

Virginia Sea Turtle and Marine Mammal Stranding Network 2016 Grant Report

W.M. Swingle, S.G. Barco, A.M. Costidis, E.B. Bates, S.D. Mallette, K.M.
Phillips, S.A. Rose, K.M. Williams



VIRGINIA
AQUARIUM
& MARINE SCIENCE CENTER



Virginia Coastal Zone
MANAGEMENT PROGRAM

*VIRGINIA AQUARIUM FOUNDATION
STRANDING RESPONSE PROGRAM*

*Virginia Sea Turtle and
Marine Mammal Stranding Network
2016 Grant Report*

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By

W. Mark Swingle
Director of Research & Conservation

Susan G. Barco
Research Coordinator

Alexander M. Costidis
Stranding Response Coordinator

Erin B. Bates
Stranding Response Volunteer Manager

Sarah D. Mallette
Research Project Manager

Kristy M. Phillips
Stranding Response Necropsy Manager

Sarah A. Rose
Research Project Manager

Kristine M. Williams
Live Animal Care Manager

Virginia Aquarium Foundation Stranding Response Program
717 General Booth Boulevard
Virginia Beach, Virginia 23451

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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.



Virginia Coastal Zone M A N A G E M E N T P R O G R A M

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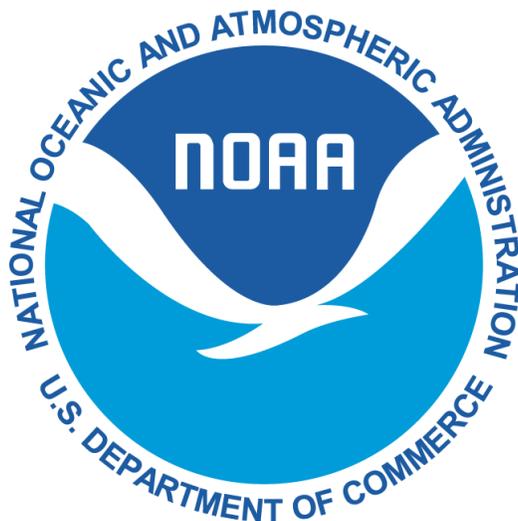


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INTRODUCTION

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 6,800) 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.

VAQS uses staff, volunteers and other organizations (cooperators) to report, record, document, examine and recover 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 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 80 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 continuing efforts, VAQS continues to maintain and improve statewide marine animal stranding response.

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 98 strandings for 2014 and 2015. It is important for organizations such as VAQS to examine stranded marine mammals because these species are very difficult to study in the wild. 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 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/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 attempt 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. Seals in triage can be held in 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 5.8 cetaceans and 3.6 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) are found 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 4,400 sea turtle strandings, with an average of 240 per year for the last ten years 2007-2016 (Fig. 7).

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. 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. In addition, 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 both recovering and rehabilitating hooked sea turtles and providing outreach

to fishermen and pier owners about proper sea turtle handling techniques. The program has also allowed for the collection of data on the 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 turtles stranded in Virginia each year. Since that time and the development of the Pier Partner Program, Virginia has averaged 58 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 controlled environments. Post-release satellite tracking of aquarium-reared loggerheads was conducted with the help of VIMS in the 1990s. Growth and nutritional studies continue with hatchling loggerheads and non-releasable loggerheads, Kemp's ridleys and greens. 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 15 million people through innovative Aquarium exhibits and public programs. In 2015, a major new exhibit area devoted to the stranding response program opened at the Aquarium. Staff and volunteers present educational programs 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 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, and possible offshore energy exploration and development. Virginia stranding data has been included in the mid-Atlantic data portal being developed to support 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
species	location
condition	body length

- weight
- gender
- 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 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 manager 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 doses 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 2016 VIRGINIA STRANDING DATA

MARINE MAMMALS

Virginia stranding data are presented for the calendar year 2016. A total of 80 marine mammal strandings were recorded during 2016 (Table 1). This number was much lower than in 2015 (101) and dramatically lower than in 2013 (427) when Virginia experienced the highest number of marine mammal strandings 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 (Fig. 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. bottlenose dolphins, harbor porpoises, common dolphins and seals) tend to strand seasonally, while others (i.e. large whales and other cetaceans) can occur at any time of the year (Fig. 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). 2016 was an average year for bottlenose dolphin strandings and they comprised 85% of the total marine mammal strandings (Fig. 3). Spatially, marine mammal strandings occur throughout Virginia's ocean and bay waters. Normally, strandings are most common along the eastern shore and southern shore of the Chesapeake Bay mouth and the southern ocean coast (Figs. 4-5). Pictures and descriptions of notable marine mammal strandings from 2016 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 2016, VAQS responded to five live marine mammal strandings in Virginia (Table 2). These strandings occurred at various times throughout the year and consisted of five cetaceans. VAQS also responded to a live cetacean stranding in North Carolina as part of cooperative assistance for the NC stranding network. The cetaceans included three bottlenose dolphins, one humpback whale and one sperm whale. Three of the cetaceans that stranded were humanely euthanized. The humpback whale was disentangled from gillnet rope and buoy lines off Cape

Henry in January. Though the final outcome of the disentanglement event was not observed, it was assumed that the whale was gear-free based upon the recovered fishing gear and telemetry buoy.

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. Most bottlenose dolphins strand from April to October, which is concurrent with their seasonal appearance in Virginia coastal waters (Barco et al. 1999; Fig. 2). During 2016, 68 bottlenose dolphin strandings were recorded in Virginia (Fig. 6A). This is an average number of strandings for a single year in Virginia much 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 2016 occurred primarily along the Atlantic Ocean and lower Chesapeake Bay shorelines (Fig. 4). In 2016, 32.4% (22) of the strandings occurred in Virginia Beach, 39.7% (27) on the eastern shore, 10.3% (7) in Norfolk/Portsmouth, and 17.6% (12) on the western shores of Chesapeake Bay north of the James River. Gender was determined for 52 of the stranded dolphins. Females comprised 38% (20) and males comprised 62% (32) of the known gender animals. Of the 59 stranded dolphins with recorded lengths (includes estimated lengths and observer descriptions), 11 (19%) were less than 160 cm (defined as “young of the year”, YOY), the approximate size of a one-year old dolphin (Fig. 5A; 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 ($n = 36$), signs of human interaction could not be determined in 15 (42%), were positive in 15 (42%), and were not observed in six (16%). 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 (Fig. 2), and strandings occur along the ocean shorelines (Fig. 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 two harbor porpoise strandings in Virginia in 2016 (Fig. 6B). 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 do strand in Virginia on an annual basis. With the exception of the sperm

