	ND
VAQS20182264	12/17/2018	Kemp's ridley	Northampton	37.16607	-75.987657	dead	U	ND
VAQS20182265	12/18/2018	loggerhead	Hampton	37.085639	-76.272444	dead	M	81.9
VAQS20182266	12/20/2018	green	Virginia Beach	36.916855	-75.992514	live	U	33.2
VAQS20182267	12/20/2018	loggerhead	Northampton	37.55176	-75.92903	dead	F	73.9
VAQS20182268	12/25/2018	loggerhead	Northampton	37.301058	-76.021223	dead	U	60.96
VAQS20182269	12/27/2018	loggerhead	Norfolk	36.956481	-76.252829	dead	M	67.8
VAQS20182270	12/30/2018	loggerhead	Northampton	37.33515	-76.01114	dead	M	82.4
VAQS20182271	12/31/2018	loggerhead	Hampton	37.02017	-76.29665	dead	M	72.7

Table 4: Live stranded sea turtles recorded by VAQS in 2018, n = 90.

(Note: Sea turtles that stranded in 2017 and were released in 2018 are also listed, n = 20)

Field Number	Strand Date	Species	State	Final Disposition	Release Location	Date
VAQS20172042	5/16/2017	Kemp's ridley	VA	current NCARI patient	N/A	N/A
VAQS20172044	5/18/2017	Kemp's ridley	VA	released by VAQS	Virginia Beach	09/10/2018
VAQS20172150	8/3/2017	Kemp's ridley	VA	released by VAQS	Virginia Beach	08/31/2018
VAQS20172172	8/27/2017	loggerhead	VA	released by NA	Volusia County, FL	01/17/2018
VAQS20172195	9/20/2017	loggerhead	VA	released by NA	Ocean City, MD	06/25/2018
VAQS20172216	10/21/2017	Kemp's ridley	VA	released by NA	Volusia County, FL	02/21/2018
VAQS20172228	11/4/2017	Kemp's ridley	VA	released by NA	Duval County, FL	04/18/2018
VAQS20172237	11/11/2017	loggerhead	VA	released by NC Aquarium	offshore, NC	02/03/2018
VAQS20172238	11/13/2017	loggerhead	VA	released by NC Aquarium	offshore, NC	03/10/2018
VAQS20172243	11/16/2017	loggerhead	VA	released by SCA	Charleston County, SC	06/07/2018
VAQS20172244	11/17/2017	loggerhead	VA	released by SCA	Isle of Palms County, SC	05/10/2018
VAQS20172245	11/18/2017	loggerhead	VA	released by SCA	Charleston County, SC	06/07/2018
VAQS20172246	11/18/2017	loggerhead	VA	released by GSTC	Glynn County, GA	04/09/2018
VAQS20172248	11/21/2017	loggerhead	VA	released by NA	Duval County, FL	04/18/2018
VAQS20172251	11/24/2017	green	VA	released by NA	Volusia County, FL	02/21/2018
VAQS20172254	11/26/2017	loggerhead	VA	released by GSTC	Chatham County, GA	04/28/2018
VAQS20172257	11/29/2017	loggerhead	VA	released by GSTC	Duval County, FL	02/27/2018
VAQS20172269	12/14/2017	Kemp's ridley	VA	released by NA	Duval County, FL	04/18/2018
VAQS20172270	12/15/2017	green	VA	died, necropsied	N/A	01/06/2018

VAQS20172275	12/19/2017	loggerhead	VA	released by VAQS	Virginia Beach	06/20/2018
VAQS20172282	12/31/2017	loggerhead	VA	released by VAQS	Virginia Beach	08/31/2018
VAQS20182001	1/1/2018	Kemp's ridley	VA	current VAQS patient	N/A	N/A
VAQS20182017	5/10/2018	Kemp's ridley	VA	released by VAQS	Virginia Beach	05/16/2018
VAQS20182018	5/10/2018	Kemp's ridley	VA	released by VAQS	Virginia Beach	05/21/2018
VAQS20182019	5/10/2018	Kemp's ridley	VA	released by VAQS	Virginia Beach	05/24/2018
VAQS20182020	5/13/2018	Kemp's ridley	VA	released by VAQS	Virginia Beach	05/27/2018
VAQS20182021	5/13/2018	Kemp's ridley	VA	released by VAQS	Virginia Beach	05/16/2018
VAQS20182022	5/13/2018	Kemp's ridley	VA	released by VAQS	Virginia Beach	05/21/2018
VAQS20182023	5/14/2018	Kemp's ridley	VA	released by VAQS	Virginia Beach	05/21/2018
VAQS20182024	5/14/2018	Kemp's ridley	VA	released by VAQS	Virginia Beach	05/24/2018
VAQS20182025	5/14/2018	Kemp's ridley	VA	released by fisher	N/A	N/A
VAQS20182026	5/14/2018	Kemp's ridley	VA	released by VAQS	Virginia Beach	05/20/2018
VAQS20182027	5/16/2018	Kemp's ridley	VA	released by VAQS	Virginia Beach	05/18/2018
VAQS20182028	5/16/2018	Kemp's ridley	VA	released by fisher	N/A	N/A
VAQS20182029	5/16/2018	Kemp's ridley	VA	released by VAQS	Virginia Beach	08/17/2018
VAQS20182030	5/16/2018	Kemp's ridley	VA	released by fisher	N/A	N/A
VAQS20182031	5/20/2018	Kemp's ridley	VA	released by VAQS	Virginia Beach	08/31/2018
VAQS20182032	5/21/2018	Kemp's ridley	VA	released by VAQS	Virginia Beach	05/24/2018
VAQS20182033	5/21/2018	Kemp's ridley	VA	released by fisher	N/A	N/A
VAQS20182035	5/21/2018	Kemp's ridley	VA	released by VAQS	Virginia Beach	05/24/2018
VAQS20182036	5/22/2018	Kemp's ridley	VA	released by VAQS	Virginia Beach	05/27/2018
VAQS20182037	5/22/2018	Kemp's ridley	VA	released by VAQS	Virginia Beach	05/27/2018
VAQS20182039	5/22/2018	Kemp's ridley	VA	released by VAQS	Virginia Beach	05/27/2018
VAQS20182040	5/23/2018	Kemp's ridley	VA	released by VAQS	Virginia Beach	08/11/2018
VAQS20182041	5/23/2018	Kemp's ridley	VA	released by VAQS	Virginia Beach	06/15/2018
VAQS20182042	5/24/2018	Kemp's ridley	VA	released by VAQS	Virginia Beach	08/31/2018
VAQS20182043	5/24/2018	loggerhead	VA	released by fisher	N/A	N/A
VAQS20182045	5/25/2018	Kemp's ridley	VA	released by VAQS	Virginia Beach	06/20/2018
VAQS20182048	5/29/2018	Kemp's ridley	VA	released by VAQS	Virginia Beach	06/01/2018
VAQS20182052	5/31/2018	loggerhead	VA	released by fisher	N/A	N/A
VAQS20182056	6/1/2018	Kemp's ridley	VA	released by fisher	N/A	N/A
VAQS20182057	6/1/2018	Kemp's ridley	VA	released by VAQS	Virginia Beach	06/04/2018
VAQS20182059	6/3/2018	loggerhead	VA	released by fisher	N/A	N/A
VAQS20182063	6/5/2018	Kemp's ridley	VA	released by VAQS	Virginia Beach	06/20/2018
VAQS20182069	6/6/2018	Kemp's ridley	VA	released by fisher	N/A	N/A
VAQS20182072	6/8/2018	Kemp's ridley	VA	released by VAQS	Virginia Beach	06/12/2018
VAQS20182073	6/8/2018	loggerhead	VA	released by fisher	N/A	N/A
VAQS20182076	6/10/2018	Kemp's ridley	VA	released by fisher	N/A	N/A
VAQS20172160	6/13/2018	loggerhead	VA	released by VAQS	Virginia Beach	06/20/2018
VAQS20182081	6/13/2018	loggerhead	VA	released by fisher	N/A	N/A

VAQS20182083	6/13/2018	Kemp's ridley	VA	released by VAQS	Virginia Beach	06/20/2018
VAQS20152190	6/14/2018	loggerhead	VA	released by VAQS	Virginia Beach	06/29/2018
VAQS20182085	6/16/2018	Kemp's ridley	VA	released by fisher	N/A	N/A
VAQS20182088	6/16/2018	Kemp's ridley	VA	current patient	N/A	N/A
VAQS20182089	6/16/2018	loggerhead	VA	released by VAQS	Virginia Beach	06/20/2018
VAQS20182090	6/17/2018	Kemp's ridley	VA	released by VAQS	Virginia Beach	08/31/2018
VAQS20182091	6/17/2018	Kemp's ridley	VA	released by fisher	N/A	N/A
VAQS20182092	6/17/2018	loggerhead	VA	DOA, necropsied	N/A	N/A
VAQS20182095	6/20/2018	Kemp's ridley	VA	released by VAQS	Virginia Beach	06/29/2018
VAQS20182099	6/21/2018	Kemp's ridley	VA	released by VAQS	Virginia Beach	07/06/2018
VAQS20182101	6/21/2018	Kemp's ridley	VA	released by VAQS	Virginia Beach	06/23/2018
VAQS20182104	6/24/2018	loggerhead	VA	released by fisher	N/A	N/A
VAQS20182109	6/28/2018	Kemp's ridley	VA	released by VAQS	Virginia Beach	07/06/2018
VAQS20182110	6/28/2018	unidentified	VA	released by fisher	N/A	N/A
VAQS20182116	7/3/2018	loggerhead	VA	died, necropsied	N/A	07/24/2018
VAQS20182118	7/4/2018	Kemp's ridley	VA	released by fisher	N/A	N/A
VAQS20182119	7/4/2018	Kemp's ridley	VA	released by VAQS	Virginia Beach	11/02/2018
VAQS20182127	7/13/2018	Kemp's ridley	VA	released by VAQS	Virginia Beach	07/13/2018
VAQS20182128	7/13/2018	Kemp's ridley	VA	released by VAQS	Virginia Beach	08/11/2018
VAQS20182136	7/21/2018	unidentified	VA	released by fisher	N/A	N/A
VAQS20172172	7/22/2018	loggerhead	VA	released by VAQS	Virginia Beach	08/17/2018
VAQS20182135	7/22/2018	Kemp's ridley	VA	released by VAQS	Virginia Beach	08/10/2018
VAQS20182142	8/4/2018	Kemp's ridley	VA	released by VAQS	Virginia Beach	08/11/2018
VAQS20182143	8/5/2018	Kemp's ridley	VA	released by VAQS	Virginia Beach	08/10/2018
VAQS20182144	8/7/2018	loggerhead	VA	released by VAQS	Virginia Beach	10/14/2018
VAQS20182145	8/9/2018	Kemp's ridley	VA	released by VAQS	Virginia Beach	10/25/2018
VAQS20182150	8/18/2018	Kemp's ridley	VA	died, necropsied	N/A	08/30/2018
VAQS20182153	8/26/2018	loggerhead	VA	unknown	N/A	N/A
VAQS20182154	8/28/2018	Kemp's ridley	VA	died, necropsied	N/A	09/01/2018
VAQS20182156	8/28/2018	unidentified	VA	released by fisher	N/A	N/A
VAQS20182160	9/3/2018	green	VA	released by VAQS	Virginia Beach	09/10/2018
VAQS20182162	9/8/2018	loggerhead	VA	released by fisher	N/A	N/A
VAQS20182170	9/25/2018	loggerhead	VA	current GSTC patient	N/A	N/A
VAQS20182177	9/30/2018	loggerhead	VA	unknown	N/A	N/A
VAQS20182186	10/5/2018	loggerhead	VA	released by fisher	N/A	N/A
VAQS20182194	10/16/2018	green	VA	released by VAQS	Cartaret County, NC	11/03/2018
VAQS20182199	10/22/2018	loggerhead	VA	died, necropsied	N/A	10/23/2018
VAQS20182200	10/26/2018	green	VA	died, necropsied	N/A	N/A
VAQS20182209	11/1/2018	loggerhead	VA	current GSTC patient	N/A	N/A
VAQS20182228	11/11/2018	loggerhead	VA	current VAQS patient	N/A	N/A
VAQS20182236	11/13/2018	loggerhead	VA	current VAQS patient	N/A	N/A

