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Virginia Sea Turtle & Marine Mammal Stranding Network 2017 Grant Report

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VIRGINIA AQUARIUM & MARINE SCIENCE CENTER

Virginia Coastal Zone MANAGEMENT PROGRAM

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VIRGINIA AQUARIUM FOUNDATION STRANDING RESPONSE PROGRAM

Virginia Sea Turtle and Marine Mammal Stranding Network 2017 Grant Report

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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 cooperation 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 Foundation 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 7,000) 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 disoriented 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 examine 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 provides 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 93 strandings for 2014-2017 (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 dolphins and harbor porpoises (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 rescue 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. Since 2000, VAQS has responded to an average of 6.4 cetaceans and 3.4 pinniped live strandings in Virginia each year. The VAQS Team also responds to live marine mammal emergencies in northeastern North Carolina (5.5 per year since 2000).

Five species of sea turtles (loggerhead, Kemp's ridley, leatherback, green, and hawksbill) 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 4,600 sea turtle strandings, with an average of 247 per year for the last ten years 2008-2017.

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 and VDGIF. 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 65

live strandings per year. In addition, VAQS Team expertise in sea turtle rehabilitation has resulted in many turtles (more than 65) 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 16 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 serves 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 and findings of human interaction.

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 has 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 2017 Stranding Data

MARINE MAMMALS

Virginia stranding data are presented for the calendar year 2017. A total of 94 marine mammal strandings were recorded during 2017 (Table 1). This number was much higher than in 2016 (80) and dramatically lower than in 2013 (427) when Virginia experienced the highest number of marine mammal strandings the state had ever recorded in a single year. In the past ten years, the number of marine mammal strandings has varied between 111 (2008) and 75 (2012), not including the historic year of 2013 (Figure 1). The unprecedented number of strandings in 2013 were caused by an unusual mortality event that affected coastal bottlenose dolphins from New York to Florida. Temporally, marine mammal strandings occur in all months of the year, but some marine mammals (*i.e.* large whales, harbor porpoises, common dolphins and seals) tend to strand seasonally, while others (*i.e.* bottlenose dolphins and other cetaceans) can occur at any time of the year (Figure 2). 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). 2017 was an average year for bottlenose dolphin strandings and they comprised 71% 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). Pictures and descriptions of notable marine mammal strandings from 2017 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 2017, VAQS responded to 12 live marine mammal strandings in Virginia (Table 2). These strandings occurred at various times throughout the year and consisted of 10 cetaceans and two pinnipeds. The cetaceans included six bottlenose dolphins, one common dolphin, one humpback whale, one fin whale and one minke 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. One animal was captured for medical treatment and potential rehabilitation. The seal was transferred to the National Aquarium in Baltimore and later the Marine Mammal Stranding Center in Brigantine, NJ for treatment, though it eventually died while in rehabilitation.

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 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 2017, bottlenose dolphin strandings are now occurring in all months of the year. In 2017, 67 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, though it was officially ended in April of that year. Bottlenose dolphin strandings in 2017 occurred primarily along the Atlantic Ocean and lower Chesapeake Bay shorelines (Figure 4). In 2017, 22.4% (15) of the strandings occurred in Virginia Beach, 40.3% (27) on the eastern shore, 9.0% (6) in Norfolk/Chesapeake/Suffolk, and 28.3% (19) on the western shores of Chesapeake Bay north of the James River. Gender was determined for 40 of the stranded dolphins. Females comprised 48% (19) and males comprised 52% (21) of the known gender animals. Of the 42 stranded dolphins with recorded lengths (includes estimated lengths and observer descriptions), four (9.5%) 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 = 48), signs of human interaction could not be determined in 33 (69%), were positive in 13 (27%), and were not observed in two (4%). Most of the signs of interactions were related to fisheries entanglements.

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). 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. Many 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 northern right whales (McLellan *et al.* 2004). During 2008, there were no large whale strandings in Virginia. In 2017, VAQS responded to eight humpback whales (*Megaptera novaeangliae*), one fin whale (*Balaenoptera physalus*), and two minke whales (*Balaenoptera acutorostrata*) in Virginia. This number of large whale strandings represents a record year for Virginia. The previous high was in 2016 when six large whale strandings were recorded. As a result of the number of humpback whales stranding in 2017, an Unusual Mortality Event was declared. Overall, an average of 3.4 large whale strandings have occurred annually in Virginia during the last ten years (Figure 8). Included in the stranding numbers, VAQS also responds to large whale entanglements. VAQS staff has 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 five strandings during 2017. These strandings typically occur along the ocean and lower bay shorelines and sometimes involve live animals. 2017 strandings for this group included three pygmy/dwarf sperm whales (*Kogia* species), one common dolphin (*Delphinus delphis*), and one Sowerby'beaked whale (*Mesoplodon bidens*).

Pinnipeds

Pinniped strandings have generally increased in Virginia since the early 1990s. There were five strandings recorded from Virginia during 2017 (Figures 5 and 9). The pinniped species included four harbor seals (*Phoca vitulina*) and one harp seal (*Pagophilus groenlandica)*. Two of the harbors seals were 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 have decreased the unwarranted captures of otherwise healthy seals which have hauled-out to rest on Virginia shorelines, piers, jetties and rock islands.

SEA TURTLES

During 2017, there were significant numbers of sea turtle strandings (283) 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 268 sea turtle strandings during the year and an additional 15 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 56 strandings (20%), followed by May, November, September and August with 52 (18%), 33 (12%), 30 (11%) and 28 (10%) strandings, respectively. There were also significant numbers of strandings in the months of July, October and December, as well. This was a more normal year for strandings with very strong spring and early summer peaks, though the July through December stranding levels remained consistently high (Figure 11). Loggerheads (*Caretta caretta*, n = 163) were the primary species recorded, followed by Kemp's ridleys (*Lepidochelys kempii*, n = 84), greens (*Chelonia mydas*, n = 13), leatherbacks (*Dermochelys coriacea*, n = 11) and 12 sea turtles that were unidentified to species (Figure 12). 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 22% (61) of the sea turtle strandings were found. Accomack County accounted for 11% (7) and Northampton County for 89% (54) of the eastern shore total. Strandings in Virginia Beach, Norfolk and other southside cities contributed to 50% (142) of the total. The remainder 28% (80) 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 (212), there were strandings related to entanglements (68, 32%), watercraft injuries (63, 30%), cold-stunning (40, 19%), disease (2, 1%), other causes (4, 2%), and turtles with no apparent injuries (35, 16%).

Improved efforts by VAQS to recruit and train cooperators have greatly enhanced stranding response on the eastern shore. Externally, a number of dead stranded turtles appeared to have been hit by vessels. In some cases, the carcasses were fresh enough to conduct thorough necropsies. Necropsies on 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 could 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 2017 are included in Appendix III.

Live strandings

2017 was another record-breaking year for the VAQS Team with 92 live sea turtle strandings recorded from Virginia – 37 loggerheads, 34 Kemp's ridleys, four greens, six leatherbacks and 11 unidentified to species (Table 4). Thirty-two of these turtles were successfully recovered, rehabilitated and released, and 27 were disentangled and/or released from commercial and recreational fishing gear. In addition, 12 sea turtles were released that had stranded in 2016 and completed rehabilitation in 2017. Many of these turtles were recovered through the successful Virginia Pier Partner Program. Of special note, five leatherbacks were disentangled from pound net leaders in the mouth of Chesapeake Bay. Throughout the year, the VAQS Team spent many hours medicating 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 20 sea turtles in rehabilitation at the VAQS Stranding Center.

VAQS Activities During 2017

VAQS conducted trainings on biology, ecology and stranding response protocols for sea turtles and marine mammals during the 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. In addition, lectures were presented on the topics of marine mammal and sea turtle necropsies, sea turtle rehabilitation, findings from sea turtle and marine mammal research, large whale status in ocean waters off Virginia, and federal efforts to manage and protect marine mammals. VAQS staff attended numerous conferences and workshops and shared knowledge of sea turtle and marine mammal strandings and their ecology and life history in Virginia. Educational programs were presented at many local and regional 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 new 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 standing center. The new exhibit experience has already reached more than 1.2 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, 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 365 days for the entire year. 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 17,900 hours during 2017.

VAQS continued several research projects that have been ongoing for many years. Staff participated in photo-identification and stock-ID research on bottlenose dolphins and humpback whales. Photo-ID catalogs contain records of numerous 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. Results of matching efforts between the mid-Atlantic catalog and others from the western North Atlantic continues to result in new data about the 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 continues to conduct advanced necropsies on fresh-dead sea turtles and marine mammals to investigate causes of mortalities and to determine baseline health information for regional populations. Sea turtle and marine mammal diet studies continued in 2017 as part of grant funded projects. Sea turtle and marine mammal population assessment studies were also conducted in Virginia waters, including both aerial surveys and satellite and acoustic tracking of individual sea turtles. Finally, nutritional and growth studies continued with sea turtles in the Virginia Aquarium's long-term and short-term collections.

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. For this reason, VAQS staff serves 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.

Sea turtle strandings remained significantly high in 2017, continuing a trend seen since 2012. Monitoring Virginia sea turtle strandings in 2018 should continue to provide valuable information to help understand the causes of sea turtle mortalities and if the increasing numbers represent a significant 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.

Data collected from strandings provides 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.

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 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 plans are in the construction bidding phase for a new 18,000 sq. ft. marine animal conservation center. This project has been formally initiated with the construction phase scheduled to begin in 2018 and completion expected in 2020.

Marine mammal and sea turtle strandings in Virginia were once again at high levels during 2017. 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 2018.

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Tables

Table 1: Marine mammal strandings in Virginia during 2017, n = 94.
(Data from VAQS marine mammal stranding database)
[Length = cm; * indicates estimated length; ND = no data; U = unknown]

Field Number	Date	Species	Location	Latitude	Longitude	Condition	Sex	Length
VAQS20171001	1/5/2017	humpback whale	Virginia Beach	36.85950	-75.84243	live	U	ND
VAQS20171002	1/10/2017	bottlenose dolphin	Norfolk	36.84196	-76.28689	dead	F	164
VAQS20171003	1/13/2017	bottlenose dolphin	Northampton	37.12003	-75.96972	dead	F	261.5
VAQS20171004	1/24/2017	humpback whale	Northampton	37.29159	-76.01563	dead	M	798*
VAQS20171005	2/2/2017	humpback whale	Hampton	36.99910	-76.31800	dead	M	996.7*
VAQS20171006	2/5/2017	humpback whale	Northampton	37.11298	-76.07425	dead	M	1080
VAQS20171007	2/11/2017	humpback whale	Virginia Beach	36.94932	-76.03004	dead	M	937
VAQS20171008	2/25/2017	humpback whale	Accomack	37.85732	-75.37157	dead	U	1010*
VAQS20171009	2/27/2017	bottlenose dolphin	Hampton	37.09488	-76.27506	dead	F	232
VAQS20171010	3/4/2017	bottlenose dolphin	Northumber-land	37.71772	-76.31834	dead	F	254
VAQS20171011	3/9/2017	harp seal	Northampton	37.11013	-75.95591	dead	F	158
VAQS20171012	3/12/2017	harbor seal	Accomack	37.86625	-75.36259	dead	F	89.6*
VAQS20171016	3/13/2017	harbor seal	Virginia Beach	36.87701	-76.06100	live	U	ND
VAQS20171013	3/14/2017	bottlenose dolphin	Virginia Beach	36.82914	-75.96914	dead	F	210*
VAQS20171014	3/15/2017	harbor porpoise	Virginia Beach	36.91511	-76.06596	dead	U	110*
VAQS20171015	3/15/2017	harbor seal	Virginia Beach	36.84295	-75.97141	live	M	142*
VAQS20171017	3/24/2017	minke whale	Mathews	37.31912	-76.28698	live	F	699
VAQS20171018	3/26/2017	harbor porpoise	Accomack	37.89025	-75.34165	dead	F	123.8
VAQS20171019	3/29/2017	bottlenose dolphin	Accomack	37.93532	-75.71730	dead	M	224
VAQS20171020	4/5/2017	bottlenose dolphin	Accomack	37.71585	-75.85773	dead	M	235
VAQS20171021	4/6/2017	harbor porpoise	Virginia Beach	36.90582	-75.98836	dead	M	117
VAQS20171022	4/11/2017	bottlenose dolphin	Accomack	37.73662	-75.56261	dead	M	234
VAQS20171023	4/11/2017	harbor porpoise	Accomack	37.73862	-75.56107	dead	U	117
VAQS20171024	4/11/2017	bottlenose dolphin	Virginia Beach	36.99583	-76.16683	dead	F	262
VAQS20171025	4/15/2017	bottlenose dolphin	Mathews	37.51469	-76.28931	dead	F	229
VAQS20171026	4/17/2017	harbor seal	Accomack	37.62034	-75.61183	dead	M	109
VAQS20171027	4/21/2017	bottlenose dolphin	Northampton	37.10520	-75.97702	dead	M	ND
VAQS20171028	4/21/2017	bottlenose dolphin	Northampton	37.29063	-76.01508	dead	F	263
VAQS20171029	4/26/2017	harbor porpoise	Newport News	36.98526	-76.44099	dead	F	105.5
VAQS20171030	4/26/2017	bottlenose dolphin	Accomack	37.79018	-75.52667	dead	M	217
VAQS20171031	4/26/2017	bottlenose dolphin	Accomack	37.79018	-75.52667	dead	U	212*
VAQS20171032	4/27/2017	bottlenose dolphin	Northampton	37.08530	-75.94877	dead	M	ND
VAQS20171033	4/28/2017	bottlenose dolphin	Northampton	37.16433	-75.98322	dead	M	226*
VAQS20171037	4/29/2017	bottlenose dolphin	Northumber-land	37.86558	-76.18386	dead	M	213*
VAQS20171034	4/30/2017	bottlenose dolphin	Poquoson	37.13800	-76.30538	live	U	ND
VAQS20171035	5/3/2017	bottlenose dolphin	Virginia Beach	36.73042	-75.93680	dead	U	ND
VAQS20171036	5/4/2017	bottlenose dolphin	Northampton	37.25759	-76.02346	dead	F	167*
VAQS20171038	5/6/2017	bottlenose dolphin	Northampton	37.16123	-75.97970	dead	U	150*
VAQS20171040	5/6/2017	bottlenose dolphin	Northampton	37.26682	-76.02597	dead	M	263.5
VAQS20171039	5/7/2017	bottlenose dolphin	Northampton	37.42594	-75.98179	dead	M	115