whale, large whales are typically baleen whales such as humpbacks or fins. 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 developed (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 developed and is specifically applied to northern right whales (McLellan et al. 2004). During 2008, there were no large whale strandings in Virginia. In 2016, VAQS responded to four humpback whales (*Megaptera novaeangliae*), one minke whale (*Balaenoptera acutorostrata*), and one sperm whale (*Physeter macrocephalus*) in Virginia. Overall, there have been 2.7 large whale strandings annually in Virginia during the last ten years (Fig. 6C). In addition to strandings, 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 only two strandings during 2016. These strandings typically occur along the ocean and lower bay shorelines and sometimes involve live animals. In 2016, there were two unidentified delphinid strandings, though one animal could have been a bottlenose dolphin.

Pinnipeds

Pinniped strandings have generally increased in Virginia since the early 1990s, though there were only two strandings recorded from Virginia during 2016 (Fig. 5, 6D). The species included one harbor seal (*Phoca vitulina*) and one harp seal (*Pagophilus groenlandica*). Both of the seals were found dead on the beach. The harp seal had evidence of canid bites, possibly from a coyote.

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 2016, there were significant numbers of sea turtle strandings (263) 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 240 annually in the last ten years, Virginia remains an area of high sea turtle mortality as measured by strandings (Fig. 7). The VAQS Team responded to 238 sea turtle strandings during the year and an additional 25 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 80 strandings (30%), followed by May, October, July and September with 46 (18%), 26 (10%), 24 (8%) and 19 (7%) strandings, respectively. There were also significant numbers of strandings in the months of August, November, December and January, as well. This was a more normal year for strandings with very strong spring and early summer peaks (Fig. 8). Loggerheads (*Caretta caretta*, n = 133) were the primary species recorded, followed by Kemp's ridleys (*Lepidochelys kempii*, n = 89), greens (*Chelonia mydas*, n = 19), leatherbacks (*Dermochelys coriacea*, n = 8) and 14 sea turtles that were unidentified to species (Fig. 9). The distribution of strandings was primarily along the ocean and lower bay shorelines (Figs. 10-11). The eastern shore of Virginia was the area where 27% (72) of the sea turtle strandings were found. Accomack County accounted for 21% (15) and Northampton County for 79% (57) of the eastern shore total. Strandings in Virginia Beach, Norfolk and other southside cities contributed to 54% (143) of the total. The remainder 19% (48) originated from the western shores of the Chesapeake Bay north of the James River. For the turtles that were possible to assess for probable causes of stranding (193), there were strandings related to entanglements (63), watercraft injuries (56), cold-stunning (35), pollution/debris (1), dredge (1), disease (1), and turtles with no apparent injuries (36).

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 (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. Flippers were collected from sea turtles for studies on aging, and skin and muscle samples were collected for genetic studies. Live turtles rehabilitated by VAQS were used in tracking studies of post-release movements. Pictures of some of the notable sea turtle strandings in 2016 are included in Appendix III.

Live strandings

2016 was a record-breaking year for the VAQS Team with 84 live sea turtle strandings recorded from Virginia – 13 loggerheads, 47 Kemp's ridleys, six greens, six leatherbacks and 12 unidentified to species (Table 4). Forty three of these turtles were successfully recovered, rehabilitated and released, and 21 were disentangled and/or released from commercial and recreational fishing gear. 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. In addition, three sea turtles were transferred to VAQS for rehabilitation from the Brigantine Marine Mammal Stranding Center in New Jersey and the North Carolina Aquarium in Roanoke Island. 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 11 sea turtles in rehabilitation at the VAQS Stranding Center.

VAQS ACTIVITIES DURING 2016

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 and beach maintenance personnel; 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, new 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 stranding center. The new exhibit experience has already reached more than 750,000 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, 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 21,500 hours during 2016.

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 2016 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, remain very high and a significant percentage of the mortalities are related to human activities such as commercial fishing. 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 recently enacted 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 2016, continuing a trend seen since 2012. Monitoring Virginia sea turtle strandings in 2017 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 2016, and the need for a fully functional response and rehabilitation facility is clear. 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 final design phase for a new 18,000 sq. ft. marine animal conservation center. This project has been formally initiated with the

architectural design and development phase continuing in 2017 and is expected to be completed by 2020.

Marine mammal and sea turtle strandings in Virginia were once again at high levels during 2016. 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 declining 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 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 2017.

LITERATURE CITED

- Barco, S.G., W.M. Swingle, W.A. McLellan and D.A. Pabst. 1999. Local abundance and distribution of bottlenose dolphins (*Tursiops truncatus*) in the nearshore waters of Virginia Beach, VA. *Marine Mammal Science* 15(2):394-408.
- Barco, S., McLellan, W., Allen, J., Asmutis-Silvia, R., Mallon-Day, R., Meagher, E., Pabst, D.A., Robbins, J., Seton, R., Swingle, W.M., Weinrich, M. and Clapham, P. 2002. Population identity of humpback whales, *Megaptera novaeangliae*, in the waters of the U.S. mid-Atlantic states. *Journal of Cetacean Research and Management* 4(2):135-141.
- Blaylock, R.A., Mase, B.G. and Driscoll, C.P. 1996. Final report on the workshop to coordinate large whale stranding response in the southeast U.S. NOAA/NMFS Southeast Fisheries Science Center, Charleston Laboratory, Charleston, SC, September 1995. SEFSC Contribution MIA-96/97-43.
- Cox, T.M., Read, A.J., Barco, S., Evans, J., Gannon, D., Koopman, H.N., McLellan, W.A., Murray, K., Nicolas, J., Pabst, D.A., Potter, C., Swingle, W.M., Thayer, V.G., Touhey, K.M. and Westgate, A.J. 1998. Documenting the bycatch of harbor porpoises, *Phocoena phocoena*, in coastal gillnet fisheries from stranded carcasses. *Fishery Bulletin* 96(4): 727-734.
- Dunn, D.G., Barco, S.G., Pabst, D.A. and McLellan, W.A. 2002. Evidence for infanticide in bottlenose dolphins of the western North Atlantic. *Journal of Wildlife Diseases*. 38(3):505-510.
- McLellan, W.A., Rommel, S., Moore, M. and Pabst, D.A. 2004. Right whale necropsy protocol. Contract Report to the Marine Mammal Health and Stranding Response Program, Office of Protected Species, National Marine Fisheries Service, Silver Spring, MD, 38 pp.
- Pikesley, S.K., Witt, M.J., Hardy, T., Loveridge, Jan, Loveridge, Jeff, Williams, R. and Godley, B.J. 2012. Cetacean sightings and strandings: evidence for spatial and temporal trends? *Journal of the Marine Biological Association of the United Kingdom*, Volume 92, Special Issue 08, pp 1809-1820.
- Pyenson, N.D. 2010. Carcasses on the coastline: measuring the ecological fidelity of the cetacean