VAQS20182240	11/15/2018	loggerhead	VA	current GSTC patient	N/A	N/A
VAQS20182241	11/16/2018	loggerhead	VA	current VAQS patient	N/A	N/A
VAQS20182242	11/16/2018	loggerhead	VA	died, necropsied	N/A	11/18/2018
VAQS20182243	11/16/2018	loggerhead	VA	died, necropsied	N/A	11/17/2018
VAQS20182245	11/17/2018	loggerhead	VA	died, necropsied	N/A	11/18/2018
VAQS20182247	11/17/2018	loggerhead	VA	current VAQS patient	N/A	N/A
VAQS20182261	12/10/2018	green	VA	current VAQS patient	N/A	N/A
VAQS20182262	12/16/2018	green	VA	current VAQS patient	N/A	N/A
VAQS20182263	12/17/2018	loggerhead	VA	unknown	N/A	N/A
VAQS20182266	12/20/2018	green	VA	died, necropsied	N/A	12/26/2018

*Key to other organizations listed in release column:

- NCARI North Carolina Aquarium - Roanoke Island, Nags Head, NC
- NA National Aquarium, Baltimore, MD
- GSTC Georgia Sea Turtle Center, Jekyll Island, GA
- SCA South Carolina Aquarium, Charleston, SC

Figures

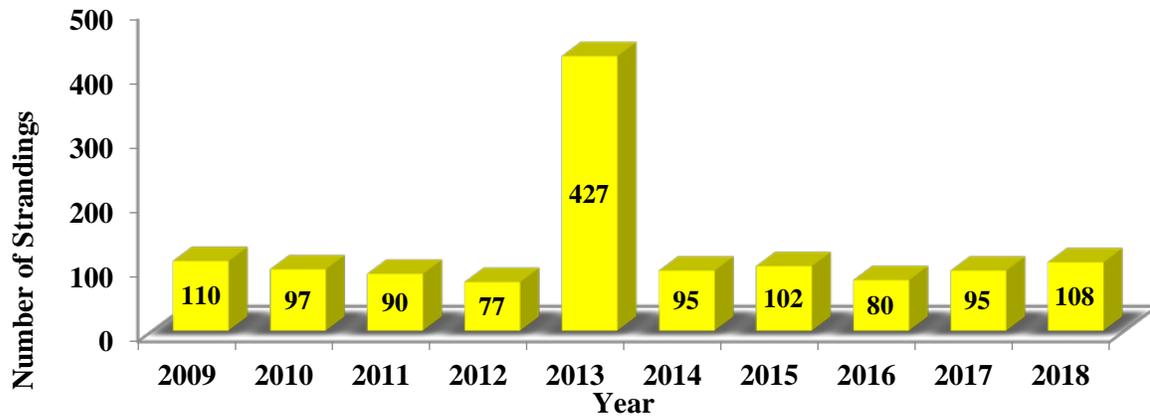


Figure 1: Yearly frequency of marine mammal strandings in Virginia, 2009-2018.

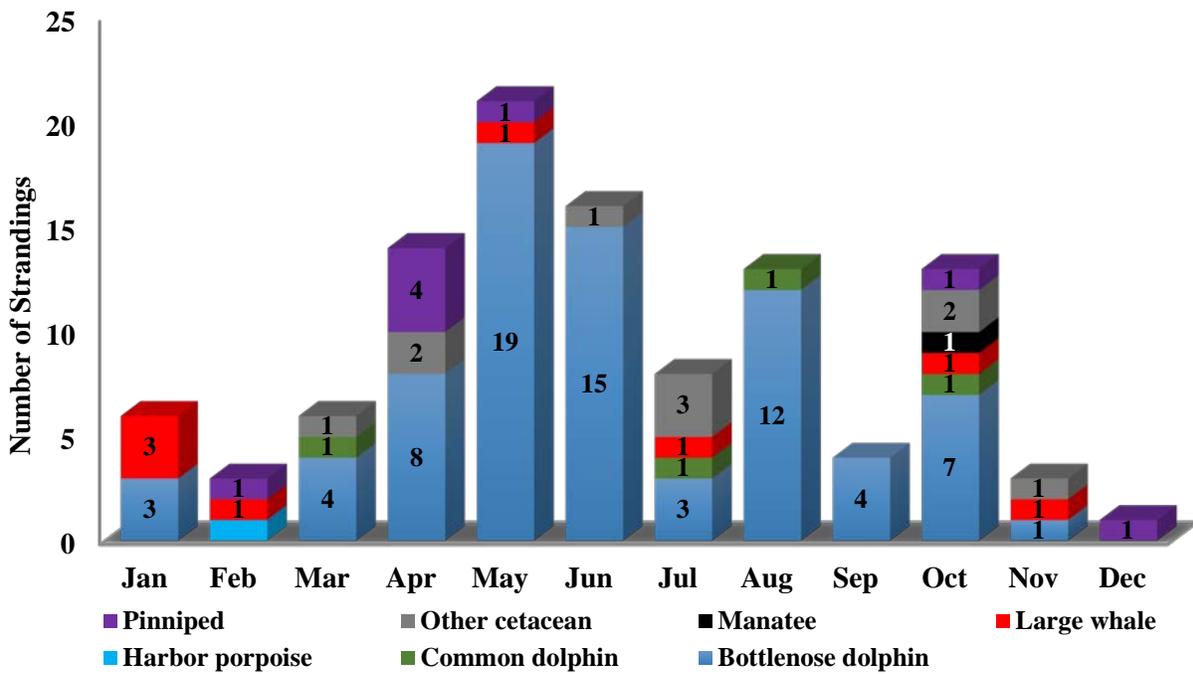


Figure 2: Monthly frequency of marine mammal strandings by species group in Virginia during 2018.

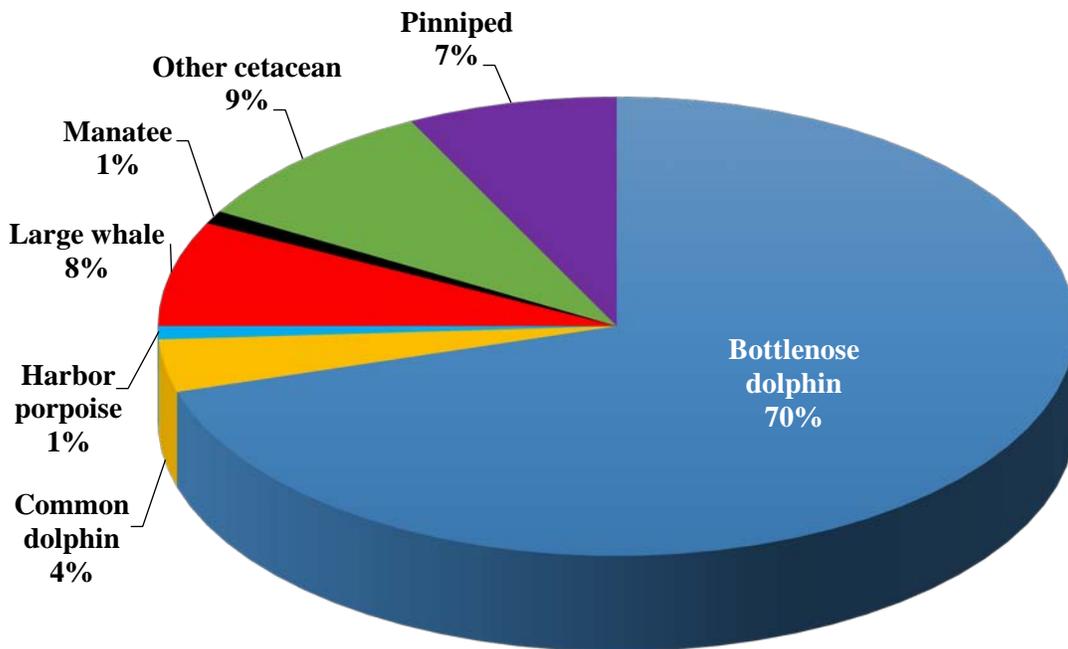


Figure 3: Marine mammal stranding groups in Virginia during 2018.

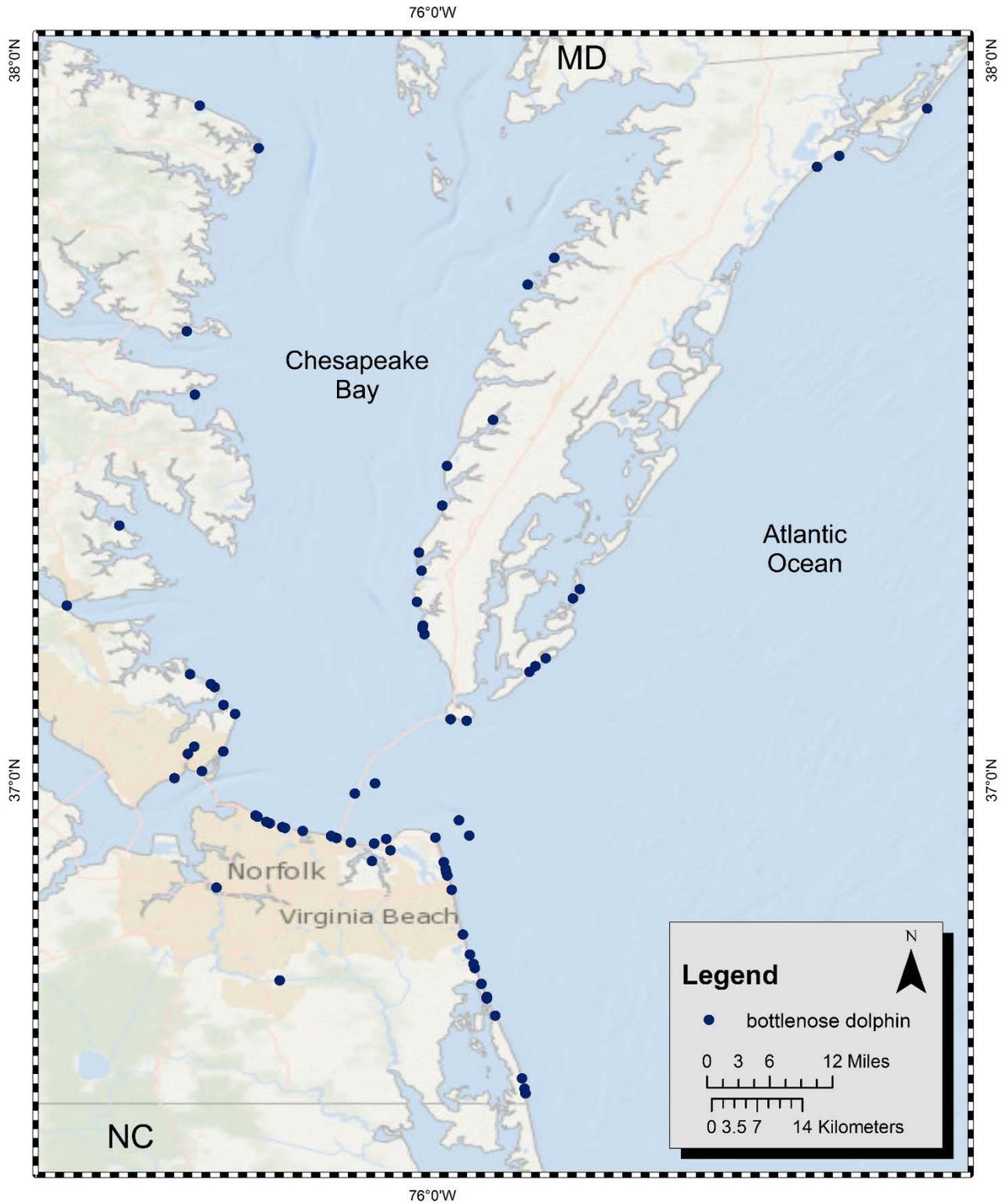


Figure 4: Locations of Virginia bottlenose dolphin strandings in 2018.