Field Number	Date	Species	Location	Latitude	Longitude	Condition	Sex	Length
VAQS20171041	5/9/2017	bottlenose dolphin	Virginia Beach	36.57605	-75.87302	dead	F	192
VAQS20171043	5/10/2017	bottlenose dolphin	Mathews	37.56017	-76.29888	dead	F	234
VAQS20171042	5/12/2017	common dolphin	Virginia Beach	36.72628	-75.93542	live	F	207.8
VAQS20171044	5/14/2017	minke whale	Hampton	37.10288	-76.28656	dead	F	695*
VAQS20171045	5/15/2017	bottlenose dolphin	Mathews	37.55217	-76.30227	dead	F	218*
VAQS20171047	5/16/2017	bottlenose dolphin	Northampton	37.17386	-75.98863	dead	U	ND
VAQS20171046	5/17/2017	bottlenose dolphin	Virginia Beach	36.87538	-75.88273	dead	F	220*
VAQS20171048	5/17/2017	bottlenose dolphin	Virginia Beach	36.93333	-75.90500	dead	U	ND
VAQS20171049	5/17/2017	humpback whale	Virginia Beach	36.87242	-75.43495	dead	U	ND
VAQS20171050	5/21/2017	bottlenose dolphin	Hampton	37.09900	-76.27830	dead	U	ND
VAQS20171051	5/21/2017	bottlenose dolphin	Accomack	37.12591	-75.88849	dead	U	ND
VAQS20171052	5/21/2017	bottlenose dolphin	Accomack	37.12038	-75.89477	dead	U	ND
VAQS20171053	5/24/2017	pygmy sperm whale	Virginia Beach	36.91157	-76.08449	dead	M	133
VAQS20171054	5/27/2017	bottlenose dolphin	Newport News	36.98390	-76.47030	dead	M	237
VAQS20171055	5/28/2017	bottlenose dolphin	Middlesex	37.53578	-76.32894	dead	U	ND
VAQS20171056	6/10/2017	bottlenose dolphin	Northumber-land	37.83588	-76.23703	live	U	ND
VAQS20171057	6/12/2017	bottlenose dolphin	Northampton	37.38347	-75.98514	dead	M	272.2
VAQS20171058	6/14/2017	bottlenose dolphin	Northampton	37.35115	-75.99742	dead	U	ND
VAQS20171059	6/15/2017	bottlenose dolphin	Northumber-land	37.94231	-76.33287	dead	U	173.2
VAQS20171060	6/22/2017	bottlenose dolphin	Virginia Beach	36.84126	-75.96874	live	U	ND
VAQS20171062	6/25/2017	unidentified small cetacean	Northampton	37.18904	-75.99940	dead	U	ND
VAQS20171061	6/27/2017	Sowerby's beaked whale	Virginia Beach	36.93842	-74.53180	dead	U	ND
VAQS20171064	6/28/2017	bottlenose dolphin	Northumber-land	37.94638	-76.39121	dead	U	ND
VAQS20171063	6/29/2017	bottlenose dolphin	Virginia Beach	36.65118	-75.90053	dead	U	222.2*
VAQS20171066	7/1/2017	bottlenose dolphin	Mathews	37.45418	-76.44121	live	M	262.5
VAQS20171065	7/2/2017	bottlenose dolphin	Virginia Beach	36.91778	-76.05822	dead	F	205.3
VAQS20171067	7/5/2017	bottlenose dolphin	Northampton	37.09145	-75.97991	dead	U	ND
VAQS20171068	7/10/2017	bottlenose dolphin	Middlesex	37.57171	-76.34197	dead	U	ND
VAQS20171069	7/11/2017	bottlenose dolphin	Middlesex	37.58167	-76.28167	dead	U	ND
VAQS20171070	7/17/2017	bottlenose dolphin	Northampton	37.19784	-76.00875	dead	M	220*
VAQS20171071	8/2/2017	bottlenose dolphin	Northampton	37.11134	-75.95653	dead	M	241
VAQS20171074	8/3/2017	bottlenose dolphin	Chesapeake	36.72015	-76.10539	live	U	ND
VAQS20171072	8/6/2017	bottlenose dolphin	Accomack	37.90007	-75.37672	dead	M	ND
VAQS20171073	8/16/2017	bottlenose dolphin	Virginia Beach	36.91836	-76.05683	dead	F	175
VAQS20171075	8/26/2017	bottlenose dolphin	Middlesex	37.52660	-76.33040	dead	U	ND
VAQS20171076	8/28/2017	bottlenose dolphin	Norfolk	36.93363	-76.20287	dead	M	175
VAQS20171077	9/17/2017	bottlenose dolphin	Norfolk	36.93512	-76.20790	dead	F	98.8
VAQS20171078	9/18/2017	bottlenose dolphin	Accomack	37.93649	-75.31145	dead	F	253
VAQS20171079	9/19/2017	bottlenose dolphin	York	37.21402	-76.47065	dead	F	196.8
VAQS20171080	10/2/2017	bottlenose dolphin	Virginia Beach	36.90821	-76.09406	dead	U	ND
VAQS20171081	10/6/2017	pygmy sperm whale	Northampton	37.22156	-75.80419	dead	U	314*
VAQS20171082	10/6/2017	pygmy/dwarf sperm whale	Northampton	37.22949	-75.79980	dead	U	223*

Field Number	Date	Species	Location	Latitude	Longitude	Condition	Sex	Length
VAQS20171083	10/23/2017	bottlenose dolphin	Suffolk	36.92973	-76.41672	live	U	ND
VAQS20171084	11/4/2017	bottlenose dolphin	Northampton	37.08520	-75.94560	dead	U	ND
VAQS20171085	11/6/2017	bottlenose dolphin	Mathews	37.36730	-76.29121	dead	M	ND
VAQS20171086	11/9/2017	bottlenose dolphin	Virginia Beach	36.63335	-75.89226	dead	U	221*
VAQS20171087	11/10/2017	bottlenose dolphin	Norfolk	36.94072	-76.22638	dead	M	213
VAQS20171088	11/11/2017	bottlenose dolphin	Virginia Beach	36.92922	-76.17269	dead	M	157*
VAQS20171089	11/14/2017	bottlenose dolphin	Virginia Beach	36.81656	-75.96639	dead	U	ND
VAQS20171090	11/26/2017	humpback whale	Virginia Beach	36.91309	-76.08033	dead	F	880
VAQS20171091	11/28/2017	bottlenose dolphin	Accomack	37.98388	-75.27694	dead	M	261.1
VAQS20171092	12/2/2017	bottlenose dolphin	Virginia Beach	36.57276	-75.87250	dead	U	214*
VAQS20171093	12/12/2017	fin whale	Newport News	36.97065	-76.40559	live	F	1330
VAQS20171094	12/17/2017	bottlenose dolphin	Northampton	37.38292	-75.98531	dead	F	217

Table 2: Live stranded marine mammals recorded by VAQS in Virginia in 2017, n = 12.

Field Number	Species	Strand Date	State	Final Disposition
VAQS20171001	humpback whale	1/5/2017	VA	Unknown (never entangled or disentangled itself)
VAQS20171016	harbor seal	3/13/2017	VA	Injured. Inaccessible to capture
VAQS20171015	harbor seal	3/15/2017	VA	Admitted to rehab, transferred to NA, MMSC, died at MMSC
VAQS20171017	minke whale	3/24/2017	VA	Euthanized at site
VAQS20171034	bottlenose dolphin	4/30/2017	VA	Unable to disentangle
VAQS20171042	common dolphin	5/12/2017	VA	Euthanized at site
VAQS20171056	bottlenose dolphin	6/10/2017	VA	Partially disentangled
VAQS20171060	bottlenose dolphin	6/22/2017	VA	Unsuccessful disentanglement
VAQS20171066	bottlenose dolphin	7/1/2017	VA	Originally reported live, found dead 7/3
VAQS20171074	bottlenose dolphin	8/3/2017	VA	Unknown
VAQS20171083	bottlenose dolphin	10/23/2017	VA	Completely disentangled
VAQS20171093	fin whale	12/12/2017	VA	Died at site

Key to other organizations listed:
NA = National Aquarium, Baltimore, MD
MMSC = Marine Mammal Stranding Center, Brigantine, NJ

Table 3: Sea turtle strandings in Virginia during 2017, n = 283.
(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	Location	Latitude	Longitude	Condi-tion	Sex	Length
VAQS20172001	1/3/2017	green	Accomack	37.8752	-75.3547	dead	U	28.9
VAQS20172002	1/3/2017	green	Northampton	37.1544	-75.9763	dead	U	29.2
VAQS20172003	1/4/2017	green	Northampton	37.1544	-75.9763	dead	U	32.9
VAQS20172004	1/14/2017	Kemp's ridley	Virginia Beach	36.8316	-76.2186	dead	U	43.4
VAQS20172005	1/21/2017	loggerhead	Northampton	37.2379	-76.0152	dead	U	ND
VAQS20172006	1/24/2017	loggerhead	Northampton	37.4243	-75.9823	dead	F	71.8
VAQS20172007	1/25/2017	loggerhead	Northampton	37.4119	-75.9821	dead	F	66.8
VAQS20172008	1/28/2017	loggerhead	Northampton	37.5211	-75.9494	dead	F	72.5
VAQS20172009	2/13/2017	loggerhead	Northampton	37.2772	-76.0157	dead	F	76.3
VAQS20172010	2/23/2017	loggerhead	Portsmouth	36.8482	-76.3051	dead	F	65*
VAQS20172011	2/28/2017	loggerhead	Northumberland	37.9966	-76.4720	dead	U	72.1
VAQS20172012	3/7/2017	loggerhead	Northampton	37.4249	-75.9821	dead	F	ND
VAQS20172013	4/25/2017	loggerhead	Norfolk	36.9594	-76.2582	dead	M	63.7
VAQS20172018	4/26/2017	unidentified	Virginia Beach	36.8438	-75.9697	alive	U	ND
VAQS20172014	4/28/2017	Kemp's ridley	Hampton	37.0360	-76.2895	alive	U	43.3
VAQS20172015	4/28/2017	Kemp's ridley	Hampton	37.0359	-76.2896	alive	U	38.3
VAQS20172016	4/29/2017	loggerhead	Virginia Beach	36.9676	-76.1146	alive	U	ND
VAQS20172017	4/30/2017	Kemp's ridley	Hampton	37.0360	-76.2895	alive	U	43
VAQS20172019	5/1/2017	loggerhead	Mathews	37.4360	-76.2525	dead	F	70
VAQS20172021	5/2/2017	Kemp's ridley	Hampton	37.0359	-76.2896	alive	U	44.1
VAQS20172020	5/2/2017	loggerhead	Hampton	37.0157	-76.3172	dead	F	54
VAQS20172022	5/2/2017	Kemp's ridley	Newport News	37.0146	-76.4553	dead	F	35.6
VAQS20172023	5/5/2017	loggerhead	Hampton	37.0504	-76.2856	dead	F	102*
VAQS20172024	5/5/2017	Kemp's ridley	Hampton	37.0054	-76.3021	dead	M	42.8
VAQS20172026	5/7/2017	Kemp's ridley	Virginia Beach	36.8436	-75.9710	alive	U	29.1
VAQS20172025	5/7/2017	loggerhead	Hampton	37.0383	-76.2910	dead	U	ND
VAQS20172027	5/8/2017	loggerhead	Accomack	37.8666	-75.3648	dead	U	55.9
VAQS20172029	5/9/2017	Kemp's ridley	Hampton	37.0363	-76.2906	alive	U	42.3
VAQS20172028	5/9/2017	loggerhead	Virginia Beach	36.7582	-75.9475	dead	M	64*
VAQS20172030	5/10/2017	Kemp's ridley	Hampton	37.0359	-76.2896	alive	U	39.3
VAQS20172031	5/10/2017	unidentified	Hampton	37.0359	-76.2896	alive	U	ND
VAQS20172032	5/11/2017	loggerhead	Northampton	37.1660	-75.9876	dead	F	79*
VAQS20172033	5/12/2017	loggerhead	Hampton	37.0544	-76.2841	dead	U	63.9
VAQS20172035	5/13/2017	loggerhead	Mathews	37.3237	-76.2723	alive	F	61.3
VAQS20172034	5/13/2017	loggerhead	Virginia Beach	36.7554	-75.9466	dead	M	86*
VAQS20172036	5/14/2017	Kemp's ridley	Hampton	37.0359	-76.2895	alive	U	40.8
VAQS20172037	5/14/2017	Kemp's ridley	Virginia Beach	36.9184	-75.9936	dead	U	ND

Field Number	Date	Species	Location	Latitude	Longitude	Condi-tion	Sex	Length
VAQS20172038	5/14/2017	loggerhead	Norfolk	36.9352	-76.1854	dead	U	75.6
VAQS20172040	5/15/2017	Kemp's ridley	Hampton	37.0360	-76.2896	alive	U	45.7
VAQS20172039	5/15/2017	loggerhead	Accomack	37.8732	-75.3573	dead	U	62
VAQS20172042	5/16/2017	Kemp's ridley	Virginia Beach	36.8109	-75.8510	alive	U	47.1
VAQS20172043	5/17/2017	Kemp's ridley	Hampton	37.0359	-76.2896	alive	U	30
VAQS20172041	5/17/2017	loggerhead	Northampton	37.3628	-75.9908	dead	F	61*
VAQS20172044	5/18/2017	Kemp's ridley	Suffolk	36.8814	-76.4888	alive	U	42
VAQS20172045	5/20/2017	Kemp's ridley	Hampton	37.0359	-76.2895	alive	U	41.2
VAQS20172046	5/20/2017	loggerhead	Lancaster	37.6156	-76.3685	dead	U	64*
VAQS20172049	5/21/2017	unidentified	Hampton	37.0363	-76.2902	alive	U	ND
VAQS20172050	5/21/2017	Kemp's ridley	Hampton	37.0364	-76.2907	alive	U	26
VAQS20172047	5/21/2017	loggerhead	Northampton	37.2042	-76.0124	dead	U	ND
VAQS20172048	5/21/2017	Kemp's ridley	Norfolk	36.9318	-76.1921	dead	F	55.9
VAQS20172051	5/22/2017	Kemp's ridley	Virginia Beach	36.8621	-75.9774	dead	F	34.3
VAQS20172052	5/22/2017	loggerhead	Gloucester	37.2549	-76.4440	dead	M	82.6
VAQS20172053	5/22/2017	Kemp's ridley	Hampton	37.0546	-76.2840	dead	F	29.8
VAQS20172054	5/22/2017	Kemp's ridley	Hampton	37.0595	-76.2823	dead	F	33.6
VAQS20172055	5/23/2017	loggerhead	Isle of Wight	36.9977	-76.5725	dead	U	ND
VAQS20172056	5/23/2017	loggerhead	Virginia Beach	36.7273	-75.9360	dead	M	64*
VAQS20172057	5/23/2017	loggerhead	Hampton	37.0357	-76.2927	dead	M	100*
VAQS20172058	5/24/2017	loggerhead	Virginia Beach	36.8724	-75.9800	dead	M	76.2
VAQS20172059	5/25/2017	Kemp's ridley	Hampton	37.0023	-76.3038	dead	F	43*
VAQS20172060	5/26/2017	Kemp's ridley	Hampton	37.0825	-76.2743	dead	F	37.3
VAQS20172069	5/27/2017	Kemp's ridley	York	37.1700	-76.4092	dead	U	45*
VAQS20172061	5/28/2017	Kemp's ridley	Norfolk	36.9341	-76.2043	alive	U	32.2
VAQS20172062	5/28/2017	loggerhead	Newport News	36.9824	-76.3956	dead	M	59.4
VAQS20172063	5/28/2017	loggerhead	Middlesex	37.5636	-76.3084	dead	U	70*
VAQS20172064	5/29/2017	loggerhead	Norfolk	36.9639	-76.2575	alive	U	ND
VAQS20172065	5/29/2017	Kemp's ridley	Norfolk	36.9631	-76.2582	alive	U	29.4
VAQS20172066	5/30/2017	leatherback	Virginia Beach	36.7625	-75.9495	dead	U	150*
VAQS20172067	5/30/2017	Kemp's ridley	Virginia Beach	36.7639	-75.9500	dead	M	39.6
VAQS20172068	5/30/2017	loggerhead	Virginia Beach	36.6161	-75.8847	dead	U	ND
VAQS20172070	5/31/2017	Kemp's ridley	Northampton	37.1692	-75.9878	dead	M	27.2
VAQS20172071	6/1/2017	loggerhead	Northampton	37.4573	-75.9684	dead	M	61.1
VAQS20172072	6/1/2017	loggerhead	York	37.2010	-76.3967	dead	U	ND
VAQS20172073	6/2/2017	leatherback	Northampton	36.9222	-76.0543	alive	U	ND
VAQS20172076	6/3/2017	unidentified	Northampton	37.1297	-75.9762	alive	U	ND
VAQS20172074	6/3/2017	loggerhead	Virginia Beach	36.6631	-75.9068	dead	F	56*
VAQS20172075	6/3/2017	Kemp's ridley	Hampton	37.0617	-76.2818	dead	U	38.8
VAQS20172077	6/6/2017	Kemp's ridley	Virginia Beach	36.9281	-76.0504	dead	M	27*
VAQS20172078	6/6/2017	Kemp's ridley	Norfolk	36.9584	-76.3266	dead	F	41.8