- stranding record in the eastern North Pacific Ocean. *Paleobiology* 36(3), pp. 453-480.
- Pyenson, N.D. 2011. The high fidelity of the cetacean stranding record: insights into measuring diversity by integrating taphonomy and macroecology. *Proceedings of the Royal Society B*, doi: 10.1098/rspb.2011.0441, published online.
- Read, A.J. and K. Murray. 2002. Gross evidence of human-induced mortality in small cetaceans. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-OPR-15. 21p.
- Swingle, W.M., Barco, S.G., Pitchford, T.D., McLellan, W.A. and Pabst, D.A. 1993. Appearance of juvenile humpback whales feeding in the nearshore waters of Virginia. *Marine Mammal Science* 9(3): 309-315.
- Swingle, W.M., Barco, S.G., McLellan, W.A. and Pabst, D.A. 1995. Strandings of bottlenose dolphins and harbor porpoises in Virginia (1990-1994). *Proceedings of the Northeast Regional Marine Mammal and Sea Turtle Stranding Network Conference*, April 28-30, Riverhead, NY, 40-49.
- Urian, K.W., Duffield, D.A., Read, A.J., Wells, R.S. and Shell, E.D. 1996. Seasonality of reproduction in bottlenose dolphins (*Tursiops truncatus*). *Journal of Mammalogy* 77(2): 394-403.

Table 1: Marine mammal strandings in Virginia during 2016, n=80.

(Data from the VAQS Marine Mammal Stranding Database)

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

<u>Field Number</u>	<u>Date</u>	<u>Species</u>	<u>Location</u>	<u>Latitude</u>	<u>Longitude</u>	<u>Condition</u>	<u>Sex</u>	<u>Length</u>
VAQS20161001	01/01/2016	bottlenose dolphin	Virginia Beach	36.8416	-75.9712	dead	F	279.0
VAQS20161002	01/10/2016	bottlenose dolphin	Virginia Beach	36.8102	-75.9649	alive	M	ND
VAQS20161003	01/14/2016	humpback whale	Virginia Beach	36.9445	-76.0001	alive	U	900.0*
VAQS20161004	01/15/2016	humpback whale	Virginia Beach	36.9214	-75.6674	dead	M	900.0*
VAQS20161005	01/26/2016	bottlenose dolphin	Northampton	37.1484	-75.8677	dead	U	ND
VAQS20161006	03/06/2016	harbor porpoise	Virginia Beach	36.6253	-75.8886	dead	M	159.6
VAQS20161007	03/08/2016	bottlenose dolphin	Virginia Beach	36.7554	-75.9463	dead	M	165.5
VAQS20161008	03/15/2016	harp seal	Virginia Beach	36.7892	-75.9589	dead	F	120.2
VAQS20161009	03/25/2016	harbor seal	Northampton	37.1660	-75.9882	dead	U	ND
VAQS20161010	03/26/2016	bottlenose dolphin	Northampton	37.1392	-75.9729	dead	M	203.0
VAQS20161011	04/01/2016	harbor porpoise	Surry	37.2053	-76.9125	dead	M	107.1
VAQS20161012	04/08/2016	bottlenose dolphin	Accomack	37.6925	-75.5829	dead	U	221.0
VAQS20161013	04/11/2016	bottlenose dolphin	Hampton	37.0980	-76.2920	dead	U	176.2
VAQS20161014	04/13/2016	bottlenose dolphin	Virginia Beach	36.7917	-75.9594	dead	M	242.6
VAQS20161015	04/22/2016	bottlenose dolphin	Virginia Beach	36.8480	-75.9732	dead	M	201.8
VAQS20161016	04/25/2016	bottlenose dolphin	Northampton	37.0907	-75.9789	dead	F	201.0*
VAQS20161017	04/30/2016	bottlenose dolphin	Virginia Beach	36.9000	-75.9870	dead	M	234.0
VAQS20161018	05/02/2016	bottlenose dolphin	Northampton	37.0887	-75.9782	dead	F	200.0*
VAQS20161019	05/03/2016	bottlenose dolphin	Northampton	37.2669	-76.0240	dead	M	205.0
VAQS20161020	05/05/2016	bottlenose dolphin	Norfolk	36.9387	-76.2205	dead	F	260.0*
VAQS20161021	05/06/2016	unknown delphinid	York	37.2226	-76.4201	dead	U	ND
VAQS20161022	05/08/2016	bottlenose dolphin	Virginia Beach	36.7136	-75.9307	dead	M	108.3
VAQS20161023	05/12/2016	bottlenose dolphin	Virginia Beach	36.8664	-75.9784	dead	M	283.0
VAQS20161024	05/18/2016	bottlenose dolphin	Hampton	37.0669	-76.2810	dead	U	118.0
VAQS20161025	05/18/2016	bottlenose dolphin	Lancaster	37.6840	-76.3360	dead	F	228.2
VAQS20161026	05/23/2016	bottlenose dolphin	Northampton	37.2196	-76.0121	dead	M	213.0
VAQS20161027	05/26/2016	bottlenose dolphin	Hampton	37.1039	-76.2885	dead	U	ND
VAQS20161028	05/27/2016	bottlenose dolphin	Northampton	37.1165	-75.9019	dead	M	279.0
VAQS20161029	05/27/2016	bottlenose dolphin	Virginia Beach	36.8598	-75.9765	dead	F	106.0
VAQS20161030	05/27/2016	bottlenose dolphin	Accomack	37.6004	-75.6160	dead	U	279.0
VAQS20161033	05/28/2016	bottlenose dolphin	Accomack	37.7381	-75.8264	dead	U	191.0
VAQS20161031	05/29/2016	bottlenose dolphin	Norfolk	36.9520	-76.2457	dead	M	91.6
VAQS20161032	06/01/2016	unknown delphinid	Northampton	37.3720	-75.7179	dead	U	ND
VAQS20161034	06/01/2016	bottlenose dolphin	Northampton	37.3774	-75.7137	dead	U	ND
VAQS20161035	06/03/2016	bottlenose dolphin	Norfolk	36.9245	-76.1869	dead	F	200.0
VAQS20161036	06/07/2016	bottlenose dolphin	Norfolk	37.2020	-76.0117	dead	M	233.0
VAQS20161037	06/08/2016	bottlenose dolphin	Portsmouth	36.8460	-76.3237	alive	M	282.0
VAQS20161038	06/15/2016	bottlenose dolphin	Northumberland	37.9369	-76.3213	dead	M	249.8
VAQS20161039	06/15/2016	bottlenose dolphin	Accomack	37.8121	-75.9911	dead	M	225.5
VAQS20161040	06/16/2016	bottlenose dolphin	Northampton	37.1683	-75.9880	dead	F	103.5
VAQS20161041	06/18/2016	bottlenose dolphin	Northumberland	37.7426	-76.3141	dead	U	267.0*
VAQS20161042	06/20/2016	bottlenose dolphin	Newport News	36.9875	-76.3902	dead	M	116.1
VAQS20161043	06/29/2016	bottlenose dolphin	Northumberland	37.7374	-76.3085	dead	U	ND
VAQS20161044	07/05/2016	bottlenose dolphin	Northampton	37.2369	-76.0145	dead	M	236.0*
VAQS20161045	07/10/2016	bottlenose dolphin	Northampton	37.2166	-76.0124	dead	U	291.0*
VAQS20161046	07/11/2016	bottlenose dolphin	Northampton	37.1690	-75.9993	dead	F	138.0
VAQS20161047	07/14/2016	bottlenose dolphin	Virginia Beach	36.7635	-75.9498	dead	U	ND
VAQS20161048	07/23/2016	bottlenose dolphin	Virginia Beach	36.9130	-76.0940	dead	M	264.4
VAQS20161049	07/29/2016	bottlenose dolphin	Northampton	37.1062	-75.9785	dead	M	135.3
VAQS20161050	07/30/2016	bottlenose dolphin	Northampton	37.1611	-75.9879	dead	M	176.4
VAQS20161051	08/04/2016	bottlenose dolphin	Virginia Beach	36.7031	-75.9267	dead	M	184.6
VAQS20161052	08/06/2016	bottlenose dolphin	Norfolk	36.9793	-76.3070	dead	U	ND
VAQS20161053	08/07/2016	bottlenose dolphin	Northampton	37.2055	-76.0124	dead	M	ND
VAQS20161054	08/10/2016	bottlenose dolphin	Virginia Beach	36.7491	-75.9441	dead	F	245.4
VAQS20161055	08/10/2016	bottlenose dolphin	Hampton	36.9943	-76.3807	dead	M	262.4
VAQS20161056	08/11/2016	bottlenose dolphin	Hampton	37.0174	-76.2964	dead	M	270.0
VAQS20161057	08/19/2016	bottlenose dolphin	Northampton	37.2044	-76.0123	dead	M	140.0*
VAQS20161058	08/20/2016	bottlenose dolphin	Virginia Beach	36.7517	-75.9456	dead	F	166.4
VAQS20161059	08/23/2016	bottlenose dolphin	Virginia Beach	36.8615	-75.9767	dead	F	261.8