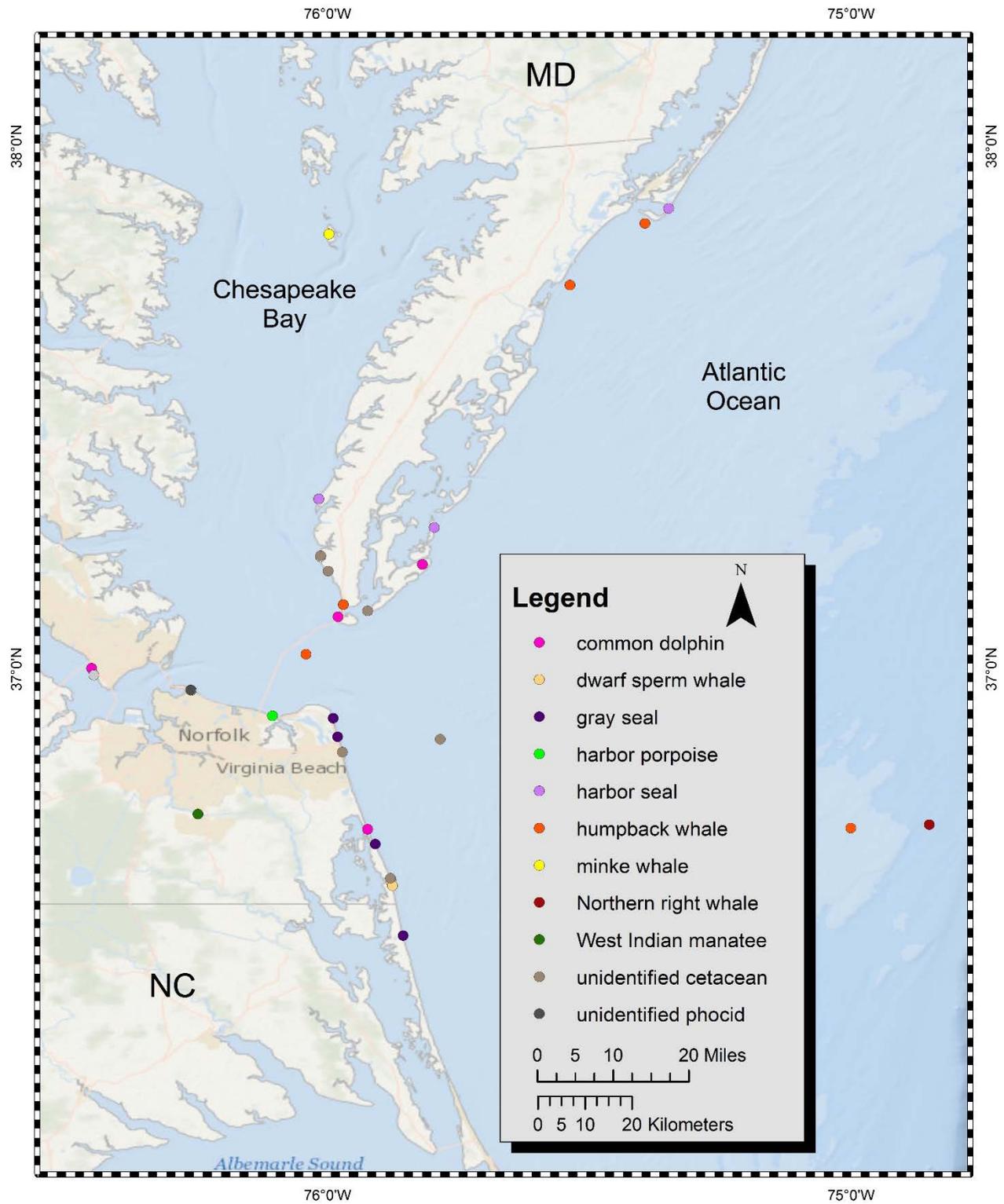


Figure 5: Locations of Virginia marine mammal strandings other than bottlenose dolphins in 2018.

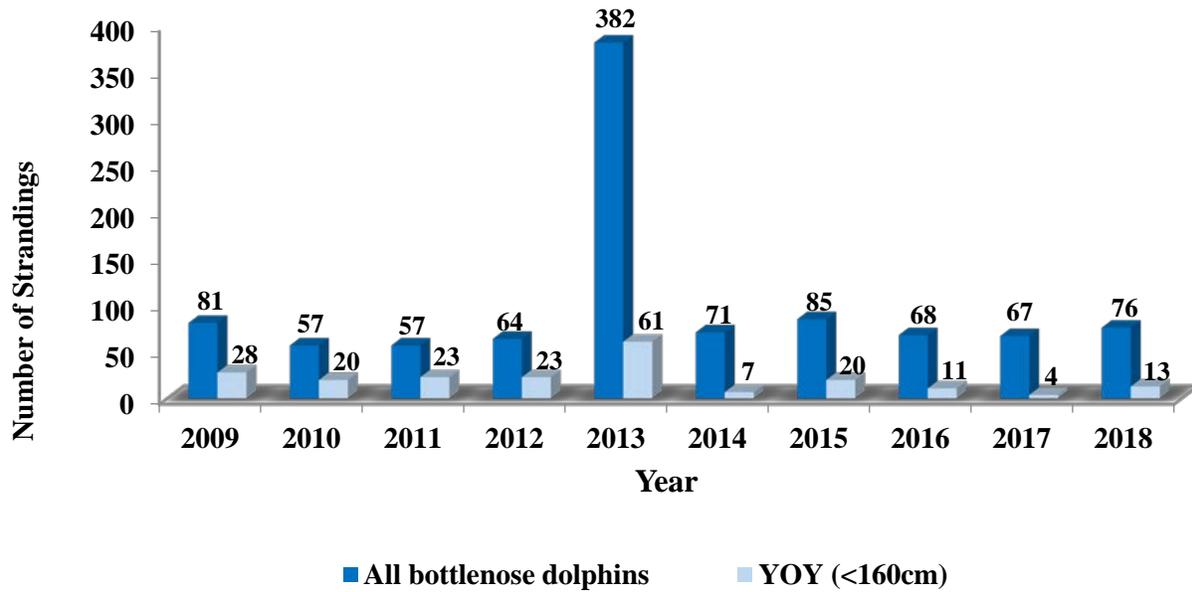


Figure 6: Yearly stranding frequency of bottlenose dolphin in Virginia, 2009-2018 (YOY = young of the year).

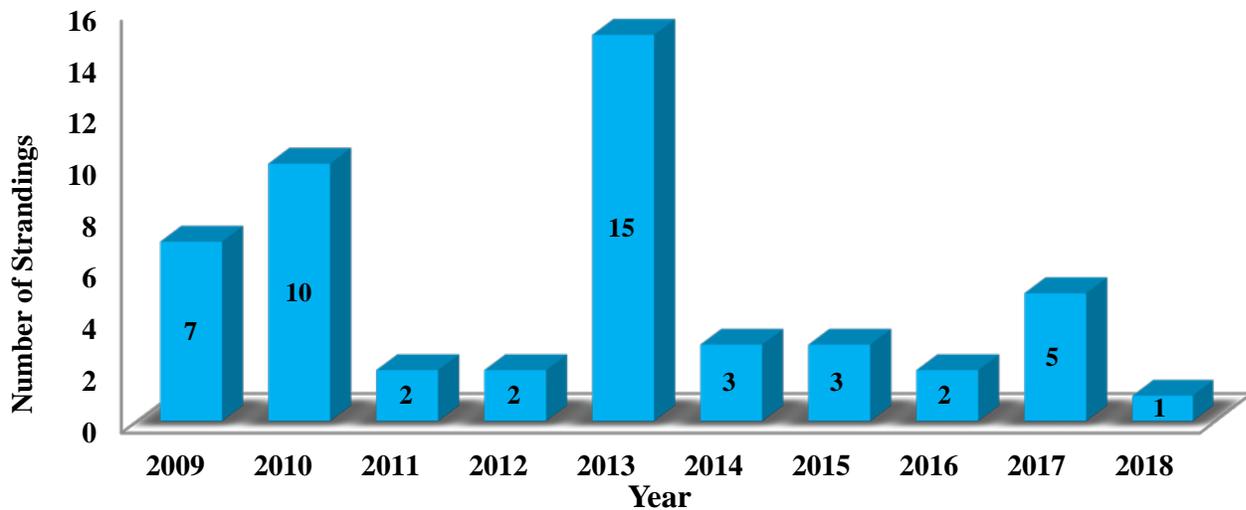


Figure 7: Yearly stranding frequency of harbor porpoise in Virginia, 2009-2018.

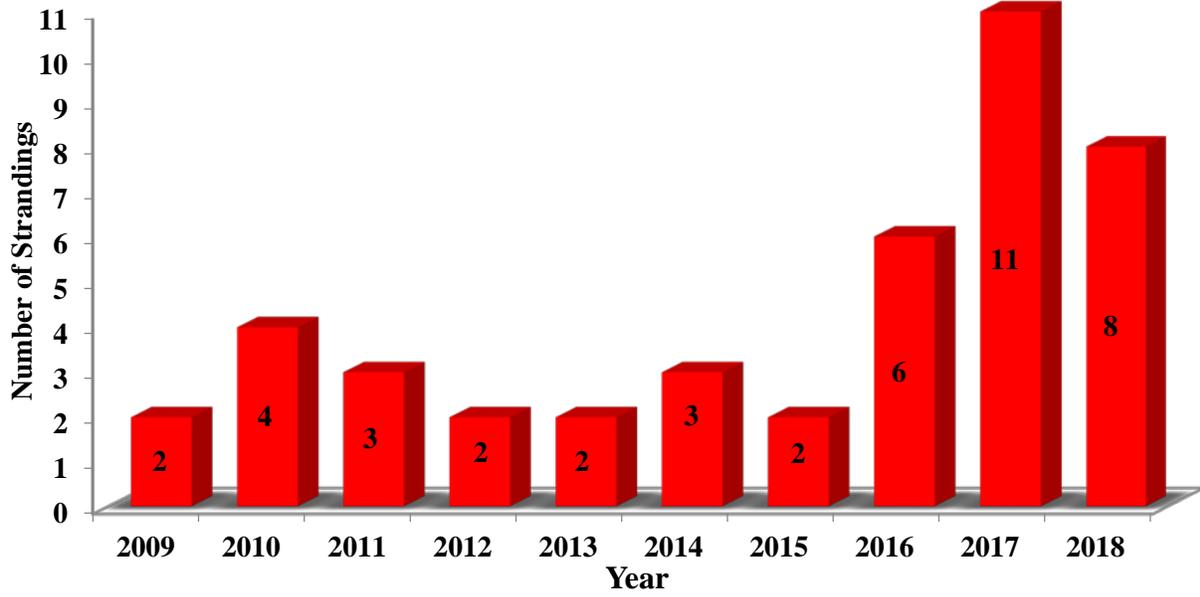


Figure 8: Yearly stranding frequency of large whales in Virginia, 2009-2018.