Field Number	Date	Species	Location	Latitude	Longitude	Condi-tion	Sex	Length
VAQS20172079	6/6/2017	Kemp's ridley	Virginia Beach	36.8465	-75.9727	dead	M	61*
VAQS20172080	6/7/2017	Kemp's ridley	Hampton	37.0006	-76.3072	alive	U	27.9
VAQS20172081	6/7/2017	loggerhead	Hampton	37.0365	-76.2913	alive	U	ND
VAQS20172082	6/8/2017	leatherback	Virginia Beach	36.8437	-75.9720	dead	M	139*
VAQS20172083	6/8/2017	loggerhead	Virginia Beach	36.6298	-75.8906	dead	U	86.6*
VAQS20172084	6/9/2017	Kemp's ridley	Virginia Beach	36.8436	-75.9712	alive	U	24.5
VAQS20172085	6/9/2017	leatherback	Virginia Beach	36.9183	-76.0633	alive	U	130*
VAQS20172086	6/9/2017	Kemp's ridley	Mathews	37.5041	-76.3508	dead	F	43.6
VAQS20172087	6/10/2017	green	Virginia Beach	36.8447	-75.9721	dead	M	29.6
VAQS20172088	6/10/2017	loggerhead	Northumberland	37.8133	-76.2728	dead	U	ND
VAQS20172085	6/11/2017	leatherback	Gloucester	37.4124	-76.4220	alive	U	130*
VAQS20172089	6/11/2017	leatherback	Northampton	37.1442	-75.9813	dead	M	140.4
VAQS20172090	6/12/2017	loggerhead	Virginia Beach	36.9671	-76.1138	alive	U	66.5
VAQS20172099	6/12/2017	Kemp's ridley	Northampton	37.2131	-75.8172	dead	U	50*
VAQS20172097	6/13/2017	loggerhead	Northampton	37.3304	-76.0128	dead	U	85.2
VAQS20172108	6/13/2017	loggerhead	Northampton	37.1873	-75.9974	dead	U	ND
VAQS20172091	6/14/2017	leatherback	Northampton	37.1581	-75.9857	alive	U	120*
VAQS20172098	6/14/2017	leatherback	Virginia Beach	36.9221	-76.0543	alive	U	ND
VAQS20172092	6/14/2017	loggerhead	Virginia Beach	36.9177	-76.0580	dead	U	80.6
VAQS20172093	6/14/2017	Kemp's ridley	Northampton	37.0839	-75.9678	dead	U	44.3
VAQS20172094	6/14/2017	leatherback	Virginia Beach	36.8186	-75.9668	dead	U	ND
VAQS20172095	6/15/2017	green	Virginia Beach	36.7621	-75.9495	dead	U	31*
VAQS20172096	6/15/2017	loggerhead	Virginia Beach	36.7283	-75.9359	dead	U	ND
VAQS20172100	6/15/2017	loggerhead	Virginia Beach	36.7136	-75.9305	dead	U	ND
VAQS20172101	6/15/2017	loggerhead	Hampton	37.0436	-76.2883	dead	F	60.5
VAQS20172102	6/15/2017	Kemp's ridley	Virginia Beach	36.6440	-75.8966	dead	U	ND
VAQS20172103	6/16/2017	loggerhead	Hampton	37.0527	-76.2849	dead	U	ND
VAQS20172104	6/16/2017	loggerhead	Lancaster	37.6522	-76.3382	dead	U	ND
VAQS20172105	6/17/2017	loggerhead	Northumberland	37.8501	-76.2501	dead	U	63.8
VAQS20172106	6/17/2017	Kemp's ridley	Virginia Beach	36.9092	-75.9901	dead	U	27.8
VAQS20172107	6/18/2017	loggerhead	Northampton	37.2549	-76.0242	dead	U	87*
VAQS20172109	6/19/2017	loggerhead	Accomack	37.8615	-75.4526	dead	U	ND
VAQS20172110	6/20/2017	loggerhead	Northampton	37.0865	-75.9436	dead	U	75*
VAQS20172111	6/20/2017	loggerhead	Northampton	37.0832	-75.9643	dead	U	ND
VAQS20172112	6/20/2017	loggerhead	Northampton	37.1596	-75.9788	dead	M	56.9
VAQS20162167	6/22/2017	loggerhead	Hampton	37.0360	-76.2895	alive	U	55.6
VAQS20172117	6/22/2017	loggerhead	Northampton	37.2943	-75.7848	dead	U	104.1
VAQS20172114	6/25/2017	Kemp's ridley	Gloucester	37.2460	-76.5030	alive	U	23.6
VAQS20172116	6/25/2017	Kemp's ridley	Mathews	37.4033	-76.3463	alive	U	25.9
VAQS20172113	6/25/2017	leatherback	Gloucester	37.2996	-76.3523	dead	U	ND
VAQS20172115	6/25/2017	green	Virginia Beach	36.9164	-76.0616	dead	M	28.5

Field Number	Date	Species	Location	Latitude	Longitude	Condi-tion	Sex	Length
VAQS20172119	6/26/2017	Kemp's ridley	Hampton	37.0138	-76.3333	alive	U	28.9
VAQS20172118	6/26/2017	Kemp's ridley	Virginia Beach	36.5924	-75.8770	dead	U	26.2
VAQS20172120	6/27/2017	loggerhead	Norfolk	36.9640	-76.2575	alive	U	59.7
VAQS20172122	6/28/2017	leatherback	Virginia Beach	36.9265	-76.0494	alive	U	ND
VAQS20172121	6/28/2017	Kemp's ridley	Norfolk	36.9628	-76.2637	dead	F	43*
VAQS20172123	6/28/2017	loggerhead	Northumberland	37.8195	-76.2642	dead	U	ND
VAQS20172136	6/29/2017	Kemp's ridley	Portsmouth	36.8406	-76.3029	dead	U	ND
VAQS20172124	7/2/2017	loggerhead	Virginia Beach	36.9130	-76.1105	dead	U	67*
VAQS20172125	7/4/2017	loggerhead	Virginia Beach	36.9669	-76.1138	alive	U	ND
VAQS20172126	7/6/2017	Kemp's ridley	York	37.2354	-76.5037	alive	U	ND
VAQS20172127	7/9/2017	Kemp's ridley	Virginia Beach	36.5874	-75.8748	dead	U	21.3
VAQS20172128	7/9/2017	loggerhead	Northampton	37.1453	-75.9852	dead	M	ND
VAQS20172129	7/9/2017	loggerhead	Mathews	37.3012	-76.2779	dead	U	ND
VAQS20172131	7/15/2017	loggerhead	Accomack	37.6988	-75.5771	dead	U	ND
VAQS20172133	7/16/2017	loggerhead	Virginia Beach	36.9669	-76.1138	alive	U	ND
VAQS20172132	7/16/2017	loggerhead	Virginia Beach	36.8880	-76.0767	dead	M	104*
VAQS20172134	7/16/2017	loggerhead	York	37.2383	-76.5070	dead	U	ND
VAQS20172135	7/17/2017	loggerhead	Northampton	37.0009	-75.9492	dead	U	ND
VAQS20172130	7/19/2017	loggerhead	Virginia Beach	36.8455	-75.9726	dead	M	64*
VAQS20172143	7/20/2017	unidentified	Virginia Beach	36.6943	-75.9222	alive	U	ND
VAQS20172137	7/20/2017	loggerhead	Poquoson	37.1435	-76.1493	dead	U	ND
VAQS20172138	7/21/2017	loggerhead	Virginia Beach	36.5558	-75.8689	alive	F	85.5
VAQS20172139	7/23/2017	loggerhead	Northampton	37.2978	-76.0170	dead	U	ND
VAQS20172140	7/23/2017	loggerhead	Northampton	37.3297	-76.0142	dead	U	ND
VAQS20172141	7/23/2017	loggerhead	Hampton	37.0512	-76.1873	dead	U	ND
VAQS20172142	7/26/2017	loggerhead	Norfolk	36.9411	-76.2269	dead	M	61*
VAQS20172145	7/30/2017	Kemp's ridley	Norfolk	36.9608	-76.2606	alive	U	29.7
VAQS20172144	7/30/2017	Kemp's ridley	Norfolk	36.9494	-76.2419	dead	M	46*
VAQS20172146	7/31/2017	loggerhead	Norfolk	36.9687	-76.2806	dead	F	69.9
VAQS20172147	8/1/2017	loggerhead	Virginia Beach	36.6489	-75.8996	dead	U	66*
VAQS20172148	8/2/2017	loggerhead	Northampton	37.0926	-75.9373	dead	U	ND
VAQS20172149	8/2/2017	green	Virginia Beach	36.9116	-76.0854	dead	U	30*
VAQS20172150	8/3/2017	loggerhead	Virginia Beach	37.0260	-76.0979	alive	U	41.1
VAQS20172151	8/3/2017	loggerhead	Norfolk	36.9276	-76.2077	dead	U	70*
VAQS20172152	8/5/2017	unidentified	Norfolk	36.9638	-76.2576	alive	U	ND
VAQS20172153	8/5/2017	unidentified	Norfolk	36.9639	-76.2575	alive	M	ND
VAQS20172154	8/5/2017	loggerhead	Virginia Beach	36.6634	-75.9069	dead	F	66*
VAQS20172155	8/5/2017	loggerhead	Northampton	37.2536	-76.0239	dead	U	ND
VAQS20172156	8/5/2017	loggerhead	Norfolk	36.9301	-76.1824	dead	U	63.4
VAQS20172157	8/6/2017	loggerhead	Virginia Beach	36.6425	-75.8963	dead	F	95.3
VAQS20172161	8/6/2017	loggerhead	Northampton	37.2555	-76.0245	dead	U	ND

Field Number	Date	Species	Location	Latitude	Longitude	Condi-tion	Sex	Length
VAQS20172158	8/7/2017	loggerhead	Virginia Beach	36.6257	-75.8886	dead	M	94
VAQS20172159	8/7/2017	loggerhead	Mathews	37.5116	-76.2846	dead	U	ND
VAQS20172160	8/9/2017	loggerhead	Norfolk	36.9628	-76.2586	alive	U	59.1
VAQS20172163	8/14/2017	loggerhead	Virginia Beach	36.8939	-75.9862	alive	U	ND
VAQS20172164	8/14/2017	loggerhead	Virginia Beach	36.8939	-75.9862	alive	U	ND
VAQS20172165	8/14/2017	loggerhead	Virginia Beach	36.9040	-75.9884	alive	U	ND
VAQS20172162	8/14/2017	loggerhead	Virginia Beach	36.8400	-75.9708	dead	U	ND
VAQS20172166	8/16/2017	loggerhead	Virginia Beach	36.9137	-76.0779	alive	U	ND
VAQS20172167	8/17/2017	loggerhead	Virginia Beach	36.8948	-75.9858	alive	U	4.5
VAQS20172168	8/22/2017	Kemp's ridley	Hampton	37.0365	-76.2911	alive	U	20.9
VAQS20172170	8/24/2017	loggerhead	Virginia Beach	36.8301	-75.9694	alive	U	ND
VAQS20172169	8/24/2017	loggerhead	Virginia Beach	36.7749	-75.9542	dead	U	73*
VAQS20172171	8/25/2017	loggerhead	Northumberland	37.9477	-76.3479	dead	U	ND
VAQS20172173	8/25/2017	loggerhead	Northampton	37.3950	-75.7018	dead	U	ND
VAQS20172172	8/27/2017	loggerhead	Norfolk	36.9639	-76.2574	alive	U	50.5
VAQS20172174	8/30/2017	loggerhead	Northampton	37.2669	-76.0245	dead	M	101.1
VAQS20172175	9/2/2017	loggerhead	Virginia Beach	36.8930	-75.9855	dead	M	96.7
VAQS20172176	9/3/2017	loggerhead	Virginia Beach	36.9190	-76.0556	dead	U	69*
VAQS20172177	9/4/2017	loggerhead	Norfolk	36.9639	-76.2574	alive	U	ND
VAQS20172178	9/5/2017	loggerhead	Accomack	37.8680	-75.3603	dead	U	30.5
VAQS20172184	9/8/2017	loggerhead	Northampton	37.3233	-76.0165	dead	U	ND
VAQS20172179	9/9/2017	Kemp's ridley	Norfolk	36.9630	-76.2586	alive	U	28.5
VAQS20172180	9/9/2017	Kemp's ridley	Hampton	37.0360	-76.2894	alive	U	30.9
VAQS20172181	9/9/2017	Kemp's ridley	Hampton	37.0360	-76.2897	alive	U	25.4
VAQS20172182	9/11/2017	loggerhead	Virginia Beach	36.9267	-76.1594	dead	U	ND
VAQS20172185	9/11/2017	loggerhead	Virginia Beach	36.8924	-76.0973	dead	F	64*
VAQS20172183	9/12/2017	Kemp's ridley	Portsmouth	36.9019	-76.3453	dead	M	34.8
VAQS20172187	9/12/2017	loggerhead	Poquoson	37.1094	-76.3185	dead	U	ND
VAQS20172186	9/13/2017	loggerhead	Northampton	37.2667	-76.0236	dead	F	63.7
VAQS20172188	9/14/2017	loggerhead	Hampton	37.0442	-76.2881	dead	M	111.7
VAQS20172189	9/16/2017	loggerhead	Northumberland	37.9525	-76.3624	dead	U	ND
VAQS20172192	9/16/2017	Kemp's ridley	Virginia Beach	36.6174	-75.8857	dead	U	ND
VAQS20172190	9/17/2017	Kemp's ridley	Virginia Beach	36.7826	-75.9568	dead	U	ND
VAQS20172191	9/17/2017	Kemp's ridley	Hampton	37.0836	-76.2737	dead	U	ND
VAQS20172193	9/18/2017	loggerhead	Virginia Beach	36.7808	-75.9564	dead	F	75
VAQS20172196	9/18/2017	loggerhead	Northumberland	37.9660	-76.4152	dead	U	ND
VAQS20172195	9/20/2017	loggerhead	Virginia Beach	36.9195	-76.1665	alive	U	76
VAQS20172194	9/20/2017	Kemp's ridley	Virginia Beach	36.9128	-76.1104	dead	F	30.2
VAQS20172197	9/21/2017	Kemp's ridley	Virginia Beach	36.8204	-75.9675	dead	F	34.8
VAQS20172198	9/21/2017	Kemp's ridley	Virginia Beach	36.9099	-76.0999	dead	M	31.2
VAQS20172200	9/23/2017	unidentified	Norfolk	36.9638	-76.2577	alive	U	ND