Table 1: Marine mammal strandings *cont.*

Field Number	Date	Species	Location	Latitude	Longitude	Condition	Sex	Length
VAQS20161060	08/23/2016	bottlenose dolphin	Northampton	37.2389	-76.0160	dead	M	275.1
VAQS20161061	08/23/2016	bottlenose dolphin	Norfolk	36.9387	-76.2205	dead	F	170.6
VAQS20161062	09/02/2016	bottlenose dolphin	Virginia Beach	36.8463	-75.9727	dead	F	263.0
VAQS20161063	09/09/2016	bottlenose dolphin	Virginia Beach	36.8459	-75.9730	dead	U	123.0*
VAQS20161064	09/17/2016	minke whale	Accomack	37.5928	-75.6464	dead	F	720.0
VAQS20161065	09/21/2016	sperm whale	Virginia Beach	36.7436	-75.9420	alive	F	354.0
VAQS20161066	10/01/2016	bottlenose dolphin	Virginia Beach	36.9261	-76.0031	dead	F	239.0
VAQS20161067	10/08/2016	bottlenose dolphin	Virginia Beach	36.9150	-76.0665	alive	F	189.0
VAQS20161068	10/14/2016	bottlenose dolphin	Virginia Beach	36.9296	-76.1743	dead	F	141.0
VAQS20161069	10/21/2016	bottlenose dolphin	Northampton	37.1378	-75.9724	dead	M	173.0
VAQS20161070	10/25/2016	bottlenose dolphin	Northampton	37.1346	-75.9716	dead	U	197.0
VAQS20161071	10/28/2016	bottlenose dolphin	Accomack	37.9965	-75.2668	dead	M	193.0
VAQS20161072	10/29/2016	bottlenose dolphin	Accomack	37.5743	-75.8997	dead	M	285.0
VAQS20161073	11/10/2016	bottlenose dolphin	Virginia Beach	36.9122	-76.1078	dead	F	259.0
VAQS20161074	11/19/2016	bottlenose dolphin	Gloucester	37.2849	-76.3822	dead	U	ND
VAQS20161075	11/25/2016	bottlenose dolphin	Mathews	37.4406	-76.2551	dead	M	266.0
VAQS20161076	12/10/2016	bottlenose dolphin	Northampton	37.1062	-75.9735	dead	F	202.0*
VAQS20161078	12/11/2016	humpback whale	Northumberland	37.6431	-76.1231	dead	U	900.0*
VAQS20161077	12/13/2016	bottlenose dolphin	Northampton	37.1796	-75.9922	dead	M	302.0*
VAQS20161079	12/15/2016	bottlenose dolphin	Virginia Beach	36.5998	-75.8792	dead	F	214.8
VAQS20161080	12/16/2016	humpback whale	Virginia Beach	36.7814	-75.9145	dead	F	885.0

Table 2: Live stranded marine mammals recorded by VAQS in 2016, n=5.