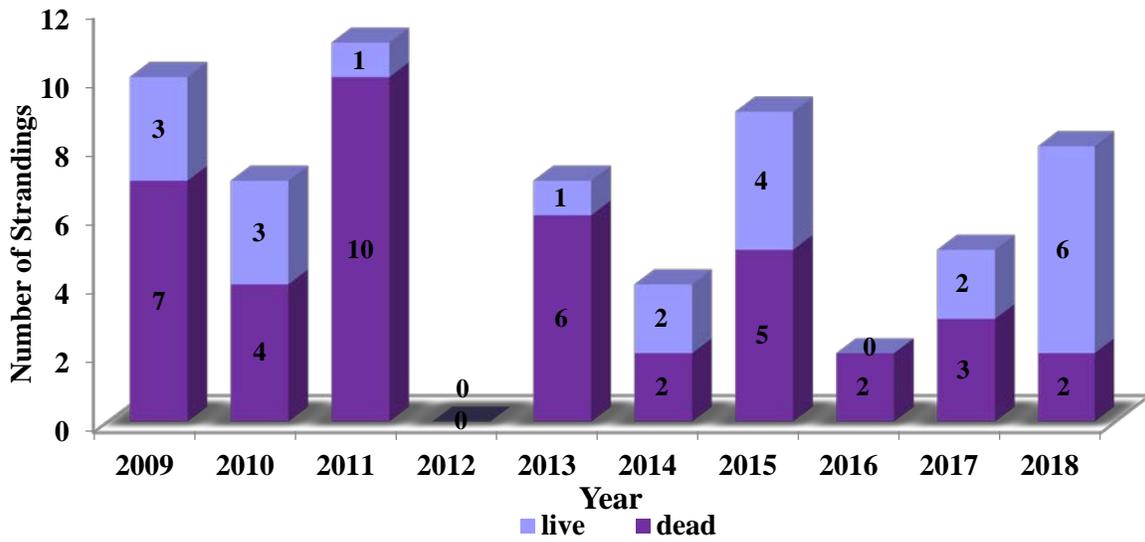


Figure 9: Yearly stranding frequency of pinnipeds in Virginia, 2009-2018.

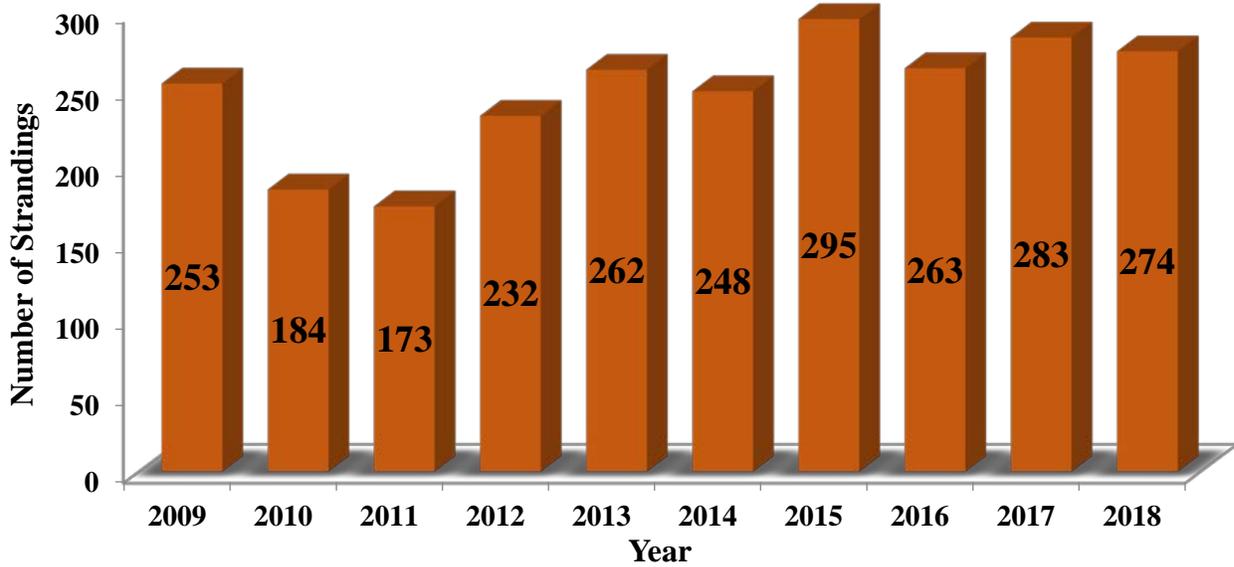


Figure 10: Yearly frequency of sea turtle strandings in Virginia, 2009-2018.

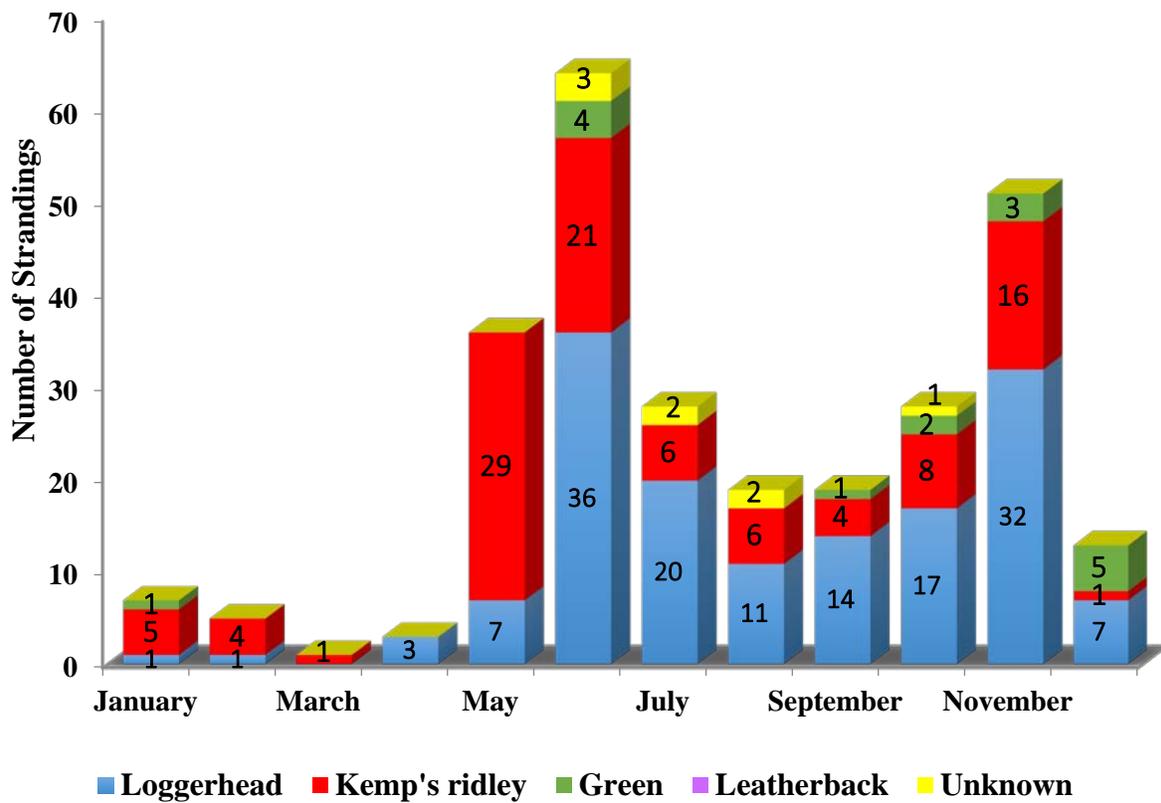


Figure 11: Monthly frequency of sea turtle strandings by species in Virginia during 2018.

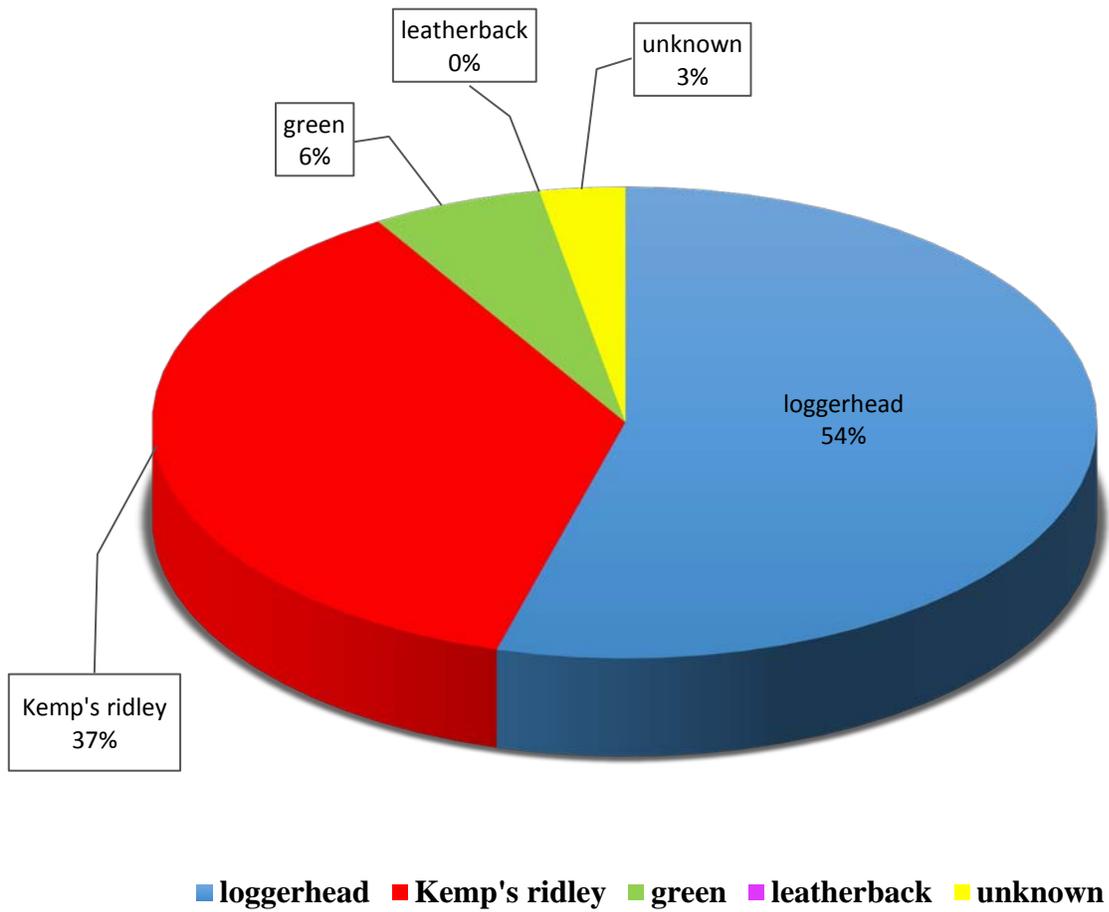


Figure 12: Frequency of sea turtle species among Virginia strandings in 2018.