Field Number	Date	Species	Location	Latitude	Longitude	Condi-tion	Sex	Length
VAQS20172199	9/23/2017	Kemp's ridley	Norfolk	36.9361	-76.2117	dead	M	26*
VAQS20172202	9/24/2017	loggerhead	Norfolk	36.9639	-76.2574	alive	U	ND
VAQS20172201	9/24/2017	loggerhead	Hampton	37.0530	-76.2705	dead	U	ND
VAQS20172204	9/25/2017	loggerhead	Virginia Beach	36.7579	-75.9479	dead	F	85*
VAQS20172203	9/26/2017	loggerhead	Virginia Beach	36.8720	-75.9801	dead	F	61.6
VAQS20172205	10/1/2017	loggerhead	Lancaster	37.6281	-76.2866	dead	U	ND
VAQS20172206	10/7/2017	loggerhead	Northampton	37.2663	-76.0253	dead	U	ND
VAQS20172207	10/8/2017	loggerhead	Hampton	37.0545	-76.2837	dead	F	44.3
VAQS20172208	10/9/2017	loggerhead	Hampton	37.0132	-76.3310	dead	U	ND
VAQS20172209	10/11/2017	green	Hampton	37.0738	-76.2782	dead	U	28.4
VAQS20172210	10/12/2017	loggerhead	Virginia Beach	36.8212	-75.9676	dead	F	67
VAQS20172211	10/14/2017	unidentified	Virginia Beach	36.9164	-76.0783	alive	U	31.1
VAQS20172212	10/15/2017	unidentified	Norfolk	36.9618	-76.2597	alive	U	ND
VAQS20172213	10/15/2017	Kemp's ridley	Norfolk	36.9341	-76.2038	dead	U	ND
VAQS20172214	10/20/2017	loggerhead	Virginia Beach	36.9152	-76.0782	alive	U	ND
VAQS20172215	10/20/2017	loggerhead	Norfolk	36.9624	-76.2590	alive	U	ND
VAQS20172216	10/21/2017	Kemp's ridley	Newport News	37.0030	-76.4655	alive	U	28.1
VAQS20172217	10/21/2017	loggerhead	Northampton	37.2491	-76.0217	dead	U	97.8
VAQS20172218	10/22/2017	loggerhead	Virginia Beach	36.9167	-76.0782	alive	U	ND
VAQS20172219	10/22/2017	unidentified	Virginia Beach	36.9164	-76.0781	alive	U	ND
VAQS20172220	10/22/2017	loggerhead	Virginia Beach	36.8486	-75.9735	dead	F	63.5
VAQS20172221	10/23/2017	loggerhead	Norfolk	36.9361	-76.2108	dead	U	ND
VAQS20172222	10/24/2017	loggerhead	Newport News	36.9542	-76.4132	dead	M	ND
VAQS20172223	10/28/2017	Kemp's ridley	Norfolk	36.9623	-76.2591	alive	U	28.4
VAQS20172224	10/29/2017	Kemp's ridley	Virginia Beach	36.8531	-75.9747	dead	M	29.7
VAQS20172226	10/31/2017	Kemp's ridley	Northampton	37.1647	-75.9881	alive	U	ND
VAQS20172225	10/31/2017	Kemp's ridley	Hampton	37.0164	-76.2978	dead	U	42*
VAQS20172227	11/2/2017	Kemp's ridley	Northampton	37.3233	-76.0165	dead	U	ND
VAQS20172228	11/4/2017	Kemp's ridley	Norfolk	36.9640	-76.2574	alive	U	46.8
VAQS20172230	11/5/2017	Kemp's ridley	Hampton	37.0360	-76.2895	alive	U	28.4
VAQS20172229	11/5/2017	loggerhead	Norfolk	36.9681	-76.2797	dead	M	88*
VAQS20172231	11/7/2017	Kemp's ridley	Norfolk	36.9511	-76.2442	dead	U	ND
VAQS20172232	11/8/2017	Kemp's ridley	Hampton	37.0049	-76.3137	dead	U	ND
VAQS20172233	11/8/2017	loggerhead	Norfolk	36.9333	-76.2007	dead	U	ND
VAQS20172234	11/8/2017	Kemp's ridley	Norfolk	36.9323	-76.1970	dead	U	46*
VAQS20172236	11/11/2017	Kemp's ridley	Virginia Beach	36.7322	-75.9386	alive	U	44.7
VAQS20172237	11/11/2017	loggerhead	Virginia Beach	36.7120	-75.9301	alive	U	64.1
VAQS20172235	11/11/2017	loggerhead	Virginia Beach	36.5917	-75.8742	dead	U	ND
VAQS20172249	11/11/2017	Kemp's ridley	Hampton	37.0935	-76.2740	dead	U	45*
VAQS20172238	11/13/2017	loggerhead	Norfolk	36.9534	-76.2479	alive	U	67.9
VAQS20172239	11/13/2017	Kemp's ridley	Norfolk	36.9648	-76.2680	dead	M	ND

Field Number	Date	Species	Location	Latitude	Longitude	Condi-tion	Sex	Length
VAQS20172241	11/14/2017	loggerhead	Norfolk	36.9127	-76.1779	alive	U	ND
VAQS20172240	11/14/2017	Kemp's ridley	Virginia Beach	36.9179	-76.1274	dead	F	38*
VAQS20172242	11/14/2017	Kemp's ridley	Norfolk	36.9364	-76.2124	dead	U	ND
VAQS20172243	11/16/2017	loggerhead	Norfolk	36.9282	-76.1696	alive	U	69.1
VAQS20172244	11/17/2017	loggerhead	Virginia Beach	36.6945	-75.9231	alive	U	54.8
VAQS20172245	11/18/2017	loggerhead	Northampton	37.3293	-76.0146	alive	U	62.7
VAQS20172246	11/18/2017	loggerhead	Northampton	37.3045	-76.0188	alive	U	68
VAQS20172248	11/21/2017	loggerhead	Northampton	37.2402	-76.0168	alive	U	61.2
VAQS20172247	11/21/2017	loggerhead	Virginia Beach	36.8998	-76.0505	dead	F	56.4
VAQS20172250	11/23/2017	loggerhead	Northampton	37.3211	-76.0169	dead	U	68.3
VAQS20172251	11/24/2017	green	York	37.1347	-76.4465	alive	U	27.2
VAQS20172254	11/26/2017	loggerhead	Northampton	37.3660	-75.9901	alive	U	63.5
VAQS20172252	11/26/2017	loggerhead	Norfolk	36.9386	-76.2196	dead	F	58.3
VAQS20172253	11/26/2017	loggerhead	Norfolk	36.9657	-76.2989	dead	F	58.4
VAQS20172255	11/27/2017	loggerhead	Virginia Beach	36.7078	-75.9284	dead	U	66*
VAQS20172257	11/29/2017	loggerhead	Northampton	37.2180	-76.0121	alive	U	53.2
VAQS20172256	11/29/2017	loggerhead	Virginia Beach	36.7226	-75.9341	dead	U	79*
VAQS20172258	11/29/2017	loggerhead	Hampton	37.0712	-76.2794	dead	U	63
VAQS20172259	11/30/2017	loggerhead	Virginia Beach	36.9219	-76.1368	dead	U	ND
VAQS20172260	12/1/2017	loggerhead	Norfolk	36.9362	-76.2108	dead	F	54.7
VAQS20172261	12/3/2017	loggerhead	Virginia Beach	36.9087	-76.0962	dead	M	73.5
VAQS20172262	12/3/2017	loggerhead	Northampton	37.4351	-75.9801	dead	F	71.2
VAQS20172263	12/4/2017	loggerhead	Virginia Beach	36.8684	-75.9792	dead	U	84.6
VAQS20172264	12/4/2017	loggerhead	Virginia Beach	36.5918	-75.8735	dead	U	70.2
VAQS20172267	12/11/2017	loggerhead	Lancaster	37.6321	-76.3098	dead	F	77.4
VAQS20172265	12/12/2017	loggerhead	Virginia Beach	36.9267	-76.1593	dead	F	67*
VAQS20172268	12/13/2017	green	Virginia Beach	36.8871	-76.0098	alive	U	24.7
VAQS20172266	12/13/2017	loggerhead	Accomack	37.8653	-75.3660	dead	U	82
VAQS20172269	12/14/2017	Kemp's ridley	Northampton	37.3581	-75.9934	alive	U	25.4
VAQS20172270	12/15/2017	green	Virginia Beach	36.9139	-76.0714	alive	U	28.5
VAQS20172271	12/16/2017	loggerhead	Virginia Beach	36.9134	-76.1633	dead	U	66.6
VAQS20172272	12/16/2017	loggerhead	Northampton	37.0926	-75.9802	dead	U	69.9
VAQS20172273	12/16/2017	loggerhead	Northampton	37.3196	-76.0177	dead	U	ND
VAQS20172274	12/17/2017	green	Virginia Beach	36.9081	-76.0333	alive	U	32.8
VAQS20172276	12/17/2017	loggerhead	Northampton	37.3792	-75.9879	dead	F	67
VAQS20172275	12/19/2017	loggerhead	Northampton	37.1473	-75.9746	alive	U	ND
VAQS20172279	12/24/2017	loggerhead	Mathews	37.4941	-76.3297	dead	U	79.7
VAQS20172277	12/26/2017	loggerhead	Northampton	37.1803	-75.9928	dead	U	ND
VAQS20172278	12/27/2017	green	Portsmouth	36.8427	-76.3543	dead	U	ND
VAQS20172282	12/31/2017	loggerhead	Virginia Beach	36.9168	-76.0607	alive	U	60.3
VAQS20172281	12/31/2017	loggerhead	Norfolk	36.9675	-76.2743	dead	U	ND

Table 2: Live stranded sea turtles recorded by VAQS in 2017, n = 92.
(Note: Sea turtles that stranded in 2016 and were released in 2017 are also listed, n = 12)

Field Number	Strand Date	Species	State	Final Disposition	Release Location	Date
VAQS20162057	5/29/2016	Kemp's ridley	VA	released by VAQS	Virginia Beach	07/27/2017
VAQS20162061	5/31/2016	Kemp's ridley	VA	released by NA	Palm Coast, FL	03/17/2017
VAQS20162192	9/17/2016	loggerhead	VA	released by VAQS	Virginia Beach	10/28/2017
VAQS20162201	10/1/2016	Kemp's ridley	VA	released by VAQS	Virginia Beach	06/22/2017
VAQS20162230	11/6/2016	Kemp's ridley	VA	released by NA	Palm Coast, FL	02/27/2017
VAQS20162232	11/9/2016	loggerhead	VA	released by VAQS	Virginia Beach	08/03/2017
VAQS20162237	11/16/2016	loggerhead	VA	released by STR	Worcester, MD	10/05/2017
VAQS20162238	11/16/2016	loggerhead	VA	released by STR	St. Johns, FL	12/12/2017
VAQS20162241	11/23/2016	Kemp's ridley	VA	released by NA	St. Augustine, FL	02/27/2017
VAQS20162242	11/25/2016	green	VA	released by VAQS	Virginia Beach	07/10/2017
VAQS20162252	12/18/2016	Kemp's ridley	VA	released by VAQS	Virginia Beach	06/22/2017
VAQS20162257	12/24/2016	loggerhead	VA	released by STR	Point Pleasant, NJ	08/08/2017
VAQS20172018	4/26/2017	unidentified	VA	released by fisher	N/A	N/A
VAQS20172015	4/28/2017	Kemp's ridley	VA	released by VAQS	Virginia Beach	05/05/2017
VAQS20172014	4/28/2017	Kemp's ridley	VA	released by VAQS	Virginia Beach	05/05/2017
VAQS20172016	4/29/2017	loggerhead	VA	released by fisher	N/A	N/A
VAQS20172017	4/30/2017	Kemp's ridley	VA	released by VAQS	Virginia Beach	06/22/2017
VAQS20172021	5/2/2017	Kemp's ridley	VA	released by VAQS	Virginia Beach	05/05/2017
VAQS20172026	5/7/2017	Kemp's ridley	VA	released by VAQS	Virginia Beach	05/26/2017
VAQS20172029	5/9/2017	Kemp's ridley	VA	released by VAQS	Virginia Beach	05/09/2017
VAQS20172030	5/10/2017	Kemp's ridley	VA	released by VAQS	Virginia Beach	05/10/2017
VAQS20172031	5/10/2017	unidentified	VA	released by fisher	N/A	N/A
VAQS20172035	5/13/2017	loggerhead	VA	euthanized, necropsied	N/A	N/A
VAQS20172036	5/14/2017	Kemp's ridley	VA	released by VAQS	Virginia Beach	05/19/2017
VAQS20172040	5/15/2017	Kemp's ridley	VA	released by VAQS	Virginia Beach	05/19/2017
VAQS20172042	5/16/2017	Kemp's ridley	VA	current VAQS patient	N/A	N/A
VAQS20172043	5/17/2017	Kemp's ridley	VA	released by VAQS	Virginia Beach	05/30/2017
VAQS20172044	5/18/2017	Kemp's ridley	VA	current VAQS patient	N/A	N/A
VAQS20172045	5/20/2017	Kemp's ridley	VA	released by VAQS	Virginia Beach	10/28/2017
VAQS20172049	5/21/2017	unidentified	VA	released by VAQS	Virginia Beach	05/21/2017
VAQS20172050	5/21/2017	Kemp's ridley	VA	released by VAQS	Virginia Beach	05/26/2017
VAQS20172061	5/28/2017	Kemp's ridley	VA	released by VAQS	Virginia Beach	06/15/2017
VAQS20172065	5/29/2017	Kemp's ridley	VA	released by VAQS	Virginia Beach	06/08/2017
VAQS20172064	5/29/2017	loggerhead	VA	released by fisher	N/A	N/A
VAQS20172073	6/2/2017	leatherback	VA	disentangled from pound net	N/A	N/A
VAQS20172076	6/3/2017	unidentified	VA	released by fisher	N/A	N/A
VAQS20172081	6/7/2017	loggerhead	VA	released by fisher	N/A	N/A
VAQS20172080	6/7/2017	Kemp's ridley	VA	released by VAQS	Virginia Beach	06/22/2017
VAQS20172084	6/9/2017	Kemp's ridley	VA	released by VAQS	Virginia Beach	06/22/2017
VAQS20172085	6/9/2017	leatherback	VA	disentangled from pound net	N/A	N/A

Field Number	Strand Date	Species	State	Final Disposition	Release Location	Date
VAQS20172085	6/11/2017	leatherback	VA	disentangled from crab pots	N/A	N/A
VAQS20172090	6/12/2017	loggerhead	VA	released by VAQS	Virginia Beach	06/30/2017
VAQS20172098	6/14/2017	leatherback	VA	disentangled from pound net	N/A	N/A
VAQS20172091	6/14/2017	leatherback	VA	disentangled from pound net	N/A	N/A
VAQS20162167	6/22/2017	loggerhead	VA	released by VAQS	Virginia Beach	07/10/2017
VAQS20172114	6/25/2017	Kemp's ridley	VA	released by VAQS	Virginia Beach	07/10/2017
VAQS20172116	6/25/2017	Kemp's ridley	VA	released by VAQS	Virginia Beach	07/10/2017
VAQS20172119	6/26/2017	Kemp's ridley	VA	released by VAQS	Virginia Beach	07/10/2017
VAQS20172120	6/27/2017	loggerhead	VA	released by VAQS	Virginia Beach	09/08/2017
VAQS20172122	6/28/2017	leatherback	VA	disentangled from pound net	N/A	N/A
VAQS20172125	7/4/2017	loggerhead	VA	released by fisher	N/A	N/A
VAQS20172126	7/6/2017	Kemp's ridley	VA	released by fisher	N/A	N/A
VAQS20172133	7/16/2017	loggerhead	VA	released by fisher	N/A	N/A
VAQS20172143	7/20/2017	unidentified	VA	released by fisher	N/A	N/A
VAQS20172138	7/21/2017	loggerhead	VA	euthanized, necropsied	N/A	N/A
VAQS20172145	7/30/2017	Kemp's ridley	VA	released by VAQS	Virginia Beach	08/10/2017
VAQS20172150	8/3/2017	Kemp's ridley	VA	current VAQS patient	N/A	N/A
VAQS20172153	8/5/2017	unidentified	VA	disposition unknown	N/A	N/A
VAQS20172152	8/5/2017	unidentified	VA	released by fisher	N/A	N/A
VAQS20172160	8/9/2017	loggerhead	VA	released by VAQS	Virginia Beach	10/12/2017
VAQS20172163	8/14/2017	loggerhead	VA	euthanized, salvaged	N/A	N/A
VAQS20172165	8/14/2017	loggerhead	VA	euthanized, salvaged	N/A	N/A
VAQS20172164	8/14/2017	loggerhead	VA	euthanized, salvaged	N/A	N/A
VAQS20172166	8/16/2017	loggerhead	VA	released by fisher	N/A	N/A
VAQS20172167	8/17/2017	loggerhead	VA	euthanized, salvaged	N/A	N/A
VAQS20172168	8/22/2017	Kemp's ridley	VA	released by VAQS	Virginia Beach	09/08/2017
VAQS20172170	8/24/2017	loggerhead	VA	released by fisher	N/A	N/A
VAQS20172172	8/27/2017	loggerhead	VA	current VAQS patient	N/A	N/A
VAQS20172177	9/4/2017	unidentified	VA	released by fisher	N/A	N/A
VAQS20172179	9/9/2017	Kemp's ridley	VA	released by VAQS	Virginia Beach	09/23/2017
VAQS20172180	9/9/2017	Kemp's ridley	VA	released by VAQS	Virginia Beach	09/23/2017
VAQS20172181	9/9/2017	Kemp's ridley	VA	released by VAQS	Virginia Beach	09/23/2017
VAQS20172195	9/20/2017	loggerhead	VA	current VAQS patient	N/A	N/A
VAQS20172200	9/23/2017	unidentified	VA	released by fisher	N/A	N/A
VAQS20172202	9/24/2017	loggerhead	VA	released by fisher	N/A	N/A
VAQS20172211	10/14/2017	Kemp's ridley	VA	released by VAQS	Virginia Beach	10/28/2017