<u>Field Number</u>	<u>Species</u>	<u>Strand Date</u>	<u>State</u>	<u>Final Disposition</u>
VAQS20161002	bottlenose dolphin	01/10/2016	VA	Unknown
VAQS20161003	humpback whale	01/14/2016	VA	Disentangled
VAQS20161037	bottlenose dolphin	06/08/2016	VA	Euthanized at Site
VAQS20161065	sperm whale	09/21/2016	VA	Euthanized at Site
VAQS20161067	bottlenose dolphin	10/08/2016	VA	Euthanized at Site

Table 3: Sea turtle strandings in Virginia during 2016, n=263.

(Data from the VAQS Sea Turtle Stranding Database)

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

U = unknown]

<u>Field Number</u>	<u>Date</u>	<u>Species</u>	<u>Location</u>	<u>Latitude</u>	<u>Longitude</u>	<u>Condition</u>	<u>Sex</u>	<u>Length</u>
VAQS20162001	1/3/2016	loggerhead	Virginia Beach	36.8891	-76.0901	dead	F	77.1
VAQS20162002	1/7/2016	Kemp's ridley	Virginia Beach	36.9173	-76.1248	alive	U	21.3
VAQS20162003	1/13/2016	green	Northampton	37.1720	-75.9877	alive	U	26.3
VAQS20162004	1/14/2016	Kemp's ridley	Northampton	37.1697	-75.9874	alive	U	25.1
VAQS20162005	1/14/2016	green	Northampton	37.3642	-75.9901	alive	U	30
VAQS20162006	1/15/2016	green	Northampton	37.3589	-75.9928	alive	U	27.9
VAQS20162007	1/15/2016	Kemp's ridley	Northampton	37.3589	-75.9928	dead	U	26.5
VAQS20162008	1/15/2016	Kemp's ridley	Northampton	37.1653	-75.9848	alive	U	28.5
VAQS20162009	1/16/2016	Kemp's ridley	Northampton	37.3079	-76.0206	alive	U	23.9
VAQS20162010	1/16/2016	Kemp's ridley	Northampton	37.2519	-76.0233	alive	U	27.5
VAQS20162011	1/16/2016	green	Northampton	37.1609	-75.9795	dead	F	31.6
VAQS20162012	1/18/2016	green	Northampton	37.0922	-75.9799	dead	U	27.3*
VAQS20162013	1/20/2016	green	Virginia Beach	36.7830	-75.9570	alive	U	27.4
VAQS20162014	1/28/2016	loggerhead	Northampton	37.3028	-75.7719	dead	U	NE
VAQS20162015	2/20/2016	green	Portsmouth	36.8513	-76.3404	dead	U	26.4
VAQS20162016	4/30/2016	Kemp's ridley	Virginia Beach	36.8438	-75.9698	alive	U	49.4
VAQS20162017	5/9/2016	Kemp's ridley	Virginia Beach	36.9167	-76.0783	alive	U	NE
VAQS20162018	5/9/2016	Kemp's ridley	Virginia Beach	36.8438	-75.9698	alive	U	33.8
VAQS20162019	5/10/2016	Kemp's ridley	Virginia Beach	36.8438	-75.9698	alive	U	39.1
VAQS20162020	5/11/2016	Kemp's ridley	Virginia Beach	36.8436	-75.9707	alive	U	35.6
VAQS20162021	5/11/2016	unidentified	Norfolk	36.9639	-76.2575	alive	U	NE
VAQS20162022	5/11/2016	Kemp's ridley	Virginia Beach	36.6943	-75.9219	alive	U	31
VAQS20162023	5/11/2016	Kemp's ridley	Virginia Beach	36.6944	-75.9219	alive	U	NE
VAQS20162024	5/12/2016	Kemp's ridley	Norfolk	36.9639	-76.2575	alive	U	35.1
VAQS20162025	5/12/2016	Kemp's ridley	Virginia Beach	36.6944	-75.9219	alive	U	35.6
VAQS20162026	5/14/2016	unidentified	Hampton	37.0364	-76.2907	alive	U	NE
VAQS20162027	5/15/2016	Kemp's ridley	Virginia Beach	36.6943	-75.9220	alive	U	30.9
VAQS20162028	5/15/2016	Kemp's ridley	Virginia Beach	36.8436	-75.9705	alive	U	34.1
VAQS20162029	5/15/2016	Kemp's ridley	Virginia Beach	36.8438	-75.9699	alive	U	33.7
VAQS20162030	5/15/2016	Kemp's ridley	Virginia Beach	36.8437	-75.9699	alive	U	34.2
VAQS20162031	5/15/2016	Kemp's ridley	Virginia Beach	36.8436	-75.9708	alive	U	32.2
VAQS20162032	5/15/2016	Kemp's ridley	Virginia Beach	36.6944	-75.9219	alive	U	33.6
VAQS20162033	5/16/2016	Kemp's ridley	Virginia Beach	36.8438	-75.9698	alive	U	32.5
VAQS20162034	5/17/2016	unidentified	Virginia Beach	36.9129	-76.0778	alive	U	NE
VAQS20162035	5/18/2016	Kemp's ridley	Hampton	37.0363	-76.2905	alive	U	35.6
VAQS20162037	5/18/2016	loggerhead	Norfolk	36.9622	-76.2631	dead	U	NE
VAQS20162036	5/19/2016	Kemp's ridley	Hampton	37.0360	-76.2896	alive	U	34.8
VAQS20162038	5/19/2016	Kemp's ridley	Virginia Beach	36.6265	-75.8889	dead	U	53.6
VAQS20162039	5/19/2016	Kemp's ridley	Virginia Beach	36.8436	-75.9707	alive	U	33.8
VAQS20162040	5/20/2016	Kemp's ridley	Virginia Beach	36.8438	-75.9698	alive	U	37.2
VAQS20162041	5/20/2016	Kemp's ridley	Virginia Beach	36.6943	-75.9221	alive	U	35.5
VAQS20162042	5/21/2016	Kemp's ridley	Virginia Beach	36.9212	-75.9961	dead	U	28
VAQS20162043	5/22/2016	Kemp's ridley	Virginia Beach	36.8437	-75.9712	alive	U	29.5*
VAQS20162044	5/22/2016	Kemp's ridley	Virginia Beach	36.7386	-75.9403	dead	F	52.7*
VAQS20162045	5/23/2016	Kemp's ridley	Virginia Beach	36.8649	-75.9779	dead	F	55.2
VAQS20162046	5/24/2016	Kemp's ridley	Virginia Beach	36.9134	-76.1127	dead	U	NE
VAQS20162047	5/24/2016	Kemp's ridley	Norfolk	36.9632	-76.2582	alive	U	31.8
VAQS20162048	5/24/2016	Kemp's ridley	Northampton	37.1660	-75.9876	dead	F	41.6
VAQS20162049	5/25/2016	Kemp's ridley	Hampton	37.0362	-76.2900	alive	U	47.7
VAQS20162050	5/26/2016	Kemp's ridley	Virginia Beach	36.6944	-75.9220	alive	U	29.4
VAQS20162051	5/27/2016	leatherback	Virginia Beach	36.9224	-76.0544	alive	U	NE
VAQS20162019	5/28/2016	Kemp's ridley	Virginia Beach	36.9208	-75.9372	dead	U	NE
VAQS20162052	5/28/2016	loggerhead	Virginia Beach	36.8517	-75.9740	dead	M	93.5*
VAQS20162053	5/28/2016	loggerhead	Virginia Beach	36.9192	-75.9939	dead	U	56.1*
VAQS20162054	5/28/2016	Kemp's ridley	Virginia Beach	36.8438	-75.9698	alive	U	29.1
VAQS20162055	5/28/2016	Kemp's ridley	Virginia Beach	36.8438	-75.9699	alive	U	26.6
VAQS20162056	5/29/2016	Kemp's ridley	Virginia Beach	36.8437	-75.9698	alive	U	29.2
VAQS20162057	5/29/2016	Kemp's ridley	Virginia Beach	36.8437	-75.9699	alive	U	30.6