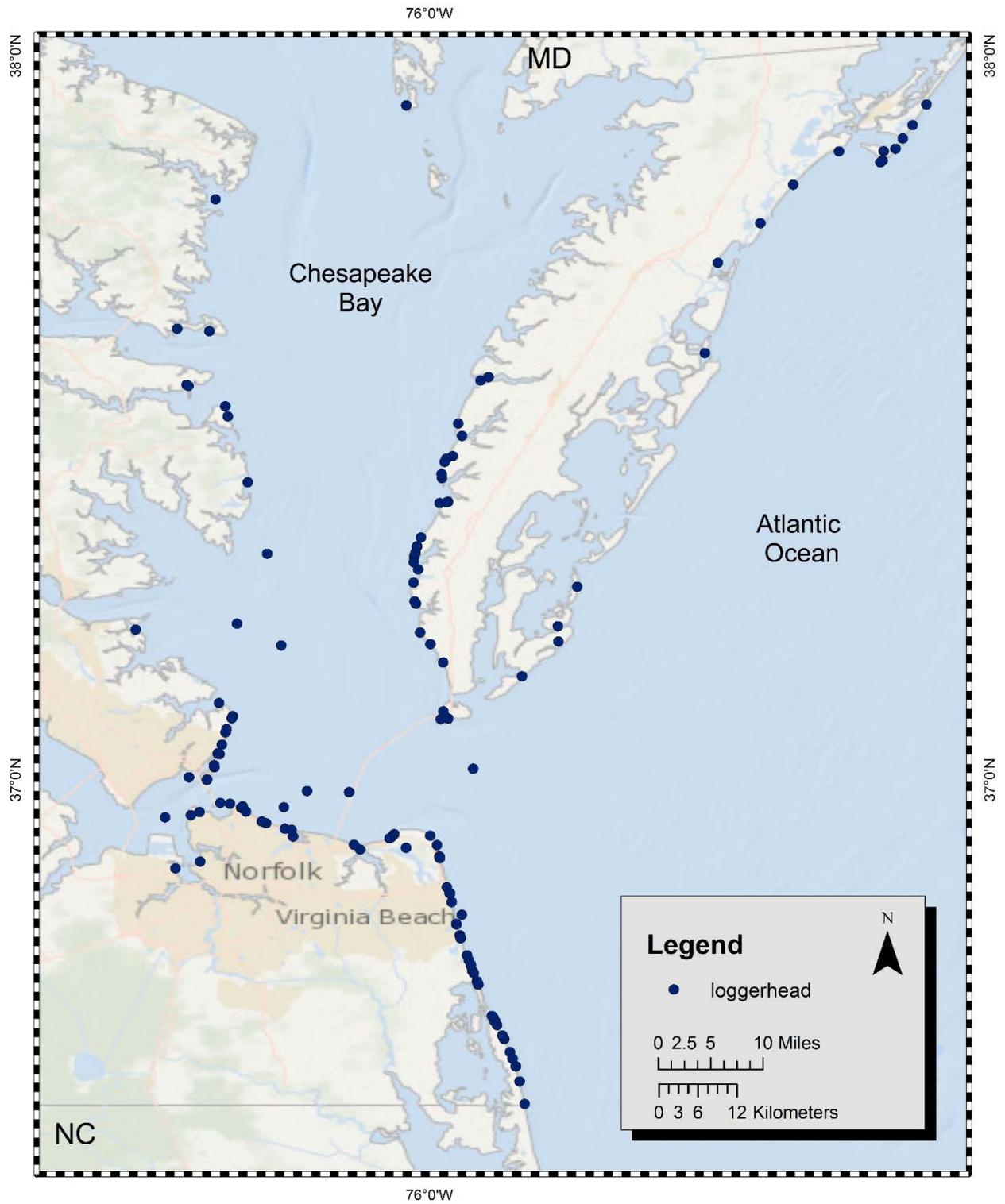


Figure 13: Locations of Virginia loggerhead sea turtle strandings in 2018.

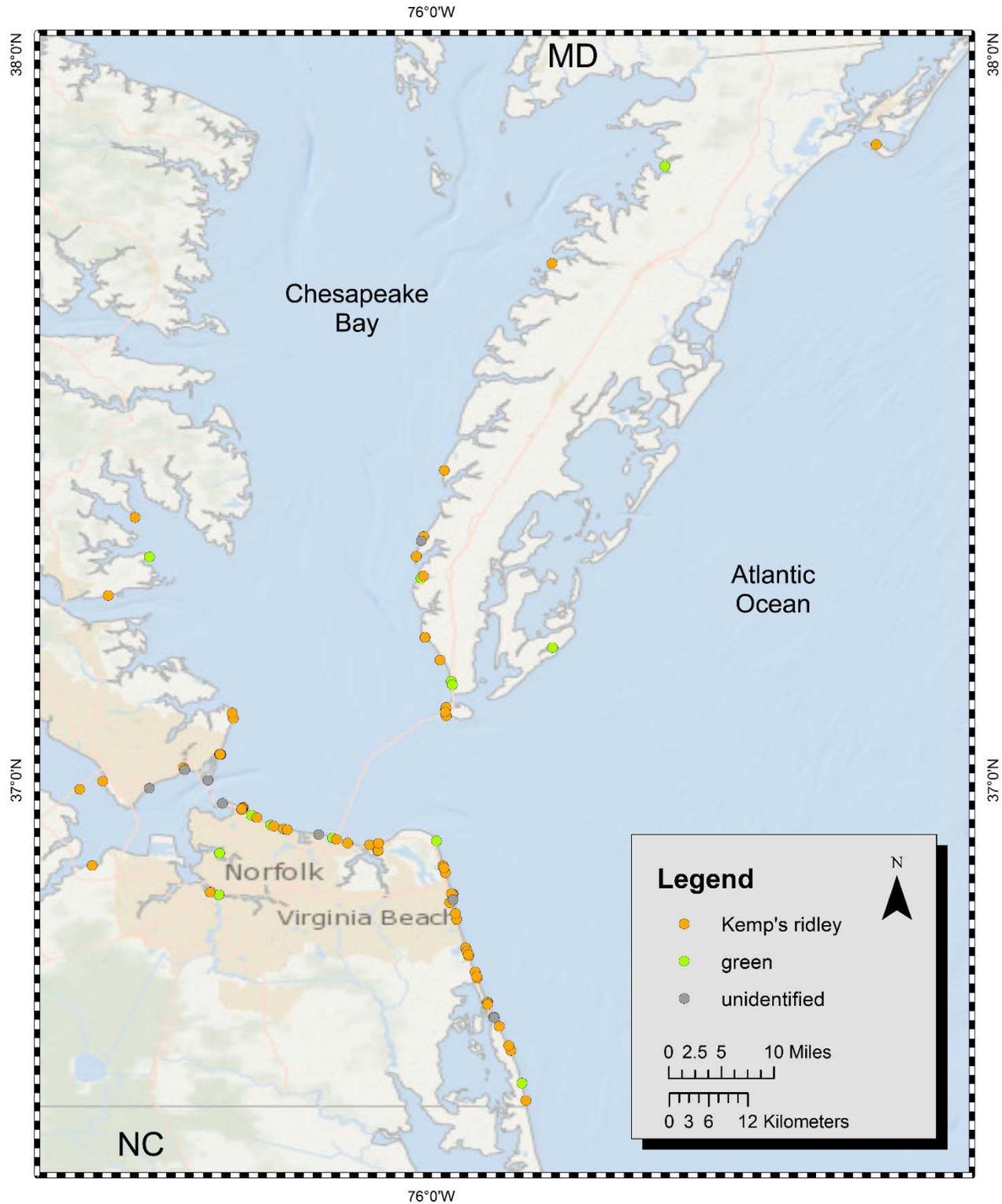


Figure 14: Locations of Virginia sea turtle strandings other than loggerheads in 2018.

Appendix I: Professional and Education Activities

Educational Activities

Outreach Opportunities

	<u>Date</u>	<u>Attendance</u>	<u>Location</u>
Empowering Girls: Whale Watch Outing/Career Development Discussion & Marine Science Presentation	1/17	22	Virginia Beach, VA
Winter Wildlife Festival	1/27	500	Virginia Beach, VA
Reptile Weekend at VLM	3/17	1000	Newport News, VA
Earth Day at Mount Trashmore	4/21	5000	Virginia Beach, VA
Seatack Party for the Planet	4/24	100	Virginia Beach, VA
NNSY Earth Day Event	4/26	250	Portsmouth, VA
Virginia Zoo Talk at VAQ	8/15	30	Virginia Beach, VA
Kiptopeke Outdoor Exploration Day	9/29	500	Accomac, VA
Oyster Crush at Yacht Club at Marina Shores	9/23	1000	Virginia Beach, VA
Chincoteague Wildlife Week Celebration	10/6	50	Chincoteague, VA
St. Francis Blessing of the Animals	10/7	50	Virginia Beach, VA
Old Donation School	12/21	25	Virginia Beach, VA

Public Presentations

	<u>Date</u>	<u>Attendance</u>	<u>Location</u>
Panelist for STEM Career Development at Nandua High School	2/16	25	Melfa, VA
Sea turtle conservation talk for ODU class	3/28	30	ODU
Panelist for STEM Career Development at Broadwater Academy	4/2	50	Exmore, VA
Seasonal Occurrence of Baleen Whales Off of the U.S. Mid-Atlantic Coast, VIMS presentation	4/4	30	Gkoucester Pt., VA
Conservation Presentation to Unitarian Church	4/6	30	Norfolk, VA
Stranding Presentation to University of Virginia Student Seminar Series	4/9	85	Charlottesville, VA
Stranding talk for Tidewater Master Naturalists at Virginia Wesleyan University	4/9	20	Virginia Beach, VA
Aquarium Conservation Presentation to William and Mary Law School	4/10	15	Williamsburg, VA
Marine mammal anatomy and imaging modalities, ODU Biomedical Seminar Series	4/20	30	Norfolk, VA
Conservation Presentation to Holy Family Church Environmental Group	5/17	30	Virginia Beach, VA
Hands Across the Sand Event	5/19	150	Virginia Beach, VA
Marine Biology Club Guest Speaker at Northampton High School	6/1	30	Eastville, VA
Conservation Presentation to St. Nicholas Catholic Church Group	9/18	65	Virginia Beach, VA
Conservation Presentation to VA Beach Rotary Club	11/29	25	Virginia Beach, VA

Stranding Center Tours & Group Presentations

	<u>Date</u>	<u>Attendance</u>	<u>Location</u>
Mentoring Young Scientists – Presentation & Tour	3/17	16	VAQ & MACC

MACC open house for Board & Aquarium Connection	4/21	20+	MACC
Kingston Knee Deep Group	5/8		VAQ
Girl Scout Troop Tour	6/9	~10	MACC
SWAT talks	7/3,10,31	30	VAQ, MACC
ESNWR Intern Visit and Tour	7/13	12	MACC
Greg Silber marine mammal class (Tt necropsy demo)	7/10	~15	MACC
VAQ sea turtle teachers stranding center tour	8/1	~10	MACC
VAQ marine mammal teachers stranding center tour	8/21	~10	MACC
Kingston Knee Deep Group	11/15		VAQ

Virginia Aquarium Talks and Events

	<u>Date</u>	<u>Attendance</u>	<u>Location</u>
Volunteer Open House	1/25	5	VAQ
Assist with ray physicals	9/6	2	VAQ
Assist with copperhead snake surgery	9/26	2	VAQ
Assist with sea turtle physicals	10/11	2	VAQ
Assist with nurse shark physicals	10/25	1	VAQ
Assist with spotted eagle ray physicals	12/18	2	VAQ

Conferences and Meetings

	<u>Date</u>	<u>Attendance</u>	<u>Location</u>
Zoos and Aquariums Committing to Conservation Conference	1/22-26	250	Jacksonville, FL
Virginia Sea Grant Graduate Symposium	2/9	150	Richmond, VA
Symposium on Sea Turtle Biology and Conservation Alliance of Marine Mammal Parks and Aquariums Annual Meeting	2/17-24	1000	Kobe, Japan
North Landing River/Albemarle Sound Estuarine Symposium	2/26-3/2	150	Washington DC
Gross anatomy of cetaceans and phocids (instructor)	4/19	150	Virginia Beach
CETUS Marine Mammal Stranding Response Marine mammal stranding response logistics and considerations (instructor)	5/5	40+	Greece
CETUS Marine Mammal Stranding Response	5/6	40+	Greece
Capitol Hill Ocean Week	6/4-6	250	Washington DC
Navy MDAT Cetacean Product updates, Duke Marine Geospatial Lab	7/11-12	15	Durham, NC
Virginia Environmental Assembly	9/7-8	100	Williamsburg, VA
Sea Turtle State Coordinator's meeting (webinar)	9/11-12	20	Baltimore, MD
Association of Zoos & Aquariums Annual Meeting	9/22-28	1500	Seattle, WA
NOAA Fisheries Large Whale Take Reduction Team	10/9-12	50	Providence, RI
Sea Turtle Vessel Interaction workshop	10/15-10	20	Tallahassee, FL
Wildlife & Wind: State of the Science Meeting	11/13-11	180	Woodbury, NY
VA Coastal Zone Management Program Coastal Partners Workshop	11/14-15	50	Richmond, VA