Field Number	Strand Date	Species	State	Final Disposition	Release Location	Date
VAQS20172212	10/15/2017	unidentified	VA	released by fisher	N/A	N/A
VAQS20172214	10/20/2017	loggerhead	VA	released by fisher	N/A	N/A
VAQS20172215	10/20/2017	loggerhead	VA	released by fisher	N/A	N/A
VAQS20172216	10/21/2017	Kemp's ridley	VA	current VAQS patient	N/A	N/A
VAQS20172219	10/22/2017	unidentified	VA	released by fisher	N/A	N/A
VAQS20172218	10/22/2017	loggerhead	VA	released by fisher	N/A	N/A
VAQS20172223	10/28/2017	Kemp's ridley	VA	released by VAQS	Virginia Beach	11/09/2017
VAQS20172226	10/31/2017	Kemp's ridley	VA	not recovered	N/A	N/A
VAQS20172228	11/4/2017	Kemp's ridley	VA	current VAQS patient	N/A	N/A
VAQS20172230	11/5/2017	Kemp's ridley	VA	released by VAQS	Virginia Beach	11/09/2017
VAQS20172236	11/11/2017	Kemp's ridley	VA	euthanized, salvaged	N/A	N/A
VAQS20172237	11/11/2017	loggerhead	VA	current VAQS patient	N/A	N/A
VAQS20172238	11/13/2017	loggerhead	VA	current VAQS patient	N/A	N/A
VAQS20172241	11/14/2017	loggerhead	VA	not recovered	N/A	N/A
VAQS20172243	11/16/2017	loggerhead	VA	current VAQS patient	N/A	N/A
VAQS20172244	11/17/2017	loggerhead	VA	current VAQS patient	N/A	N/A
VAQS20172246	11/18/2017	loggerhead	VA	current VAQS patient	N/A	N/A
VAQS20172245	11/18/2017	loggerhead	VA	current VAQS patient	N/A	N/A
VAQS20172248	11/21/2017	loggerhead	VA	current VAQS patient	N/A	N/A
VAQS20172251	11/24/2017	green	VA	current VAQS patient	N/A	N/A
VAQS20172254	11/26/2017	loggerhead	VA	current VAQS patient	N/A	N/A
VAQS20172257	11/29/2017	loggerhead	VA	current VAQS patient	N/A	N/A
VAQS20172268	12/13/2017	green	VA	died, salvaged	N/A	N/A
VAQS20172269	12/14/2017	Kemp's ridley	VA	current VAQS patient	N/A	N/A
VAQS20172274	12/17/2017	green	VA	died, salvaged	N/A	N/A
VAQS20172275	12/19/2017	loggerhead	VA	current VAQS patient	N/A	N/A
VAQS20172282	12/31/2017	loggerhead	VA	current VAQS patient	N/A	N/A

Key to other organizations listed in release column:
NA = National Aquarium, Baltimore, MD
STR = Sea Turtle Recovery, West Orange, NJ

Figures

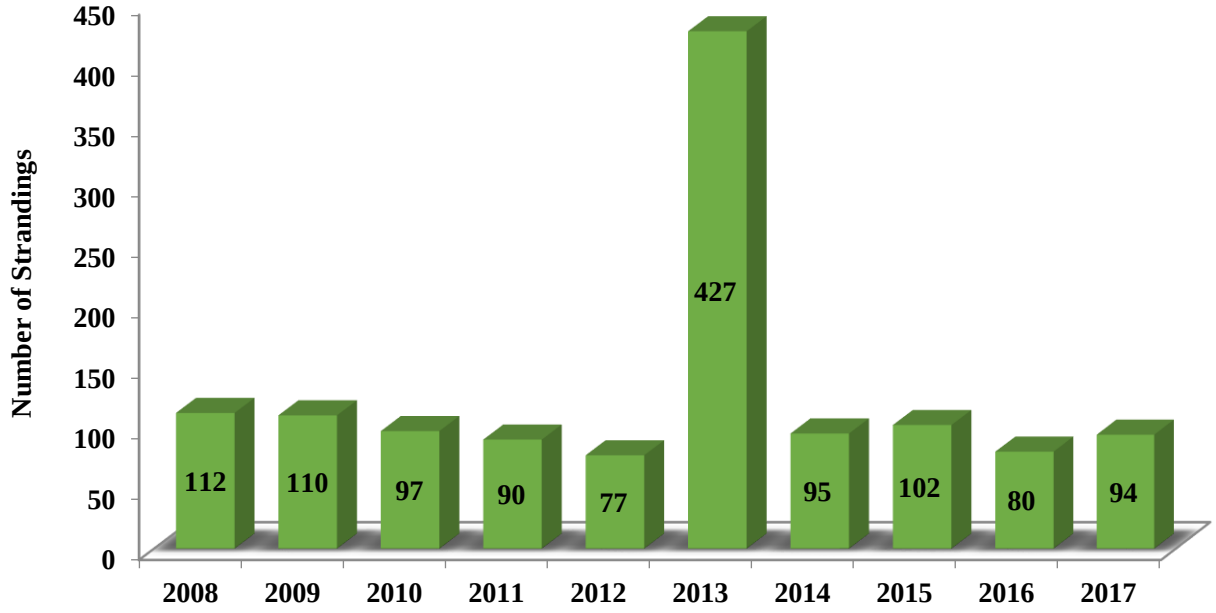


Figure 1: Yearly frequency of marine mammal strandings in Virginia, 2008-2017.

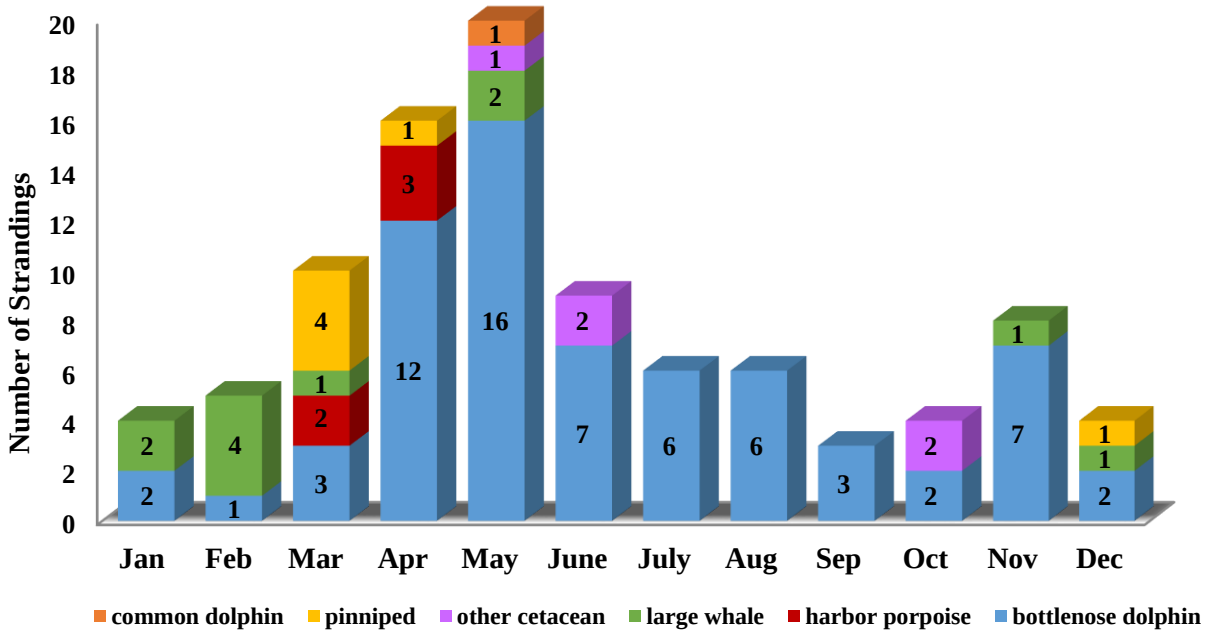


Figure 2: Monthly frequency of marine mammal strandings by species group in Virginia during 2017.

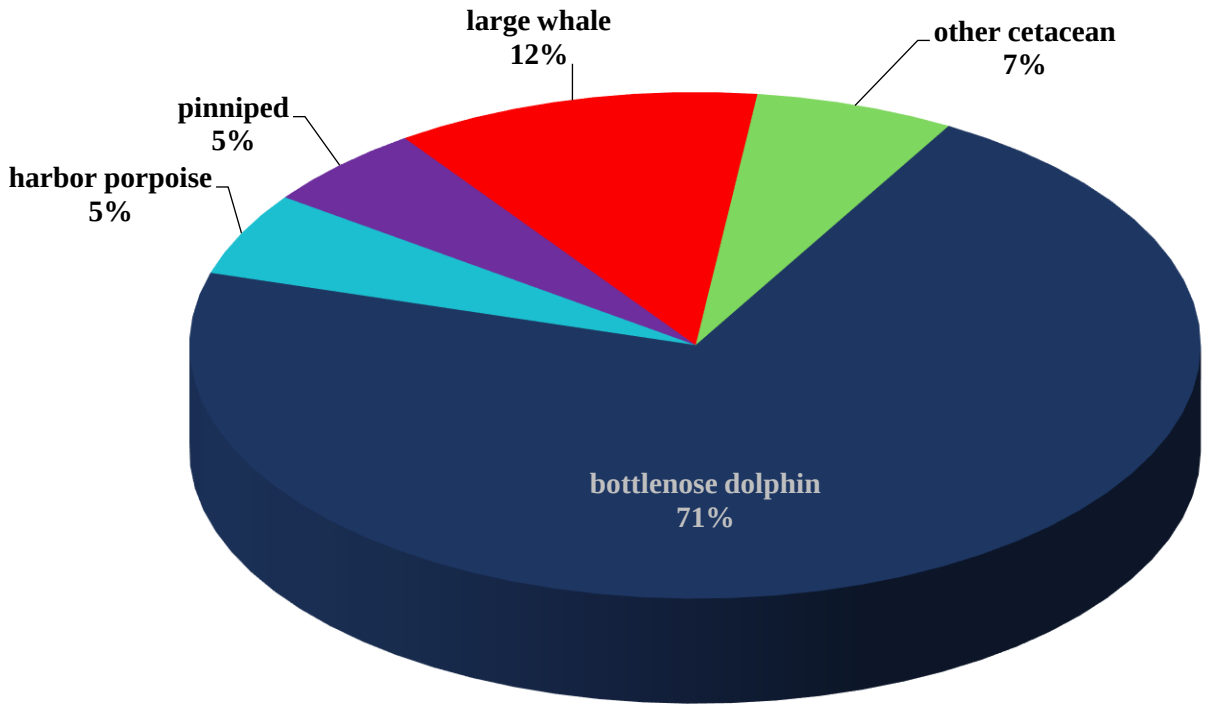


Figure 3: Marine mammal stranding groups in Virginia during 2017.

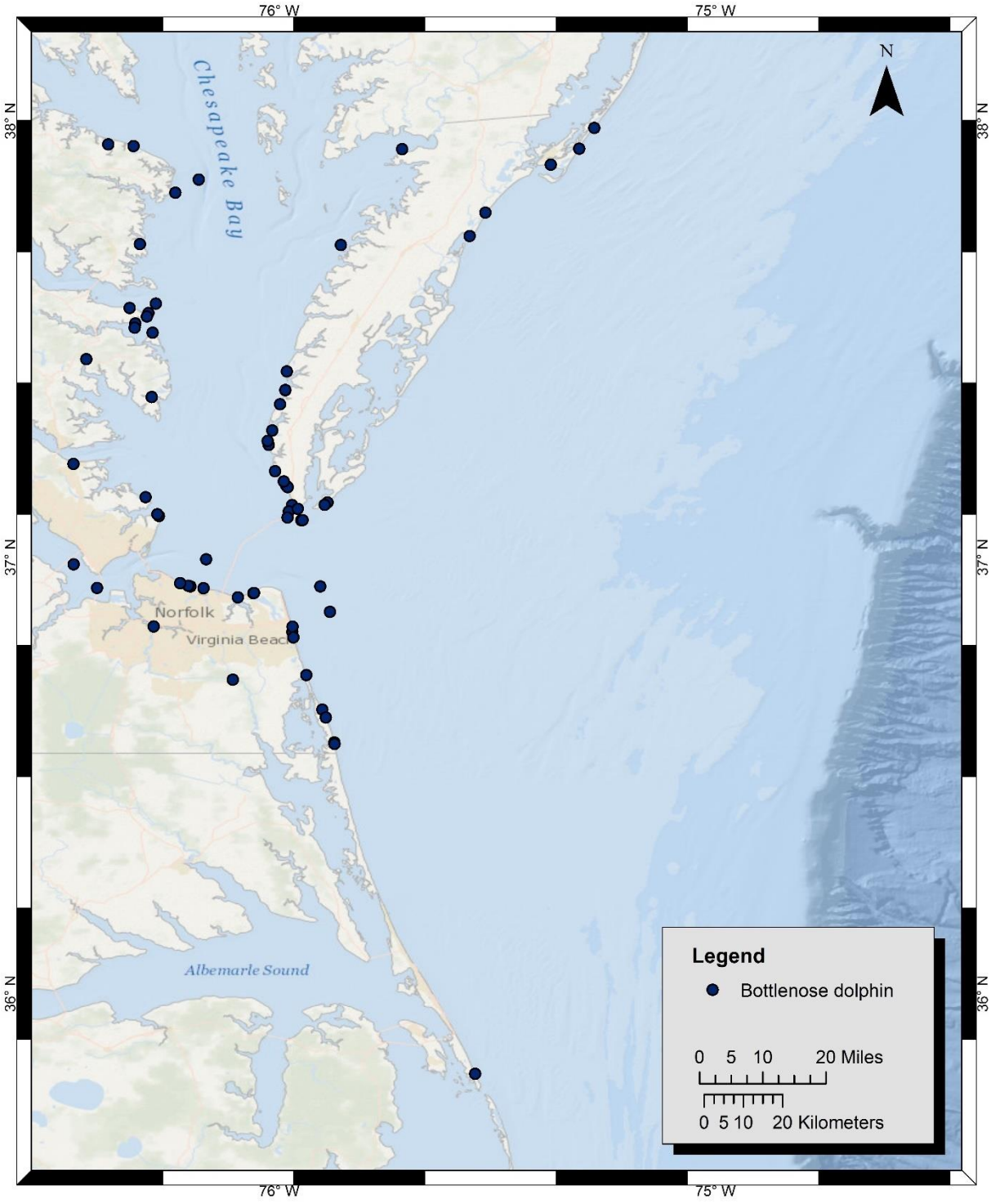


Figure 4: Locations of Virginia bottlenose dolphin strandings in 2017.