Table 3: Sea turtle strandings *cont.*

<u>Field Number</u>	<u>Date</u>	<u>Species</u>	<u>Location</u>	<u>Latitude</u>	<u>Longitude</u>	<u>Condition</u>	<u>Sex</u>	<u>Length</u>
VAQS20162058	5/29/2016	Kemp's ridley	Virginia Beach	36.8436	-75.9712	alive	U	23.9
VAQS20162060	5/29/2016	leatherback	Virginia Beach	36.9239	-76.0554	alive	U	NE
VAQS20162059	5/30/2016	Kemp's ridley	Virginia Beach	36.5570	-75.8693	dead	U	56.9*
VAQS20162061	5/31/2016	Kemp's ridley	Virginia Beach	36.8438	-75.9697	alive	U	29
VAQS20162062	6/1/2016	Kemp's ridley	Virginia Beach	36.6943	-75.9223	alive	U	30.8
VAQS20162063	6/1/2016	Kemp's ridley	Virginia Beach	36.9133	-76.0773	dead	U	27.6
VAQS20162064	6/1/2016	Kemp's ridley	Virginia Beach	36.8436	-75.9707	alive	U	33.4
VAQS20162065	6/2/2016	Kemp's ridley	Virginia Beach	36.6995	-75.9253	dead	F	33.1
VAQS20162066	6/2/2016	loggerhead	Lancaster	37.6258	-76.3304	dead	U	NE
VAQS20162067	6/2/2016	unidentified	Norfolk	36.9635	-76.2579	alive	U	NE
VAQS20162068	6/2/2016	Kemp's ridley	Virginia Beach	36.8932	-75.9856	dead	M	29.7
VAQS20162069	6/2/2016	loggerhead	Virginia Beach	36.7734	-75.9535	dead	F	85
VAQS20162070	6/2/2016	Kemp's ridley	Virginia Beach	36.9133	-76.0777	dead	M	31.3
VAQS20162071	6/2/2016	Kemp's ridley	Virginia Beach	36.6725	-75.9120	dead	F	33.3*
VAQS20162072	6/2/2016	unidentified	Norfolk	36.9625	-76.2589	alive	U	NE
VAQS20162074	6/2/2016	loggerhead	Virginia Beach	36.7342	-75.9385	dead	U	67.9
VAQS20162073	6/3/2016	loggerhead	Virginia Beach	36.6994	-75.9256	dead	F	98.8
VAQS20162075	6/3/2016	loggerhead	Hampton	37.0372	-76.2918	dead	F	73.1
VAQS20162076	6/3/2016	loggerhead	Caroline	38.1715	-77.1879	dead	U	NE
VAQS20162077	6/3/2016	loggerhead	Virginia Beach	36.8524	-75.9742	dead	F	71.2
VAQS20162078	6/4/2016	loggerhead	Virginia Beach	36.8174	-75.9667	dead	U	77
VAQS20162079	6/4/2016	Kemp's ridley	Hampton	37.0510	-76.2855	dead	M	54.4
VAQS20162080	6/4/2016	green	Hampton	37.0361	-76.2898	alive	U	27.6
VAQS20162081	6/4/2016	unidentified	Norfolk	36.9623	-76.2591	alive	U	NE
VAQS20162082	6/4/2016	leatherback	Virginia Beach	36.9231	-76.0549	alive	U	NE
VAQS20162083	6/4/2016	loggerhead	Virginia Beach	36.8275	-75.9394	dead	F	86.5
VAQS20162095	6/4/2016	leatherback	Virginia Beach	36.9266	-76.0495	alive	U	NE
VAQS20162084	6/5/2016	loggerhead	Hampton	37.0086	-76.3008	dead	U	84
VAQS20162085	6/5/2016	loggerhead	Virginia Beach	36.8104	-75.9649	dead	F	71
VAQS20162086	6/5/2016	loggerhead	Virginia Beach	36.9500	-76.1500	dead	U	NE
VAQS20162087	6/5/2016	loggerhead	Suffolk	36.8988	-76.4832	dead	U	60
VAQS20162097	6/5/2016	loggerhead	Accomack	37.9533	-75.3009	dead	U	70.7*
VAQS20162088	6/6/2016	Kemp's ridley	Virginia Beach	36.9226	-75.9975	dead	U	30.5*
VAQS20162089	6/6/2016	Kemp's ridley	Hampton	37.0361	-76.2898	alive	U	45.4
VAQS20162090	6/6/2016	green	Northampton	37.1613	-75.9798	dead	U	28.3
VAQS20162091	6/6/2016	unidentified	Mathews	37.2514	-76.4720	dead	U	NE
VAQS20162092	6/6/2016	loggerhead	Accomack	37.7406	-75.5596	dead	M	NE
VAQS20162093	6/6/2016	loggerhead	Virginia Beach	36.9632	-76.2582	alive	U	NE
VAQS20162094	6/7/2016	loggerhead	Northampton	37.2534	-76.0238	dead	F	62.4
VAQS20162096	6/8/2016	unidentified	Hampton	37.0363	-76.2906	alive	U	NE
VAQS20162116	6/8/2016	loggerhead	Poquoson	37.1651	-76.3646	dead	U	NE
VAQS20162098	6/9/2016	loggerhead	Virginia Beach	36.9009	-76.0869	dead	U	74.8
VAQS20162099	6/9/2016	leatherback	Virginia Beach	36.9194	-76.0638	alive	U	NE
VAQS20162100	6/10/2016	loggerhead	Portsmouth	36.8425	-76.3550	dead	U	NE
VAQS20162101	6/10/2016	leatherback	Virginia Beach	36.9185	-76.0634	alive	U	NE
VAQS20162102	6/11/2016	loggerhead	Northampton	37.2873	-76.0482	alive	U	NE
VAQS20162103	6/11/2016	Kemp's ridley	Northampton	37.3416	-76.0056	dead	U	36
VAQS20162104	6/12/2016	loggerhead	Northampton	37.3268	-76.0158	dead	U	63.7
VAQS20162105	6/13/2016	leatherback	Virginia Beach	36.9284	-76.0455	dead	M	133.8
VAQS20162106	6/13/2016	loggerhead	Virginia Beach	36.6636	-75.9069	dead	F	69.9
VAQS20162107	6/13/2016	loggerhead	Northampton	37.1065	-75.9769	dead	U	NE
VAQS20162111	6/13/2016	Kemp's ridley	Northampton	37.3412	-76.0060	dead	U	36.8
VAQS20162109	6/14/2016	loggerhead	Lancaster	37.6417	-76.3336	dead	U	NE
VAQS20162108	6/15/2016	leatherback	Accomack	37.8693	-75.8284	dead	U	NE
VAQS20162110	6/15/2016	loggerhead	Newport News	36.9768	-76.4343	dead	U	74.0*
VAQS20162112	6/15/2016	loggerhead	Northampton	37.1705	-75.8394	dead	U	NE
VAQS20162113	6/16/2016	loggerhead	Northampton	37.3464	-76.0008	dead	U	67.4
VAQS20162114	6/17/2016	loggerhead	Virginia Beach	36.6815	-75.9169	dead	F	88.8*
VAQS20162115	6/17/2016	loggerhead	Mathews	37.3696	-76.2573	dead	U	NE
VAQS20162117	6/17/2016	loggerhead	Northumberland	37.8528	-76.2480	dead	U	NE
VAQS20162118	6/18/2016	loggerhead	Hampton	37.0358	-76.2925	dead	F	53.2
VAQS20162119	6/18/2016	Kemp's ridley	Gloucester	37.3350	-76.4023	dead	U	38.3