Workshop on forensic evaluations of watercraft injuries in marine mammals, focus on sea otters (workshop leader/instructor), USFWS & CA Dept. of Fish and Wildlife

	12/3-6	14	Santa Cruz, CA
AZA Sea Turtles SAFE Planning Workshop	12/13-14	15	Silver Spring, MD

Staff Training

	<u>Date</u>	<u>Attendance</u>	<u>Location</u>
Hands On Nesting Training	5/23	10	BBNWR
Histology techniques training	5/1	9	MACC
Volgistics New Operator Training	5/23	2	MACC
Volgistics Operator Training	7/25	30	TCC Joint Use Library
VRM Sharepoint Navigation Training	7/23	2	Municipal Center
Volgistics Operator Training	11/29	50	EMS Headquarters

Stranding Team & Cooperator Meetings & Trainings

	<u>Date</u>	<u>Attendance</u>	<u>Location</u>
Natural History Training	2/25	7	VAQ
Natural History Training	2/28	38	VAQ
Hands On Husbandry Training	3/18-24	60	MACC
Hands On Response Training	4/8-14	59	MACC
Beach Driving Training	4/22,26	16	BBNWR
Beach Driving Training	6/14	16	BBNWR
Make-up Hands on Training	5/16, 6/6	12	VAQ
Nesting Training (w/ BBNWR)	4/24	50	VAQ
Hands On Nesting Training	5/12	20	Croatan Beach
Stranding response training (CNWR)	4/30	10	Chincoteague
Necropsy training (CNWR)	8/8	17	MACC
Nest Sitting Training (w/ BBNWR)	8/7	50	VAQ
Cold Stun/ Seal Training	10/30, 11/3	61	VAQ

Other

	<u>Date</u>	<u>Attendance</u>	<u>Location</u>
Provide necropsy team support to NMFS	1/22-28	30	
Lead pilot whale necropsy team in NC	7/1/1 2017-	~50	Carova, NC
Minke whale UME core team member	2018 2017-	~20	Telephone/internet
Minke whale UME investigative team member	2018 2017-	~30	Telephone/webinar
Humpback whale UME core team member	2018 2017-	~20	Telephone/internet
Humpback whale UME investigative team member	2018 2017-	~30	Telephone/webinar
North Atlantic right whale UME core team member	2018	~20	Telephone/internet

North Atlantic right whale UME investigative team	2017-2018	~30	Telephone/webinar
NOAA large whale UME GARFO liaison	2017-2018	~40	Telephone/internet
GARS Consortium Steering committee member	2017-2018	~40	Telephone/internet
UNCW Graduate student committee (PhD student)	2018	6	MACC/UNCW
UNCW Graduate student committee (MSc student)	7/10	6	MACC/UNCW
Vessel interaction case review/consultation (CA Dept Wildlife/USFWS Sea Otter group)	June-Aug 2018	~8	Telephone/internet
NOAA SEUS Stranding Conference Planning (Large whale necropsy techniques lecturer)	9/5-6	~40	Telephone/internet
NOAA SEUS Stranding Conference Planning (Heart anatomy wet lab instructor)	9/5-6	~20	Telephone/internet
Human Interaction consultations for NOAA (large whale mortalities)	All year	~40+/case	Telephone/internet
Human Interaction consultations USFWS (CA sea otter mortalities)	Nov-Dec	~6/case	Telephone/internet

Book Chapters, Scientific Papers and Reports (VAQ staff in bold)

Books

- Rommel SA, **Costidis AM**, Lowenstine L. 2018. Gross and microscopic anatomy (Chapter 7). CRC Handbook of Marine Mammal Medicine, eds. Dierauf, Gulland, Whitman, 3rd Edition, CRC Press, Boca Raton
- **Costidis A** (senior contributor) to Cozzi B & Huggenburger S (in press). Atlas of Cetacean Anatomy. Elsevier Publishing.
- **Costidis AM**. 2018. Invited Book Review for Marine Mammal Science. The Anatomy of Dolphins: Insights into Body Structure and Function. B Cozzi, S Huggenburger, and H Oelschlager. Academic Press. 2017.

Scientific Papers

- Santos, B. S., Friedrichs, M. A., **Rose, S. A.**, **Barco, S. G.**, & Kaplan, D. M. 2018. Likely locations of sea turtle stranding mortality using experimentally-calibrated, time and space-specific drift models. *Biological Conservation*, 226, 127-143.
- Keenan-Bateman, TF, McLellan WA, **Costidis AM**, Harms CA, Gay DM, Rotstein DS, Rommel SA, Potter CW, Pabst DA, 2018. Habitat use pattern of the giant parasitic nematode *Crassicauda magna* within the pygmy sperm whale *Kogia breviceps*. *Disease of Aquatic Organisms*, 127: 163-175.
- Lee C, Jensen ED, Meegan J, Ivancic M, Bailey J, Hendrickson D, Weiss J, Grindley J, **Costidis A**, Wisbach G. (submitted). Surgical management of a chronic neck abscess in a US Navy bottlenose dolphin--a case report. *Journal of Military Surgery*.
- Bernaldo de Quiros Y, Fernandez A, Baird R, Brownell R, Aguilar de Soto N, Allen D, Arbelo M, Arregui M, **Costidis A**, Fahlman A, Frantzis A, Gulland F, Iniguez M, Johnson M, Komnenou A, Koopman H, Pabst DA, Roe W, Sierra E, Tejedor M, Schorr G. (In Press).

Advances in research on the impacts of anti-submarine sonar on beaked whales. Proceeding of the Royal Society B.

- Sharp S, McLellan WA, Rotstein D, **Costidis AM**, **Barco SG**, Pitchford T, Jackson K, Daoust PY, Wimer T, Couture EL, Bourque L, Fauquier D, Rowles T, Hamilton P, Pettis H, Moore MJ. (In prep). Gross and histopathologic diagnoses from North Atlantic right whale (*Eubalaena glacialis*) mortalities between 2003 and 2018.

Reports

- **Rose, S.A.**, O'Hara K.J., & **Barco, S.G.** 2018. Sea turtles & fishing piers in Virginia: mitigating hook and line interactions. Final Report to the Virginia Coastal Zone Management Program, NOAA CZM Grant #NA16NOS4190171, Task 94.04. VAQF Scientific Report 2018-02, 29 pp.
- Brownell, R. L. Jr., and **Mallette, S.D.** Illegal Totoaba fishing in San Felipe, Mexico in January 2018. Report to the Scientific Committee of the International Whaling Commission, SC/67B/SM15.
- Brownell, R. L. Jr., and **Mallette, S.D.** Global Baleen Whale Bycatch: The Most Threatened Populations, Report to the Scientific Committee of the International Whaling Commission, SC/67B/HIM09/Rev1.
- **Mallette, S.D.**, M. L. Burt. L. Thomas. R.J. McAlarney, G.G. Lockhart, E.W. Cummings, W.A. McLellan, D.A. Pabst, and **S.G. Barco**. 2018. Occurrence of Baleen Whales along the Continental Shelf Region of the VACAPES OPAREA off southern Virginia: Final Report. Prepared for U.S. Fleet Forces Command. Submitted to Naval Facilities Engineering Command Atlantic, Norfolk, Virginia, under Contract No. N62470-15-D-8006, Task Order 05, issued to HDR, Inc., Virginia Beach, Virginia. July 2018.
- **Mallette S.D.**, **Barco S.G.**, Fujioka E. and Urian K. Development of the *Mid-Atlantic Humpback Whale Photo-ID Catalog (MAHWC)*. 2018 US Navy Marine Species Monitoring Technical Review Meeting. Mar 19-21, 2018; San Diego, CA.
- **Mallette, S.D.**, **N.H. Mathies**, and **S.G. Barco**. 2018. *Development of a Web-based Mid-Atlantic Humpback Whale Catalog: 2017 Annual Progress Report. Final Report*. Prepared for U.S. Fleet Forces Command. Submitted to Naval Facilities Engineering Command Atlantic, Norfolk, Virginia, under Contract No. N62470-15-8006, Task Order 17F4031, issued to HDR Inc., Virginia Beach, Virginia. March 2018.
- **Costidis, A.M.**, **Barco, S.G.**, **Epple, A.L.**, Volker, K.M., **Swingle, W.M.** 2018. Supporting Expert Stranding Response, Rehabilitation, and Data Collection for Marine Mammals in Virginia. Final Report to the John H. Prescott Marine Mammal Rescue Assistance Grant Program, #NA15NMF4390025. VAQF Scientific Report 2018-03.
- **Swingle, W.M.**, **Barco, S.G.**, **Costidis, A.A.**, **Bates, E.B.**, **Mallette, S.D.**, **Rose, S.A.**, and **Epple, A.L.** 2018. Virginia Sea Turtle and Marine Mammal Stranding Network 2017 Grant Report. Final Report to the Virginia Coastal Zone Management Program, NOAA CZM Grant NA16NOS4190171, Task 49. VAQF Scientific Report 2018-01, Virginia Beach, VA, 52 pp.

Appendix II: Highlights of the Year – Marine Mammals

In 2018, Virginia experienced the second highest number of large whale strandings (n=8) in 10 years, and second highest number of humpback whale strandings since 1990 (n=5), following the record setting 2017 year for humpback whale and all large whale strandings (n=11). For the entirety of the 2016-2018 federally declared humpback whale Unusual Mortality Event (UME), Virginia is tied with Massachusetts for the second largest number of strandings (n=14). The 2018 humpback whale strandings included a free-swimming entangled whale observed in coastal waters off of Virginia Beach. Several attempts were made to locate and disentangle the whale, however the whale could never be relocated following initial reports. Of the five humpback whale strandings in 2018, three were positive for human interaction lesions, while two were severely decomposed and could not be assessed for evidence of human interaction. The most notable large whale stranding event in 2018 was the stranding of a deceased, critically endangered North Atlantic right whale. The whale was observed floating over 60 miles offshore of Virginia Beach. A multi-day, multi-institutional relocation, towing and examination effort lead by VAQS resulted in the identification of chronically entangling Canadian snow crab gear as the cause of death.



The North Atlantic right whale pictured above, VAQS20181005, was found floating off-shore with extensive chronic entanglements in a heavy gauge multifilament, twisted line subsequently identified as buoy line from the Canadian snow crab fishery. Aerial footage (left) shows at-sea documentation and satellite buoy attachment conducted by VAQS (credit Sea 2 Shore Alliance). Underwater footage shows anchoring line coming out of mouth and heading to seafloor (credit VAQS). Multiple loops of line were present within the oral cavity, entangling the baleen, wrapping around the head and partially amputating the right pectoral flipper.

Two additional whales stranded in 2018. The first was a severely decomposed large rorqual (fin or sei whale) floating 9 miles offshore of Virginia Beach. Due to the distance and condition, this animal was not recovered or examined. The second whale was a minke whale that stranded on



Tangier Island, inside the Chesapeake Bay. The minke whale had a piece of twisted twine fishing net chronically entangling and slowly amputating its rostrum and appeared to have stranded alive.