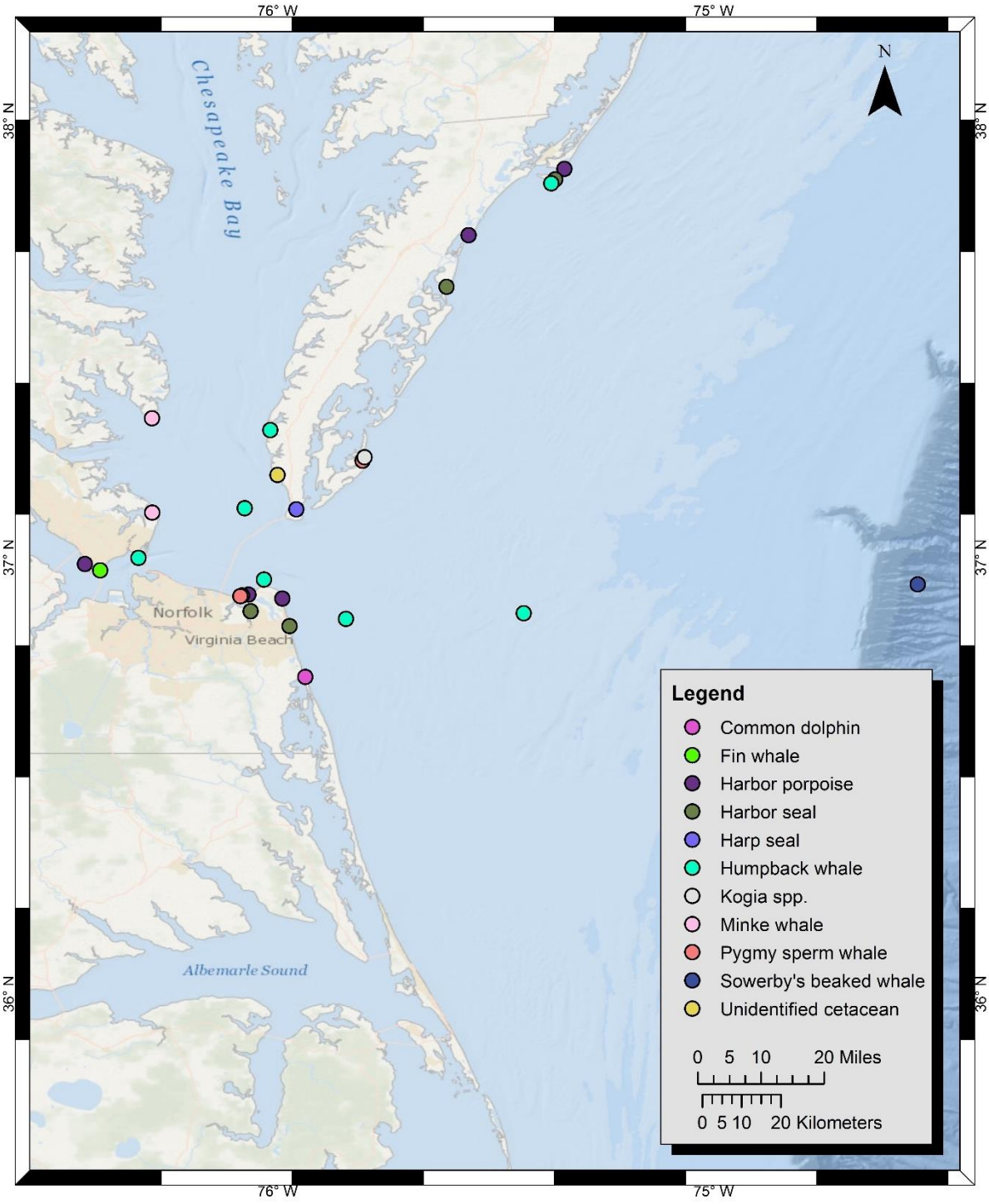


Figure 5: Locations of Virginia marine mammal strandings other than bottlenose dolphins in 2017.

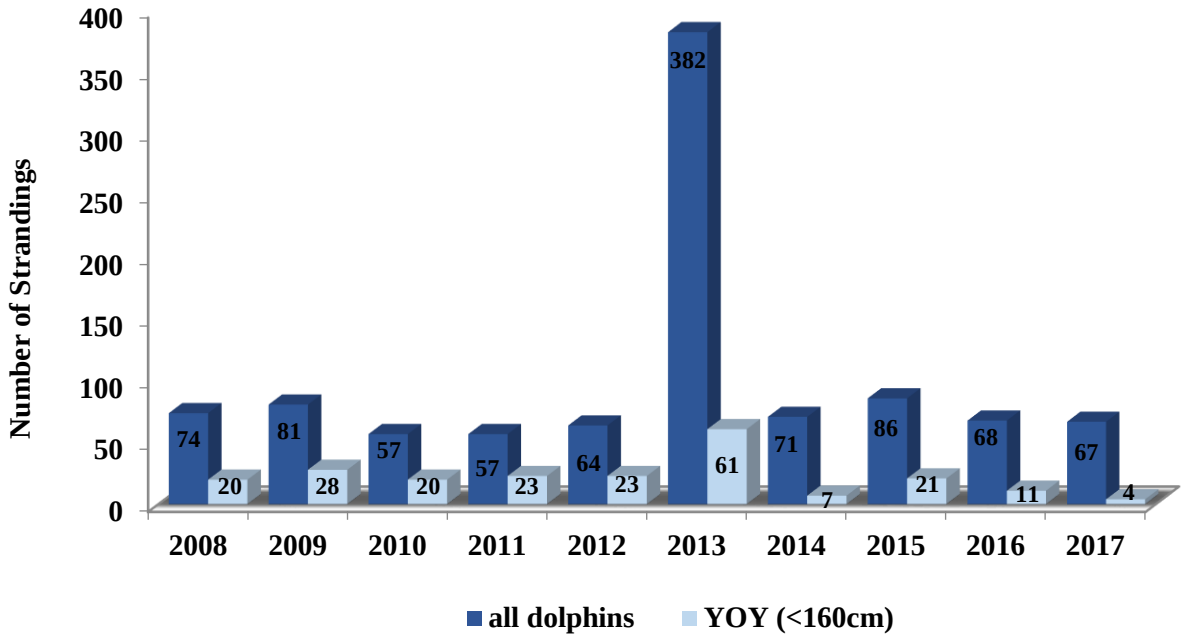


Figure 6: Yearly stranding frequency of bottlenose dolphin in Virginia, 2008-2017.
(YOY = young of the year)

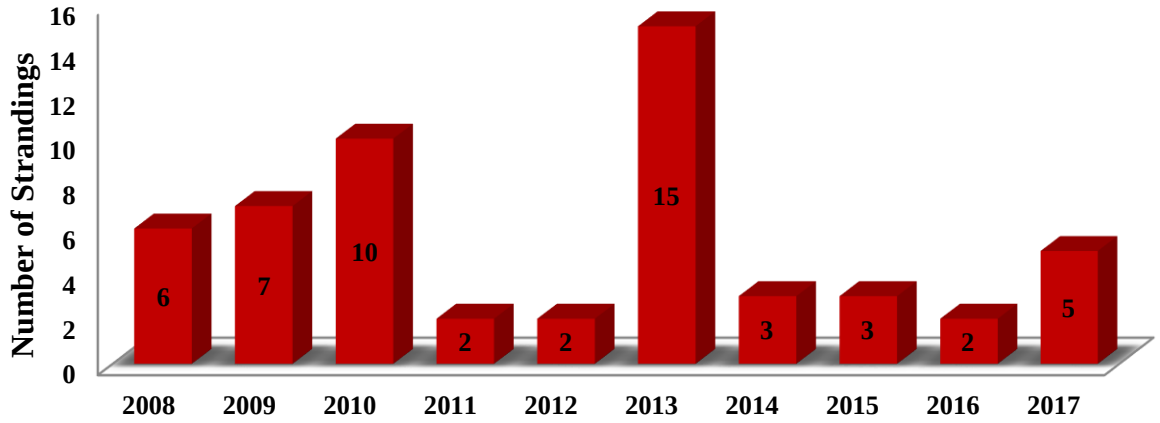


Figure 7: Yearly stranding frequency of harbor porpoise in Virginia, 2008-2017.

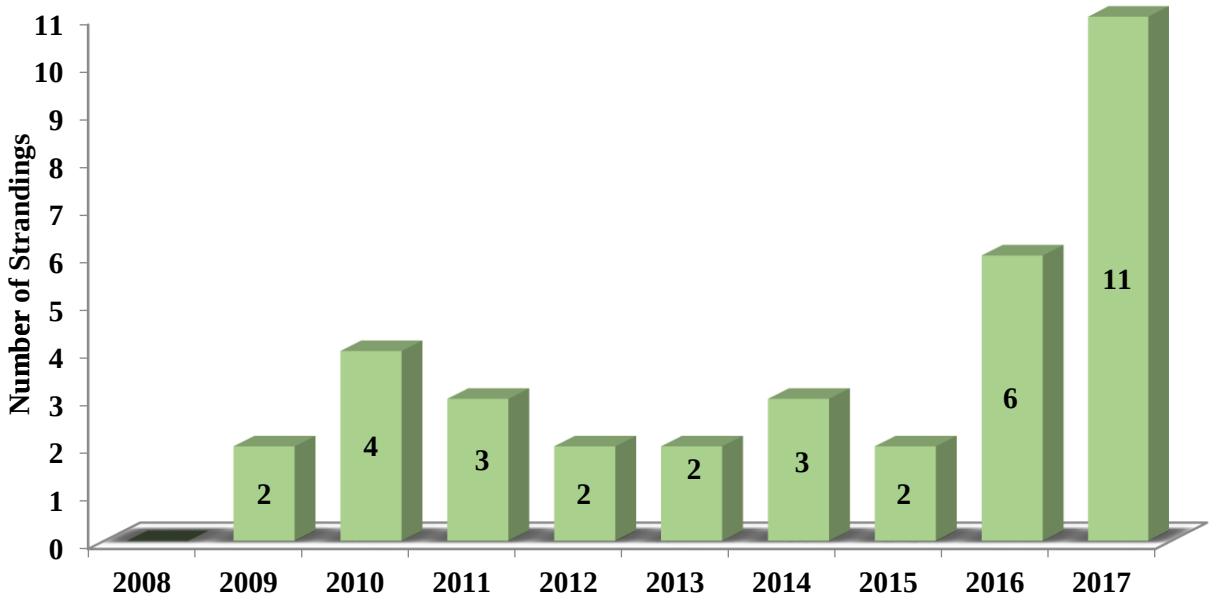


Figure 8: Yearly stranding frequency of large whales in Virginia, 2008-2017.

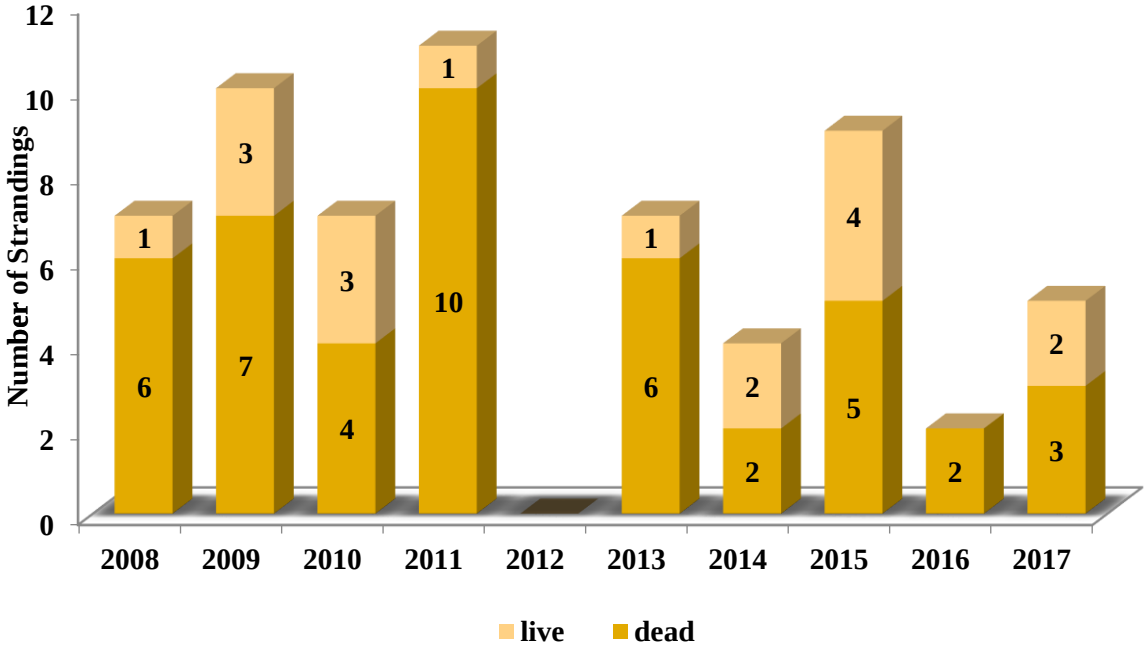


Figure 9: Yearly stranding frequency of pinnipeds in Virginia, 2008-2017.

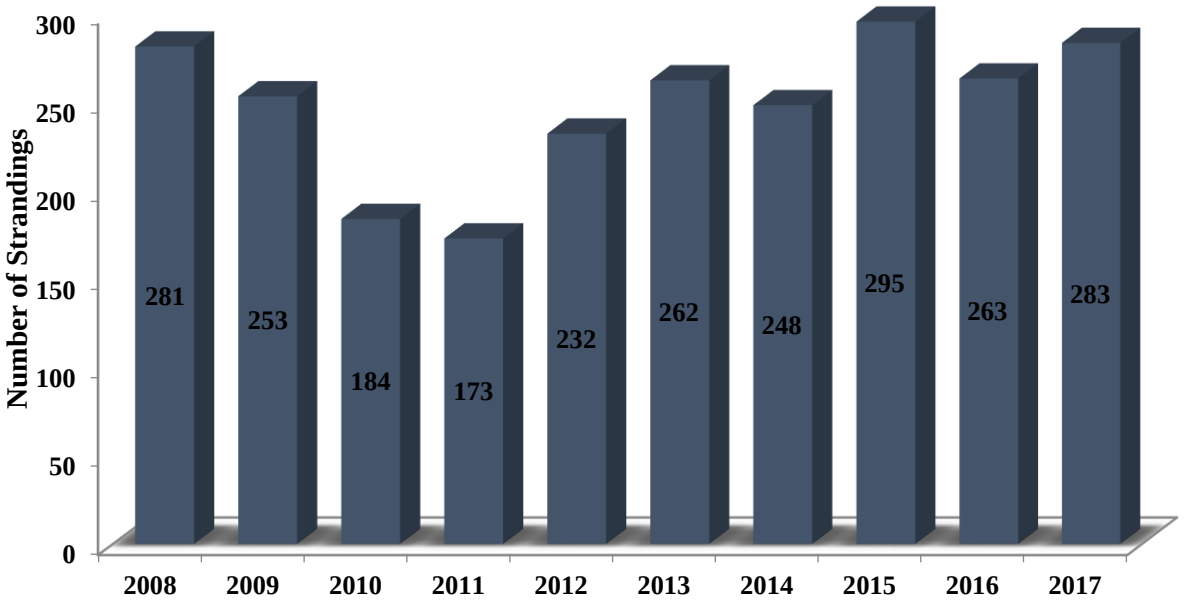


Figure 10: Yearly frequency of sea turtle strandings in Virginia, 2008-2017.

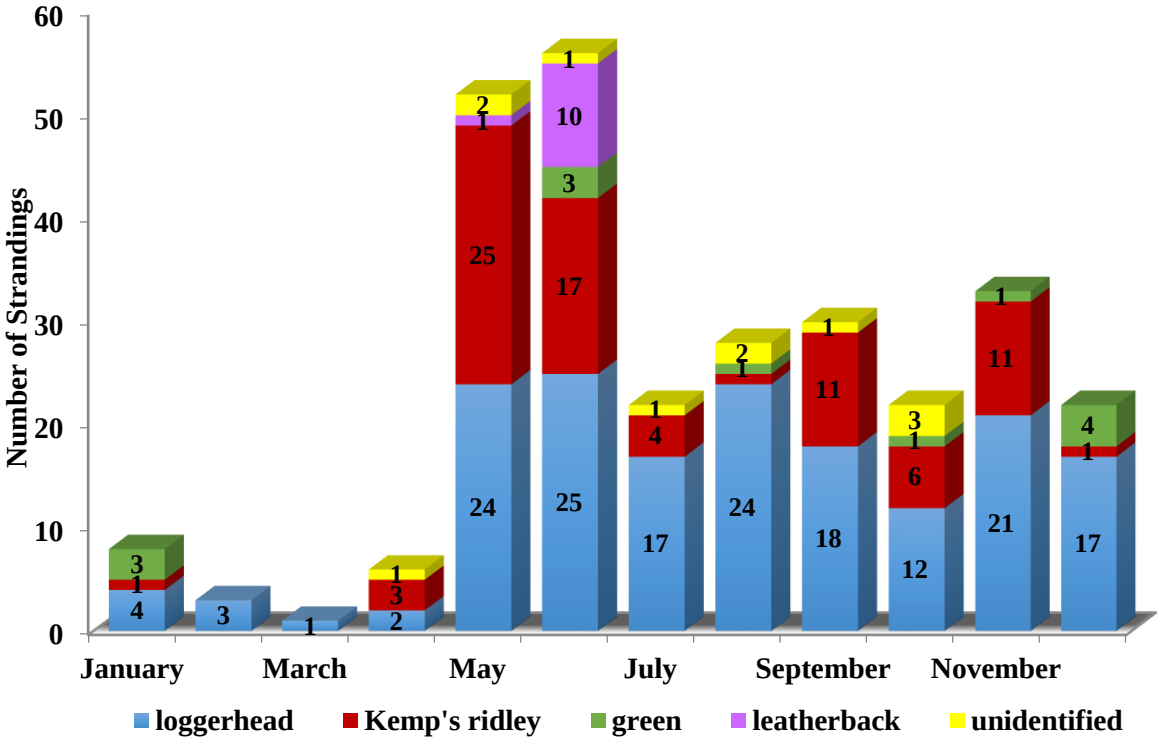


Figure 11: Monthly frequency of sea turtle strandings by species in Virginia during 2017.