Table 3: Sea turtle strandings *cont.*

Field Number	Date	Species	Location	Latitude	Longitude	Condition	Sex	Length
VAQS20162120	6/18/2016	loggerhead	Middlesex	37.5390	-76.3287	dead	M	84.5*
VAQS20162121	6/18/2016	loggerhead	Northumberland	37.8173	-76.2665	dead	U	75.1*
VAQS20162122	6/18/2016	loggerhead	Middlesex	37.5619	-76.3165	dead	F	92.3*
VAQS20162123	6/18/2016	unidentified	Hampton	37.0364	-76.2907	alive	U	NE
VAQS20162124	6/18/2016	Kemp's ridley	Northumberland	37.7427	-76.3142	dead	U	50
VAQS20162129	6/18/2016	loggerhead	Middlesex	37.5746	-76.3417	dead	U	NE
VAQS20162131	6/18/2016	loggerhead	Northumberland	37.8257	-76.2946	dead	F	90.9*
VAQS20162125	6/19/2016	loggerhead	Norfolk	36.9444	-76.2333	dead	U	75.0*
VAQS20162126	6/19/2016	Kemp's ridley	Norfolk	36.9384	-76.2189	dead	F	54.7
VAQS20162127	6/19/2016	loggerhead	Virginia Beach	36.9325	-76.0295	dead	F	62.0*
VAQS20162128	6/19/2016	loggerhead	Virginia Beach	36.5659	-75.8711	dead	F	62.2*
VAQS20162130	6/19/2016	loggerhead	Virginia Beach	36.7849	-75.9576	dead	F	76.7*
VAQS20162134	6/19/2016	loggerhead	Poquoson	37.1578	-76.3954	dead	U	89.0*
VAQS20162135	6/21/2016	loggerhead	Northampton	37.0829	-75.9637	dead	U	NE
VAQS20162132	6/23/2016	unidentified	Northumberland	37.7861	-76.3035	dead	U	NE
VAQS20162133	6/24/2016	loggerhead	Virginia Beach	36.9223	-76.0509	dead	M	69.5*
VAQS20152135	6/25/2016	loggerhead	Hampton	37.0182	-76.2965	dead	F	68.0*
VAQS20162137	6/25/2016	unidentified	Norfolk	36.9639	-76.2577	alive	U	NE
VAQS20162136	6/26/2016	unidentified	Hampton	37.0364	-76.2906	alive	U	NE
VAQS20162138	6/27/2016	loggerhead	Virginia Beach	36.4775	-75.4989	dead	U	NE
VAQS20162139	6/28/2016	Kemp's ridley	Hampton	37.0450	-76.2876	dead	U	52.9*
VAQS20162140	6/28/2016	Kemp's ridley	Northumberland	37.8167	-76.2690	dead	F	48.2
VAQS20162141	7/1/2016	green	Northampton	37.1895	-75.8236	dead	U	NE
VAQS20162142	7/1/2016	loggerhead	Virginia Beach	36.9702	-76.1683	dead	F	94.5
VAQS20162144	7/2/2016	Kemp's ridley	Accomack	37.8700	-75.4368	dead	U	42.0*
VAQS20162143	7/4/2016	loggerhead	Norfolk	36.9586	-76.2562	dead	F	74.3
VAQS20162145	7/6/2016	loggerhead	Northampton	37.1496	-75.8653	dead	U	105
VAQS20162146	7/6/2016	loggerhead	Northampton	37.1469	-75.8679	dead	U	76
VAQS20162147	7/7/2016	loggerhead	Northampton	37.1360	-75.9719	dead	U	NE
VAQS20162148	7/9/2016	Kemp's ridley	Norfolk	36.9639	-76.2572	dead	U	NE
VAQS20162149	7/10/2016	loggerhead	Hampton	37.0368	-76.2918	alive	U	56.2
VAQS20162150	7/10/2016	loggerhead	Virginia Beach	36.7385	-75.9400	dead	U	64.9*
VAQS20162151	7/11/2016	loggerhead	Norfolk	36.9580	-76.2553	dead	F	75.7*
VAQS20162152	7/12/2016	loggerhead	Virginia Beach	36.5590	-75.8694	dead	U	88.3
VAQS20162153	7/12/2016	loggerhead	Virginia Beach	36.7301	-75.9369	dead	F	64
VAQS20162154	7/12/2016	loggerhead	Norfolk	36.9595	-76.2579	dead	U	NE
VAQS20162155	7/12/2016	loggerhead	Hampton	37.0005	-76.3071	alive	U	NE
VAQS20162156	7/12/2016	loggerhead	Virginia Beach	36.9300	-76.0006	dead	U	NE
VAQS20162157	7/13/2016	Kemp's ridley	Virginia Beach	36.9151	-76.0781	alive	U	22.2
VAQS20162158	7/14/2016	Kemp's ridley	York	37.2382	-76.5071	dead	U	50