These photographs show the minke whale that stranded on Tangier Island. While the immediate cause of death is believed to be natural (infectious), a piece of net can be seen gradually amputating the tip of the rostrum. It is unclear if/how the entanglement and the open wound it created may have contributed to the demise of this animal.



Finally, a marine mammal stranding of note in 2018 was the recovery of a deceased Florida manatee. While live manatee sightings have become relatively common during summer and early fall, this was the first reported deceased Florida manatee in VA in 30 years. The manatee was found at the Great Bridge Lock, Chesapeake, VA, a guard lock operated by the U.S. Army Corps of Engineers (USACE). The manatee was recovered and necropsied, at which point catastrophic traumatic blunt force injuries were discovered. While external epidermal impressions and defects were noted on the manatee and the carcass was associated with the locks and the vessels that travel through, the external lesions were not diagnostic of a particular structure which precluded identification of the source of the traumatic injuries. The USACE provided complete access to VAQS staff to investigate the lock structure in order to assess



likelihood of the locks resulting in the mortality, however no structures consistent with the impressions on the manatee were found.

This photograph shows the manatee being lowered into the VAQS truck by the USACE crane.

© VAQS

Appendix III: Highlights of the Year – Sea Turtles

The 2018 sea turtle stranding year was within normal numbers when compared to the previous five years, but remained notably higher than some years prior to 2013. The largest stranding peaks occurred in May, June, and November, with months in between the peaks remaining elevated, as is normal to seasonal sea turtle stranding patterns. The November peak was notably higher than the Five-year average for November. The 2018 live sea turtle stranding season was heavy. In 2018 alone, VAQS was able to admit, rehabilitate and release 45 sea turtles (38 Kemp's ridley, 5 loggerhead, 2 green). An additional eight turtles (5 loggerhead, 1 Kemp's ridley, 2 green) are still patients at the VAQS rehab center, while 10 turtles either died following admission into rehab or were dead on arrival of the rescue team at the beach. An additional 17 turtles were released either intentionally or unintentionally by fishers after being hooked at a fishing pier.

Similar to 2017, the fall cold-stun season started with early October live strandings of loggerheads preceding the normal Kemp's ridley cold-stunned turtles. The loggerheads presented with uncharacteristic clinical signs, often involving lethargy, depressed cardiopulmonary function and neurologic symptoms. Like the unusual 2017 cold-stun loggerheads, in 2018 they were hypokalemic (low potassium). Unlike 2017, they had other, sometimes contradictory, clinical signs, with some being acidotic while others were alkalotic. For most of these turtles, significant fluid therapy and, in many cases, cardiopulmonary stimulation and stabilization were required.

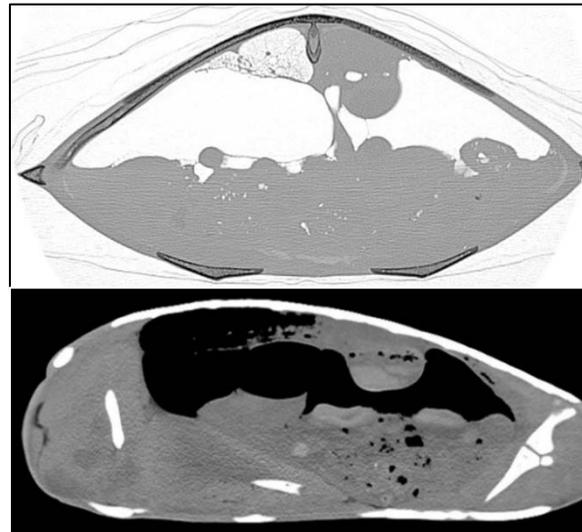
Live and dead loggerheads continued to strand well into November, dominating the second half of November with 18 strandings of loggerheads and only a single green sea turtle. In December, live loggerhead strandings all but terminated, being replaced with strandings of deceased loggerheads and live and deceased green turtles. With multiple sea turtle rehab patients already under care, several of the cold-stun turtles were transferred to other facilities in order to make room for future patients that were expected to arrive as water temperatures dropped further in December.

Like 2017, the 2018 cold-stun loggerhead stranding patterns appeared different from previous (pre-2017) years. In 2018, substantially elevated loggerhead strandings occurred in November (n=32) compared to the previous 5 and 10-year averages of 9 and 8, respectively. Kemp's ridley strandings, which have been increasing since 2013, set a 12 year record of 101 strandings (2013-2017 5-year average = 82, 2008-2017 10-year average = 62). Conversely, reported leatherback strandings fell to a record 0 for 2018, completely reversing the spikes from 2016 and 2017, and green sea turtle strandings were within normal limits.

Several of the 2018 live sea turtle cases were very challenging, including cases involving traumatic hook ingestions and blunt trauma. One green sea turtle was admitted with evidence of turgid tissues and cardiovascular impairment suggestive of intracoelomic gas and/or fluid. This patient underwent computed tomography (CT) scans following radiographs that revealed an intracoelomic gas/liquid interface and abnormal soft tissue pulmonary anatomy. CT scans revealed two large pneumatoceles and pulmonary hematoceles suggesting that the fluid in the coelomic cavity was blood. A coelomocentesis was performed to remove air and reduce intracoelomic pressure, however once pressure was relieved, the patient underwent cardiovascular decompensation. Postmortem examination revealed that reduction in coelomic pressure likely resulted in renewed ruptures in one of the hematoceles with subsequent exsanguination. While this was not the desired outcome, this case provided invaluable insights for clinical and diagnostic manifestations of such medical conditions.



© VAQS



The images above show the green turtle on the left with severe tissue distension suggestive of elevated intracoelomic pressures, and CT ortho-slices in the axial and sagittal planes on the right showing a radio-opaque right lung and a large spherical mass with internal layering, suggesting of a hematocele.

In 2018, despite the closure of two piers in the southeastern part of the state, we recorded a record number of hooked sea turtles in Virginia for the 5th year in a row. In an effort to mitigate the number and severity of hook interactions, as well as the cost of response, examination, and rehabilitation of hooked sea turtles, we compared survey and angler interview data, tested metal detectors for determining hook presence, and applied immediate release criteria for apparently healthy turtles that had been hooked.

Over the past five years we surveyed pier anglers on basic fishing practices while simultaneously interviewing anglers who reported hooking a turtle. Comparison of the two datasets is helping us understand the mechanics of hook interactions. Thus far, there is little evidence to suggest that changes in bait or hook use by anglers is likely to result in a meaningful decrease in hook interactions, but there are some interesting trends that can be examined further.

We tested several types of hand-held metal detectors for use in the field to determine hook presence in turtles and the results were promising for smaller turtles (≤ 30 cm straight carapace length) with less than 5% failure rates. One particular detector, Garrett Pro Pointer, was ideal for this application, being small, powerful, waterproof and relatively inexpensive.

Application of immediate release criteria (IRC) in 2017, and adjustments made to those criteria in 2018, resulted in shorter rehab times for hooked turtles compared to prior years. While some of the decrease may be related to both increased use of lift nets (and the resulting decrease in severity of hooking injuries) as well as better hook removal techniques, we believe that use of the IRC has had a positive impact on reducing the length of rehabilitation time for hooked turtles.

Appendix IV: Stranding Network Datasheets

A. Marine Mammal Level A data sheet

MARINE MAMMAL STRANDING REPORT - LEVEL A DATA																													
FIELD #: _____		NMFS REGIONAL #: _____		NATIONAL DATABASE#: _____																									
		(NMFS USE)		(NMFS USE)																									
COMMON NAME: _____		GENUS: _____		SPECIES: _____																									
EXAMINER Name: _____ Affiliation: _____																													
Address: _____ Phone: _____																													
Stranding Agreement or Authority: _____																													
LOCATION OF INITIAL OBSERVATION State: _____ County: _____ City: _____ Body of Water: _____ Locality Details: _____ _____ Lat (DD): _____ N Long (DD): _____ W <input type="checkbox"/> Actual <input type="checkbox"/> Estimated How Determined: (check ONE) <input type="checkbox"/> GPS <input type="checkbox"/> Map <input type="checkbox"/> Internet/Software		OCURRENCE DETAILS <input type="checkbox"/> Restrand GE# _____ Group Event: <input type="checkbox"/> YES <input type="checkbox"/> NO (NMFS Use) If Yes, Type: <input type="checkbox"/> Cow/Calf Pair <input type="checkbox"/> Mass Stranding # Animals: _____ <input type="checkbox"/> Actual <input type="checkbox"/> Estimated Findings of Human Interaction: <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> Could Not Be Determined (CBD) If Yes, Choose one or more: <input type="checkbox"/> 1. Boat Collision <input type="checkbox"/> 2. Shot <input type="checkbox"/> 3. Fishery Interaction <input type="checkbox"/> 4. Other Human Interaction: _____ How Determined (Check one or more): <input type="checkbox"/> External Exam <input type="checkbox"/> Internal Exam <input type="checkbox"/> Necropsy <input type="checkbox"/> Other: _____ Gear Collected? <input type="checkbox"/> YES <input type="checkbox"/> NO Gear Disposition: _____ Other Findings Upon Level A: <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> Could Not Be Determined (CBD) If Yes, Choose one or more: <input type="checkbox"/> 1. Illness <input type="checkbox"/> 2. Injury <input type="checkbox"/> 3. Pregnant <input type="checkbox"/> 4. Other: _____ How Determined (Check one or more): <input type="checkbox"/> External Exam <input type="checkbox"/> Internal Exam <input type="checkbox"/> Necropsy <input type="checkbox"/> Other: _____																											
INITIAL OBSERVATION Date: Year: _____ Month: _____ Day: _____ First Observed: <input type="checkbox"/> Beach or Land <input type="checkbox"/> Floating <input type="checkbox"/> Swimming CONDITION AT INITIAL OBSERVATION (Check ONE) <input type="checkbox"/> 1. Alive <input type="checkbox"/> 4. Advanced Decomposition <input type="checkbox"/> 2. Fresh dead <input type="checkbox"/> 5. Mummified/Skeletal <input type="checkbox"/> 3. Moderate decomposition <input type="checkbox"/> 6. Condition Unknown			LEVEL A EXAMINATION <input type="checkbox"/> Not Able to Examine Date: Year: _____ Month: _____ Day: _____ CONDITION AT EXAMINATION (Check ONE) <input type="checkbox"/> 1. Alive <input type="checkbox"/> 4. Advanced Decomposition <input type="checkbox"/> 2. Fresh dead <input type="checkbox"/> 5. Mummified/Skeletal <input type="checkbox"/> 3. Moderate decomposition <input type="checkbox"/> 6. Unknown																										
INITIAL LIVE ANIMAL DISPOSITION (Check one or more) <input type="checkbox"/> 1. Left at Site <input type="checkbox"/> 6. Euthanized at Site <input type="checkbox"/> 2. Immediate Release at Site <input type="checkbox"/> 7. Transferred to Rehabilitation: <input type="checkbox"/> 3. Relocated Date: Year: _____ Month: _____ Day: _____ Facility: _____ <input type="checkbox"/> 4. Disentangled <input type="checkbox"/> 8. Died during Transport <input type="checkbox"/> 5. Died at Site <input type="checkbox"/> 9. Euthanized during Transport <input type="checkbox"/> 10. Other: _____			MORPHOLOGICAL DATA SEX (Check ONE) AGE CLASS (Check ONE) <input type="checkbox"/> 1. Male <input type="checkbox"/> 1. Adult <input type="checkbox"/> 4. Pup/Calf <input type="checkbox"/> 2. Female <input type="checkbox"/> 2. Subadult <input type="checkbox"/> 5. Unknown <input type="checkbox"/> 3. Unknown <input type="checkbox"/> 3. Yearling <input type="checkbox"/> Whole Carcass <input type="checkbox"/> Partial Carcass Straight length: _____ <input type="checkbox"/> cm <input type="checkbox"/> in <input type="checkbox"/> actual <input type="checkbox"/> estimated Weight: _____ <input type="checkbox"/> kg <input type="checkbox"/> lb <input type="checkbox"/> actual <input type="checkbox"/> estimated PHOTOS/VIDEOS TAKEN: <input type="checkbox"/> YES <input type="checkbox"/> NO Photo/Video Disposition: _____																										
CONDITION/DETERMINATION (Check one or more) <input type="checkbox"/> 1. Sick <input type="checkbox"/> 7. Location Hazardous <input type="checkbox"/> 2. Injured <input type="checkbox"/> a. To animal <input type="checkbox"/> 3. Out of Habitat <input type="checkbox"/> b. To public <input type="checkbox"/> 4. Deemed Releasable <input type="checkbox"/> 8. Unknown/CBD <input type="checkbox"/> 5. Abandoned/Orphaned <input type="checkbox"/> 9. Other _____ <input type="checkbox"/> 6. Inaccessible			CARCASS STATUS (Check one or more) <input type="checkbox"/> 1. Left at Site <input type="checkbox"/> 4. Towed: Lat _____ Long _____ <input type="checkbox"/> 7. Landfill <input type="checkbox"/> 2. Buried <input type="checkbox"/> 5. Sunk: Lat _____ Long _____ <input type="checkbox"/> 8. Unknown <input type="checkbox"/> 3. Rendered <input type="checkbox"/> 6. Frozen for Later Examination <input type="checkbox"/> 9. Other _____																										
TAG DATA Tags Were: Present at Time of Stranding (Pre-existing): <input type="checkbox"/> YES <input type="checkbox"/> NO Applied during Stranding Response: <input type="checkbox"/> YES <input type="checkbox"/> NO <table style="width: 100%; border-collapse: collapse; font-size: small;"> <thead> <tr> <th style="width: 10%;">ID#</th> <th style="width: 10%;">Color</th> <th style="width: 10%;">Type</th> <th style="width: 15%;">Placement* (Circle ONE)</th> <th style="width: 10%;">Applied</th> <th style="width: 10%;">Present</th> </tr> </thead> <tbody> <tr> <td>_____</td> <td>_____</td> <td>_____</td> <td>D DF L LF LR RF RR</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>_____</td> <td>_____</td> <td>_____</td> <td>D DF L LF LR RF RR</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> <tr> <td>_____</td> <td>_____</td> <td>_____</td> <td>D DF L LF LR RF RR</td> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </tbody> </table> <p style="font-size: x-small;">* D= Dorsal; DF= Dorsal Fin; L= Lateral Body LF= Left Front; LR= Left Rear; RF= Right Front; RR= Right Rear</p>			ID#	Color	Type	Placement* (Circle ONE)	Applied	Present	_____	_____	_____	D DF L LF LR RF RR	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____	_____	D DF L LF LR RF RR	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____	_____	D DF L LF LR RF RR	<input type="checkbox"/>	<input type="checkbox"/>	SPECIMEN DISPOSITION (Check one or more) <input type="checkbox"/> 1. Scientific collection <input type="checkbox"/> 2. Educational collection <input type="checkbox"/> 3. Other: _____ Comments: _____ NECROPSIED <input type="checkbox"/> NO <input type="checkbox"/> YES <input type="checkbox"/> Limited <input type="checkbox"/> Complete <input type="checkbox"/> Carcass Fresh <input type="checkbox"/> Carcass Frozen/Thawed NECROPSIED BY: _____ Date: Year: _____ Month: _____ Day: _____		
ID#	Color	Type	Placement* (Circle ONE)	Applied	Present																								
_____	_____	_____	D DF L LF LR RF RR	<input type="checkbox"/>	<input type="checkbox"/>																								
_____	_____	_____	D DF L LF LR RF RR	<input type="checkbox"/>	<input type="checkbox"/>																								
_____	_____	_____	D DF L LF LR RF RR	<input type="checkbox"/>	<input type="checkbox"/>																								