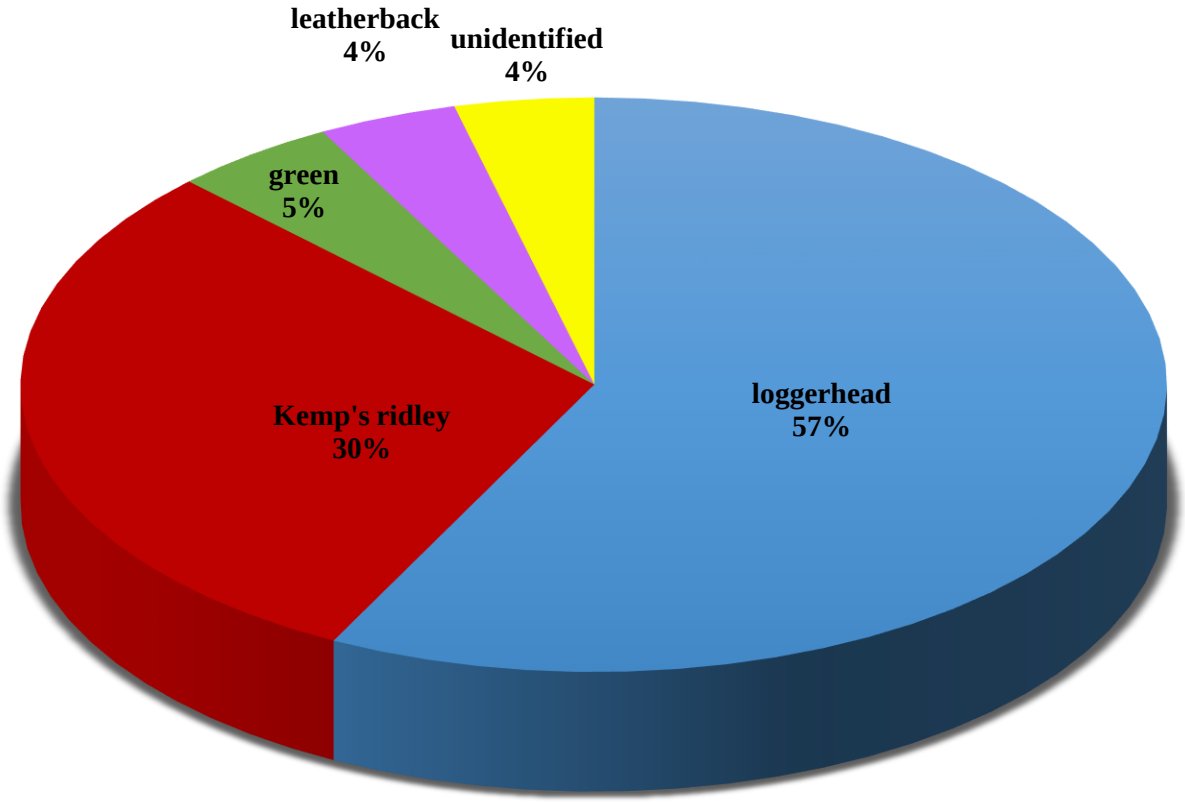


Figure 12: Frequency of sea turtle species among Virginia strandings in 2017.

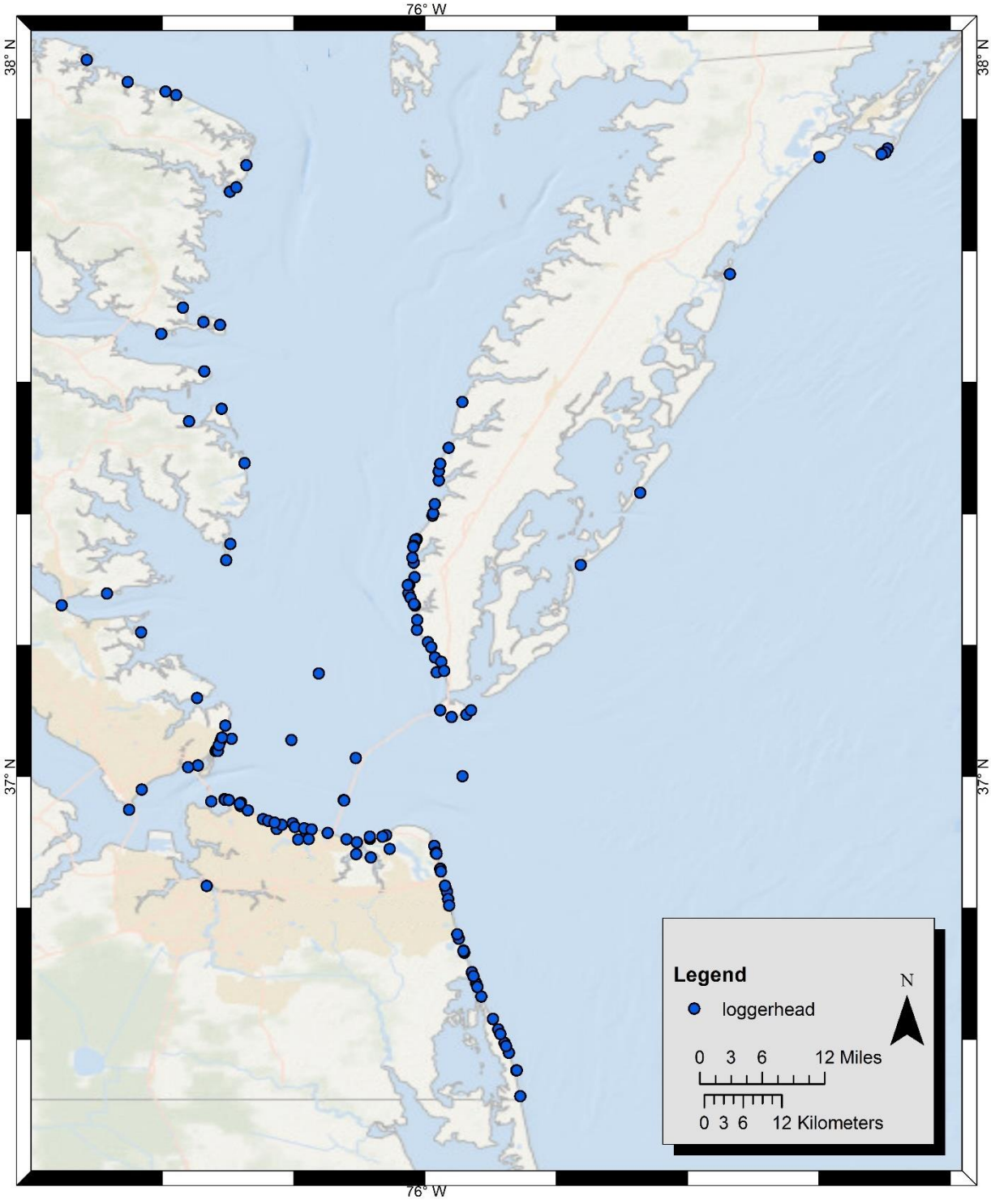


Figure 13: Locations of Virginia loggerhead sea turtle strandings in 2017.

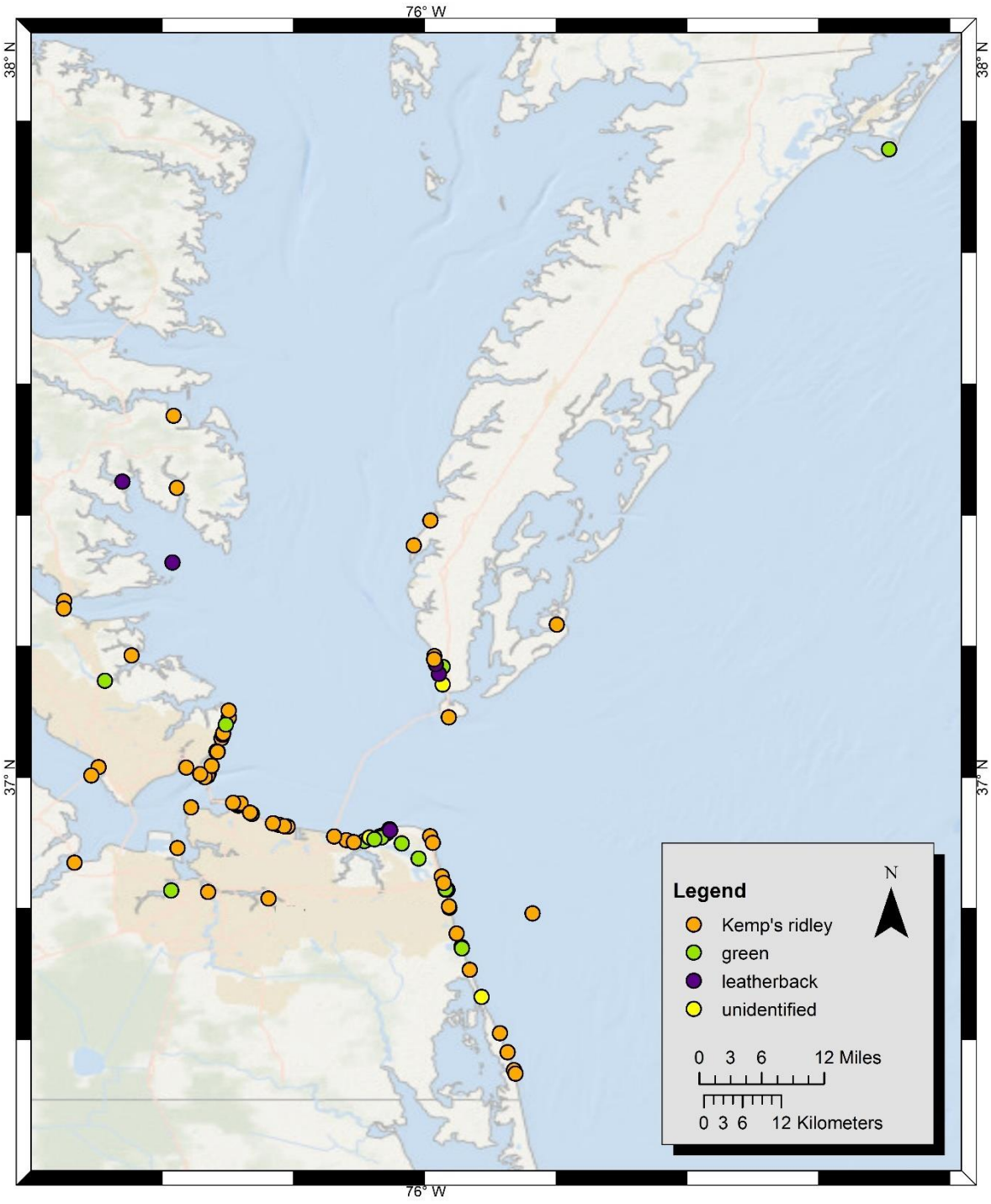


Figure 14: Locations of Virginia sea turtle strandings other than loggerheads in 2017.

Appendix I: Professional and Education Activities

Outreach	**Date**	**Attendance**	**Location**
Winter Wildlife Festival	1/21/17	1200	Virginia Beach, VA
Greetings 2 U Women's Group	1/26/17	11	Virginia Beach, VA
John B Dey Elementary School STEM Expo	2/28/17	120	Virginia Beach, VA
Virginia Living Museum's Reptile Weekend	3/25-26/17	2375	Virginia Beach, VA
Earth Day Celebration, Mt Trashmore	4/11/17	>300	Virginia Beach, VA
Party for the Planet, Seatack Elementary School	4/18/17	165	Virginia Beach, VA
Junior Tidewater Master Naturalist	4/30/17	25	Virginia Beach, VA
St. Mary Star of the Sea	5/22/17	20	Hampton, VA
Summer Camp @ Greek Orthodox Church	8/10-11/17	70	Virginia Beach, VA
Birding Festival	10/7/17	400	Eastern Shore, VA

Public Presentations	**Date**	**Attendance**	**Location**
Anatomy and Physiology of Marine Mammals (U Miami)	3/5/17	25	Miami, FL
Florida Fish and Wildlife Human Interaction Training	3/6-7/17	40	Tampa, FL
Sea Turtle Conservation (ODU)	3/28/17	30	Norfolk, VA
Anatomy and Physiology Lecture (UNCW)	April	25	Wilmington, NC
Environmental Educators (Eastern Shore VA)	6/6/17	15	Eastern Shore, VA
Eastern Shore Wildlife Refuge	6/6/17	~20	Fisherman Island, VA
Tidewater Science & Reason Presentation	6/22/2017	20	Norfolk, VA
Forum on Mid-Atlantic Seismic Testing for Offshore Oil & Gas Development	6/26/2017	100	Virginia Beach, VA
Diving Physiology Workshop (Office of Naval Research & U Santa Cruz)	9/9-12/17	~25	Santa Cruz, CA
Technology and Research on Beaked Whales and Antisubmarine Sonar	9/20-25/17	~30	Canary Islands
Environmental Group (St. Nicholas Church)	10/5/2017	24	Virginia Beach, VA
Old Dominion University ILR Presentation	10/31/17	40	Virginia Beach, VA

Stranding Center Tours & Group Presentations	**Date**	**Attendance**	**Location**
Knee Deep in the Chesapeake	3/16/17	22	MACC
Mentoring Young Scientists	3/18/17	25	MACC
Junior Docent Tours	5/14/17	15	MACC
SWAT Camp - Presentation and Necropsy	7/7/17	9	VAQ/MACC
SWAT Camp - Presentation and Necropsy	7/11/17	10	VAQ/MACC
SWAT Camp - Presentation and Necropsy	8/1/17	10	VAQ/MACC
Tour for Marine Mammal Teacher Workshop	8/7/17	5	MACC
Tour & Necropsy for Marine Mammal Class	8/8/17	15	MACC
Tour for Chincoteague National Wildlife Refuge	8/10/17	10	MACC
Tour for VAQ Adult Education Docents	9/22/17	15	MACC
South Korean Delegation	9/25/2017	7	MACC
Tour for VAQ Adult Education Docents	10/18/17	12	MACC

Virginia Aquarium Talks and Events	**Date**	**Attendance**	**Location**
Evening on the Creek	3/25/17	>50	VAQ
MM, ST, and Whale Research for Staff and Volunteers	4/27/17	20	VAQ
Volunteer League	5/16/2017	40	VAQ
Commotion in the Ocean	10/7/17	>100	VAQ
Chesapeake Bay Foundation Junior Naturalists	12/3/17	28	VAQ
Lunch & Learn	12/15/17	30	VAQ

Conferences and Meetings	**Date**	**Attendance**	**Location**
Atlantic States Marine Fisheries Commission Bycatch Committee Meeting	2/14-16/17	30	Jacksonville, FL
Atlantic States Marine Fisheries Commission Bycatch Committee Meeting	2/14-16/17	30	Jacksonville, FL
Alliance of Marine Mammal Parks and Aquariums Annual Meeting	2/20-24/17	80	Washington DC
Navy Environmental Monitoring Annual Meeting	3/12-15/17	30	Virginia Beach, VA
Southeast and Mid-Atlantic Marine Mammal Symposium	4/11-12/17	75	Beaufort, NC
International Sea Turtle Symposium	4/15-20/17	1000	Las Vegas, NV
Atlantic Large Whale Take Reduction Team Meeting	4/25-27/17	50	Providence, RI
MARCO Healthy Ocean Indicators Workshop	7/19-20/17	50	Baltimore, MD
Association of Zoos & Aquariums Annual Conference	9/9-13/17	1200	Indianapolis, IN
Greater Atlantic Region Stranding Consortium Conference	10/9-13/17	~50	Hull, MA
Society for Marine Mammalogy Biennial Conference	10/21-30/17	~70	Halifax, Nova Scotia
MMPA 45 Year Celebration and Lobby Day	11/15/17	75	Washington DC
Bottlenose Dolphin Take Reduction Team	12/4-8/17	40	St. Petersburg, FL
Scoring marine mammals for vulnerability to climate change	12/6/17	25	webinar

Staff Training	**Date**	**Attendance**	**Location**
NE Pinniped Entanglement Response Workshop	4/3-4/17	40	Portland, ME

Stranding Response Team & Cooperator Trainings	**Date**	**Attendance**	**Location**
VAQS Natural History Training	2/1/17	27	Virginia Beach, VA
VAQS Natural History Training	2/10/17	23	Virginia Beach, VA
VAQS Outreach Team Meeting	3/7/17	8	Virginia Beach, VA
VAQS Annual Business Meeting	3/31/17	50	Virginia Beach, VA
VAQS Hands-on Response Training	4/11-19/17	56	Virginia Beach, VA
VAQS Live Husbandry Training	4/18-25/17	62	Virginia Beach, VA
Hands-on Nesting Training	5/21/17	8	Virginia Beach, VA
Eastern Shore Cooperator Training	5/22/17	25	Chincoteague, VA
VAQS Beach Driving Training	6/14/17	10	Virginia Beach, VA
VAQS Beach Driving Training	7/8/17	10	Virginia Beach, VA
Nest Sitting Training	8/1/17	80	VAQ
VAQS TRL Meeting	9/7/17	9	MACC

Scientific papers and book chapters – (VAQ staff in bold)

Keenan-Bateman T, McLellan W, **Costidis A**, Harms C, Gay D, Rotstein D, Rommel S, Potter C, Pabst D (In Press). Pattern of habitat use of the giant parasitic nematode, *Crassicauda magna*, within its host, the pygmy sperm whale (*Kogia breviceps*). *Diseases of Aquatic Organisms*

Perrin W, **Mallette S**, Brownell R. 2018. Minke Whales: *Balaenoptera acutorostrata* and *B. bonaerensis. In*"Encyclopedia of Marine Mammals" (B Würsig, JGM Thewissen, KM. Kovacs, eds.), 3rd ed, pp. 608-613, Academic Press/Elsevier, San Diego, CA, USA.