B. Sea Turtle Stranding and Salvage Network (STSSN) data sheet

SEA TURTLE STRANDING AND SALVAGE NETWORK – STRANDING REPORT

OBSERVER'S NAME / ADDRESS / PHONE:
 First _____ M.I. _____ Last _____
 Affiliation: Virginia Aquarium Stranding Response Program
 Address: 717 General Booth Blvd, Virginia Beach, VA 23451
 vaqstranding@gmail.com
 Area code/Phone number: 757-385-7575

STRANDING DATE:
 Year 20__ __ Month __ __ Day __ __
 Turtle number by day __ __

-State coordinator must be notified within 24 hrs; this was done by phone (757)385-7575
 email fax (757)437-4933

SPECIES: (check one)
 CC = Loggerhead
 CM = Green
 DC = Leatherback
 EI = Hawksbill
 LK = Kemp's Ridley
 LO = Olive Ridley
 UN = Unidentified

Check Unidentified if not positive. Do Not Guess.

Carcass necropsied? Yes No
 Necropsied By _____
 Necropsy Date _____
 Photos taken? Yes No
 Species verified by state coordinator?
 Yes No Initial _____

SEX:
 Undetermined
 Female Male
 Does tail extend beyond carapace?
 Yes; how far? _____ cm / in
 No
 How was sex determined?
 Necropsy
 Tail length (adult only)

STRANDING LOCATION: Offshore (Atlantic or Gulf beach) Inshore (bay, river, sound, inlet, etc)
 State _____ County _____
 Descriptive location (be specific) _____

 Latitude _____ Longitude _____

CONDITION: (check one)
 0 = Alive
 1 = Fresh dead
 2 = Moderately decomposed
 3 = Severely decomposed
 4 = Dried carcass
 5 = Skeleton, bones only

FINAL DISPOSITION: (check)
 1 = Left on beach where found; painted? Yes* No(5)
 2 = Buried: on beach / off beach; carcass painted before buried? Yes* No
 3 = Salvaged: all / part(s), what/why? _____

 4 = Pulled up on beach/dune; painted? Yes* No
 6 = Alive, released
 7 = Alive, taken to rehab. facility, where? _____

 8 = Left floating, not recovered; painted? Yes* No
 9 = Disposition unknown, explain _____

**If painted, what color?* _____

TAGS: Contact state coordinator before disposing of any tagged animal!!
 Checked for flipper tags? Yes No
Check all 4 flippers. If found, record tag number(s) / tag location / return address

 PIT tag scan? Yes No
 If found, record number / tag location

 Coded wire tag scan? Yes No
 If positive response, record location (flipper)

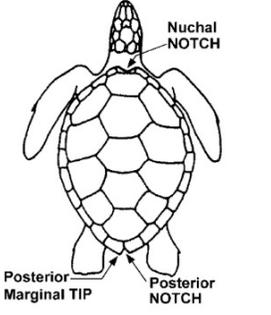
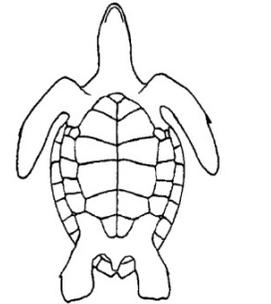
 Checked for living tag? Yes No
 If found, record location (scute number & side)

CARAPACE MEASUREMENTS: (see drawing)

Using calipers Circle unit
 Straight length (NOTCH-TIP) _____ cm / in
 Minimum length (NOTCH-NOTCH) _____ cm / in
 Straight width (Widest Point) _____ cm / in

Using non-metal measuring tape Circle unit
 Curved length (NOTCH-TIP) _____ cm / in
 Minimum length (NOTCH-NOTCH) _____ cm / in
 Curved width (Widest Point) _____ cm / in

Weight actual / est. _____ kg / lb

Mark wounds / abnormalities on diagrams at left and describe below (note tar or oil, gear or debris entanglement, propeller damage, epibiota, papillomas, emaciation, etc.). **Please note if no wounds / abnormalities are found.**

Appendix V: Virginia Species Lists

A. Marine mammal species in stranding records from Virginia, U.S.A. (Virginia Aquarium Marine Mammal Stranding Database)

Common Name	Scientific Name	Status
Class: Mammalia		
Order: Sirenia		
Family: Trichechidae		
Florida manatee	<i>Trichechus manatus latirostris</i>	Threatened
Order: Cetacea		
Suborder: Mysticeti		
Family: Balaenidae		
Northern right whale	<i>Eubalaena glacialis</i>	Endangered
Family: Balaenopteridae		
Fin whale	<i>Balaenoptera physalus</i>	Endangered
Sei whale	<i>Balaenoptera borealis</i>	Endangered
Bryde's whale	<i>Balaenoptera brydei</i>	Uncertain
Minke whale	<i>Balaenoptera acutrostrata</i>	Common
Humpback whale	<i>Megaptera novaeangliae</i>	Threatened
Suborder: Odontoceti		
Family: Physeteridae		
Sperm whale	<i>Physeter macrocephalus</i>	Endangered
Pygmy sperm whale	<i>Kogia breviceps</i>	Uncertain
Dwarf sperm whale	<i>Kogia sima</i>	Uncertain
Family: Ziphiidae		
Cuvier's beaked whale	<i>Ziphius cavirostris</i>	Uncertain
Gervais' beaked whale	<i>Mesoplodon europaeus</i>	Uncertain
True's beaked whale	<i>Mesoplodon mirus</i>	Uncertain
Sowerby's beaked whale	<i>Mesoplodon bidens</i>	Uncertain
Blainville's beaked whale	<i>Mesoplodon densirostris</i>	Uncertain
Family: Delphinidae		
Longfinned pilot whale	<i>Globicephala melas</i>	Common
Shortfinned pilot whale	<i>Globicephala macrorhynchus</i>	Uncommon
Risso's dolphin	<i>Grampus griseus</i>	Common
Bottlenose dolphin	<i>Tursiops truncatus</i>	Common
Atlantic white-sided dolphin	<i>Lagenorhynchus acutus</i>	Common

Common Name	Scientific Name	Status
Family: Dephinidae (continued)		
Pygmy killer whale	<i>Feresa attenuata</i>	Uncertain
Melonheaded whale	<i>Peponocephala electra</i>	Uncertain
Rough-toothed dolphin	<i>Steno bredanensis</i>	Uncommon
Common dolphin	<i>Delphinus delphis</i>	Common
Striped dolphin	<i>Stenella coeruleoalba</i>	Common
Pantropical spotted dolphin	<i>Stenella attenuata</i>	Common
Atlantic spotted dolphin	<i>Stenella frontalis</i>	Common
Family: Phocoenidae		
Harbor porpoise	<i>Phocoena phocoena</i>	Common
Order: Carnivora		
Suborder: Pinnipedia		
Family: Phocidae		
Harbor seal	<i>Phoca vitulina</i>	Common
Gray seal	<i>Halichoerus grypus</i>	Common
Hooded seal	<i>Crystophora cristata</i>	Common
Harp seal	<i>Pagophilus groenlandica</i>	Common

B. Sea turtle species in stranding records from Virginia, U.S.A. (Virginia Aquarium Sea Turtle Stranding Database)

Common Name	Scientific Name	Status
Class: Reptilia		
Order: Testudines		
Family: Dermochelyidae		
Leatherback sea turtle	<i>Dermochelys coriacea</i>	Endangered
Family: Cheloniidae		
Green sea turtle	<i>Chelonia mydas</i>	Threatened/Endangered
Loggerhead sea turtle	<i>Caretta caretta</i>	Threatened
Kemp's ridley sea turtle	<i>Lepidochelys kempii</i>	Endangered
Hawksbill sea turtle	<i>Eretmochelys imbricata</i>	Endangered