Rommel S., **Costidis A**, Lowenstein L. 2017 (In press)
Chapter 7: Gross and Microscopic Anatomy. *CRC Handbook ofMarine Mammal Medicine*, 2nd Edition (eds. Dierauf & Gulland).

Rommel S, Pabst D, McLellan W, **Costidis A** (2017) "Skull." In B. Wursig, J. Thewissen, and K. Kovacs (Eds.), *Encyclopedia of Marine Mammals* (3rd Edition) (871-881). London: Elsevier.

Winton M, Fay G, Haas H, Arendt M, **Barco S**, James M, Sasso C, Smolowitz R (2018) Estimating the distribution and relative density of satellite-tagged loggerhead sea turtles using geostatistical mixed effect models. *Marine Ecology Progress Series* 586: 217-232, doi.org/10.3354/meps12396

Conference/workshop presentations (VAQ staff in bold)

Barco S, Lockhart G, **Rose S,** DiMatteo A (2017) Telemetry with Kemp's ridley and green turtles in Virginia. Presented to the US Navy Annual Environmental Monitoring Meeting, Virginia Beach, VA, March 2017

Barco S, Seney E, Bunch A, **Phillips K**, Reinheimer S, **Rose S**, Williard A (2017) Piscivory by loggerheads in Virginia, USA. Presented to the 38th International Sea Turtle Symposium, Las Vegas, NV, April 2017

Bates E, Williams K, McNaughton A (2017) Osteomyelitis in two Kemp's ridley sea turtles admitted following incidental capture by recreational fishers and presumed otherwise healthy. Presented to the Greater Atlantic Region Stranding Conference, Hull, MA, October 2017

Costidis A, Phillips K, Rotstein D, McLellan W (2017) Novel gross findings related to entanglement of bottlenose dolphins along the mid-Atlantic. Presented at the 22ndBiennial Conference on the Biology of Marine Mammals, Halifax, Nova Scotia, Canada.

Costidis A (2017) The Beaked Whale Vascular Tree: Roots but no branches. Workshop on the Advances in Technology and Research on Beaked Whales and Antisubmarine Sonar; Fuerteventura, Grand Canary. Sponsor: Spanish & Canary Island governments.

Costidis A (2017) Morphology of Beaked Whales: Body Composition and Anatomical features. Diving Physiology Workshop, Santa Cruz, CA. Sponsor: Office of Naval Research & University of Santa Cruz.

Cucuzza M, **Barco S**, **Rose S** (2017) Testing the ability of metal detectors to find recreational hooks ingested by juvenile sea turtles. Presented to the 38th International Sea Turtle Symposium, Las Vegas, NV, April 2017

Mallette S, Lockhart G, Robbins J, **Rabon A**, Rayfield K, **Mathies N**, Stevick P, Fernald, T, Allen J, Aschettino J, **Swingle M**, Bort J, Pepe M, Engelhaupt A, and **Barco S**. Seasonality and site-fidelity of humpback whales off the mid-Atlantic region of the U.S. Presented to: The Society for Marine Mammalogy (SMM) 22st Biennial Conference, Halifax, NS, Oct 2017

Mallette S, McAlarney R, Lockhart G, Cummings E, Pabst D,McLellan W, and **Barco S**. VACAPES Continental Shelf Aerial Surveys. Presented to the U.S. Navy Marine Species Monitoring Program annual meeting, Norfolk, VA, April 2017

Mallette S, Urian K, Fujioka E, **Mathias N**, Robbins J, Stevick P, and **Barco, S**. Development of an online Mid-Atlantic Humpback Whale Catalog. Presented to the U.S. Navy Marine Species Monitoring Program annual meeting, Norfolk, VA, April 2017

Rose S, Williams K, O'Hara K, Barco S (2017) Are "hooked" turtles representative of Virginia Strandings? Presented to the 38th International Sea Turtle Symposium, Las Vegas, NV, April 2017

Seney E, Reinheimer S, Bankoski A, Ball L, **Mallette S, Barco S** (2017) Shifting diets of loggerhead and Kemp's ridley sea turtles in Virginia, USA. Presented to the 38th International Sea Turtle Symposium, Las Vegas, NV, April 2017

Shoemaker R, **Barco S**, Williard A (2017) Measuring physiological response in sea turtles following capture in the recreational hook-and-line fishery. Presented to the 38th International Sea Turtle Symposium, Las Vegas, NV, April 2017

Appendix II: Highlights of the Year – Marine Mammals

Virginia experienced a record year for large whale strandings in 2017 (n=11), including two live whale responses. The high number of large whale strandings was dominated by eight humpback whales. Six of the humpbacks stranded in January and February, one stranded in May and one in late November. Of the three humpbacks where cause of death was determined, all three died as a result of vessel strike: two had propeller trauma consistent with a large vessel and one had blunt trauma where the vessel size was undetermined. The whale pictured at right, VAQS20171004, was one of two with obvious large propeller trauma.

The two live whale responses included an adult female minke whale that stranded on a remote shoal in Mathews County. The whale was completely dry at low tide but partially submerged at high tide. VAQS staff including veterinarian Dr. Allyson McNaughton (pictured with the minke whale in the image below left) responded and humanely euthanized the whale. It was necropsied the following day and was found to be pregnant with a very small fetus. The second live whale response involved a juvenile, female fin whale that stranded on a shoal in Newport News. The thin animal died while being sedated to facilitate further examination. It was found to have a severe parasitic infection that most likely prevented the kidneys from functioning properly (image of fin whale below).

Appendix III: Highlights of the Year – Sea Turtles

In 2017, the fall cold-stun season started early with eight live loggerheads stranding from November 11-23 while water temperatures were still relatively warm (see image to the left). 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.

Following the early cold-stunned loggerheads, the stranding team started seeing additional dead turtles, loggerheads and other species mixed with live animals. By the end of December, eight more live strandings and 19 dead cold-stunned turtles were recorded. When combined with the turtles that stranded in January, 2017 was the most active year for cold-stunned turtles in the past 10 years – with a total of 17 live and 22 dead turtles. Historically, there were 35 cold-stuns in 2016 and 32 in 2013, but the 10 year mean from 2008-2017 was 17 ±14, including a low of zero in 2011.

Several of the 2017 cold-stun cases were very challenging. The early stranded loggerheads were hypokalemic (low potassium) and had signs that they had recently compensated for changes in acid-base status, which is unusual for cold-stunned critters. These turtles required significant fluid therapy in order to correct their unusual blood values. Another challenging case involved the green turtle pictured to the right. Despite diligent monitoring and treatment, staff were never able to stabilize this turtle's blood glucose level. It died after approximately three weeks in rehab.

Appendix IV: Stranding Network Datasheets

A. Marine Mammal Level A data sheet

MARINE MAMMAL STRANDING REPORT - LEVEL A DATA

FIELD #: _____ **NMFS REGIONAL #:** _____ (NMFS USE) **NATIONAL DATABASE#:** _____ (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

☐ Actual ☐ Estimated

How Determined: (check ONE)

☐ GPS ☐ Map ☐ Internet/Software

OCURRENCE DETAILS ☐ Restrand GE# _____ (NMFS Use)

Group Event: ☐ YES ☐ NO

If Yes, Type: ☐ Cow/Calf Pair ☐ Mass Stranding # Animals: _____ ☐ Actual ☐ Estimated

Findings of Human Interaction: ☐ YES ☐ NO ☐ Could Not Be Determined (CBD)

If Yes, Choose one or more: ☐ 1. Boat Collision ☐ 2. Shot ☐ 3. Fishery Interaction

☐ 4. Other Human Interaction: _____

How Determined (Check one or more): ☐ External Exam ☐ Internal Exam ☐ Necropsy

☐ Other: _____

Gear Collected? ☐ YES ☐ NO Gear Disposition: _____

Other Findings Upon Level A: ☐ YES ☐ NO ☐ Could Not Be Determined (CBD)

If Yes, Choose one or more: ☐ 1. Illness ☐ 2. Injury ☐ 3. Pregnant ☐ 4.Other: _____

How Determined (Check one or more): ☐ External Exam ☐ Internal Exam ☐ Necropsy

☐ Other: _____

INITIAL OBSERVATION

Date: Year: _____ Month: _____ Day: _____

First Observed: ☐ Beach or Land ☐ Floating ☐ Swimming

CONDITION AT INITIAL OBSERVATION (Check ONE)

☐ 1. Alive ☐ 4. Advanced Decomposition

☐ 2. Fresh dead ☐ 5. Mummified/Skeletal

☐ 3. Moderate decomposition ☐ 6. Condition Unknown

LEVEL A EXAMINATION ☐ Not Able to Examine

Date: Year: _____ Month: _____ Day: _____

CONDITION AT EXAMINATION (Check ONE)

☐ 1. Alive ☐ 4. Advanced Decomposition

☐ 2. Fresh dead ☐ 5. Mummified/Skeletal

☐ 3. Moderate decomposition ☐ 6. Unknown

INITIAL LIVE ANIMAL DISPOSITION (Check one or more)

☐ 1. Left at Site ☐ 6. Euthanized at Site

☐ 2. Immediate Release at Site ☐ 7. Transferred to Rehabilitation:

☐ 3. Relocated Date: Year:_____ Month:_____Day:___ Facility:_____

☐ 4. Disentangled ☐ 8. Died during Transport

☐ 5. Died at Site ☐ 9. Euthanized during Transport

☐ 10. Other: _____

CONDITION/DETERMINATION (Check one or more)

☐ 1. Sick 7. Location Hazardous

☐ 2. Injured ☐ a. To animal

☐ 3. Out of Habitat ☐ b. To public

☐ 4. Deemed Releasable ☐ 8. Unknown/CBD

☐ 5. Abandoned/Orphaned ☐ 9.Other_____

☐ 6. Inaccessible _____

MORPHOLOGICAL DATA

SEX (Check ONE)

☐ 1. Male

☐ 2. Female

☐ 3. Unknown

AGE CLASS (Check ONE)

☐ 1. Adult ☐ 4. Pup/Calf

☐ 2. Subadult ☐ 5. Unknown

☐ 3. Yearling

☐ Whole Carcass ☐ Partial Carcass

Straight length:_____ ☐ cm ☐ in ☐ actual ☐ estimated

Weight:_____ ☐ kg ☐ lb ☐ actual ☐ estimated

PHOTOS/VIDEOS TAKEN: ☐ YES ☐ NO

Photo/Video Disposition: _____

_____

TAG DATA Tags Were:

Present at Time of Stranding (Pre-existing): ☐ YES ☐ NO

Applied during Stranding Response: ☐ YES ☐ NO

ID#	Color	Type	Placement* (Circle ONE)	Applied	Present
			D DF L LF LR RF RR	☐	☐
			D DF L LF LR RF RR	☐	☐
			D DF L LF LR RF RR	☐	☐

* D= Dorsal; DF= Dorsal Fin; L= Lateral Body
LF= Left Front; LR= Left Rear; RF= Right Front; RR= Right Rear

CARCASS STATUS (Check one or more)

☐ 1. Left at Site ☐ 4. Towed: Lat_____Long_____ ☐ 7. Landfill

☐ 2. Buried ☐ 5. Sunk: Lat_____Long_____ ☐ 8. Unknown

☐ 3. Rendered ☐ 6. Frozen for Later Examination ☐ 9. Other_____

SPECIMEN DISPOSITION (Check one or more)

☐ 1. Scientific collection ☐ 2. Educational collection

☐ 3. Other: _____

Comments: _____

_____

NECROPSIED ☐ NO ☐ YES ☐ Limited ☐ Complete

☐ Carcass Fresh ☐ Carcass Frozen/Thawed

NECROPSIED BY: _____

Date: Year: _____ **Month:** _____ **Day:** _____

NOAA Form 89-864; OMB No.0648-0178; Expires 01/31/2014

PLEASE USE THE BACK SIDE OF THIS FORM FOR ADDITIONAL REMARKS

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

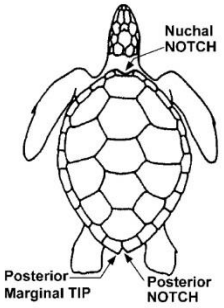
STRANDING DATE:
Year 20☐☐ Month ☐☐Day☐☐
Turtle number by day ☐☐

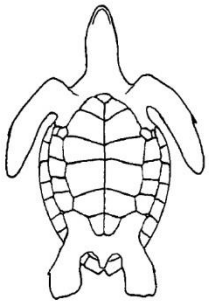
-State coordinator must be notified within 24 hrs; this was done by ☐phone (757)385-7575 ☐email ☐fax (757)437-4933

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

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)
_____

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?* _____

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
		Circle unit
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, Potter 1991).

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

A. Marine mammal species *cont.*

Common Name	Scientific Name	Status
Family: Delphinidae (cont)		
Rough-toothed dolphin	*Steno bredanensis*	Uncommon
Common dolphin	*Delphinus delphis*	Common
Striped dolphin	*Stenella coeruleoalba*	Common
Pantropical spotted dolphin	*Stenella attenuata*	Common
Atlantic spotted dolphin	*Stenella frontalis*	Common
Family: Phocoenidae		
Harbor porpoise	*Phocoena phocoena*	Common
Order: Carnivora		
Suborder: Pinnipedia		
Family: Phocidae		
Harbor seal	*Phoca vitulina*	Common
Gray seal	*Halichoerus grypus*	Common
Hooded seal	*Crystophora cristata*	Common
Harp seal	*Pagophilus groenlandica*	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	*Dermochelys coriacea*	Endangered
Family: Cheloniidae		
Green sea turtle	*Chelonia mydas*	Threatened
Loggerhead sea turtle	*Caretta caretta*	Threatened
Hawksbill sea turtle	*Eretmochelys imbricata*	Endangered
Kemp's ridley sea turtle	*Lepidochelys kempii*	Endangered