VAQS20162159	7/14/2016	loggerhead	Virginia Beach	36.8644	-75.9777	dead	U	69.2*
VAQS20162160	7/15/2016	loggerhead	Lancaster	37.6149	-76.2867	dead	U	NE
VAQS20162161	7/16/2016	green	Virginia Beach	36.7328	-75.9379	dead	U	30.2*
VAQS20162162	7/22/2016	loggerhead	Virginia Beach	36.6845	-75.9184	dead	U	93
VAQS20162163	7/25/2016	loggerhead	Accomack	37.7274	-75.5667	dead	M	97
VAQS20162164	7/26/2016	loggerhead	Norfolk	36.9072	-76.3083	dead	U	NE
VAQS20162165	8/1/2016	loggerhead	Accomack	37.7695	-75.5392	dead	U	NE
VAQS20162166	8/4/2016	loggerhead	Norfolk	36.9371	-76.2154	dead	U	72.2*
VAQS20162167	8/4/2016	loggerhead	Hampton	37.0361	-76.2898	alive	U	55.9
VAQS20162168	8/7/2016	loggerhead	Virginia Beach	36.9245	-76.0005	dead	U	64.5*
VAQS20162169	8/8/2016	loggerhead	Virginia Beach	36.5619	-75.8703	dead	M	86.0*
VAQS20162170	8/8/2016	loggerhead	Norfolk	36.9627	-76.2588	alive	U	NE
VAQS20162171	8/9/2016	loggerhead	Virginia Beach	36.6000	-75.8789	dead	M	73.3
VAQS20162172	8/9/2016	green	Virginia Beach	36.8154	-75.9659	dead	U	31.0*
VAQS20162173	8/13/2016	loggerhead	Northampton	37.3699	-75.7269	dead	U	NE
VAQS20162174	8/21/2016	loggerhead	Accomack	37.8671	-75.4381	dead	F	99.8
VAQS20162175	8/23/2016	Kemp's ridley	Virginia Beach	36.9085	-76.0951	dead	U	45
VAQS20162176	8/23/2016	Kemp's ridley	Hampton	37.0080	-76.3011	dead	M	45.4
VAQS20162177	8/24/2016	loggerhead	Virginia Beach	36.8992	-75.9868	dead	F	92.5*
VAQS20162178	8/27/2016	loggerhead	Norfolk	36.9686	-76.2863	dead	U	NE
VAQS20162018	8/28/2016	Kemp's ridley	Virginia Beach	36.8781	-76.0173	dead	F	42.5*
VAQS20162179	8/28/2016	loggerhead	Norfolk	36.9693	-76.2935	dead	U	64

Table 3: Sea turtle strandings *cont.*

<u>Field Number</u>	<u>Date</u>	<u>Species</u>	<u>Location</u>	<u>Latitude</u>	<u>Longitude</u>	<u>Condition</u>	<u>Sex</u>	<u>Length</u>
VAQS20162180	8/31/2016	loggerhead	Accomack	37.8421	-75.4780	dead	U	106
VAQS20162181	8/31/2016	loggerhead	Hampton	37.0089	-76.3006	dead	M	77.9
VAQS20162182	9/1/2016	loggerhead	Accomack	37.8187	-75.5017	dead	U	112.2
VAQS20162183	9/2/2016	loggerhead	Virginia Beach	36.6730	-75.9123	dead	F	79.1
VAQS20162184	9/2/2016	Kemp's ridley	Virginia Beach	36.9094	-76.0886	dead	U	53.0*
VAQS20162185	9/2/2016	loggerhead	Virginia Beach	36.8288	-75.9688	alive	U	64.3*
VAQS20162186	9/3/2016	loggerhead	Virginia Beach	36.9156	-76.1193	alive	U	3.6
VAQS20162187	9/3/2016	loggerhead	Norfolk	36.9691	-76.2948	dead	M	55
VAQS20162188	9/4/2016	loggerhead	Virginia Beach	36.8515	-75.9741	dead	U	78.1
VAQS20162189	9/12/2016	loggerhead	Virginia Beach	36.6032	-75.8801	dead	U	52
VAQS20162190	9/12/2016	loggerhead	Virginia Beach	36.9145	-76.1166	dead	U	NE
VAQS20162191	9/13/2016	loggerhead	Northampton	37.1077	-75.9841	dead	U	NE
VAQS20162192	9/17/2016	loggerhead	Virginia Beach	36.7034	-75.9268	alive	U	78.5*
VAQS20162193	9/20/2016	loggerhead	Virginia Beach	36.7814	-75.9561	dead	M	97.5
VAQS20162194	9/23/2016	Kemp's ridley	Norfolk	36.9608	-76.2607	dead	U	44.1
VAQS20162195	9/25/2016	loggerhead	Virginia Beach	36.6526	-75.9014	dead	U	60.1
VAQS20162196	9/25/2016	loggerhead	Virginia Beach	36.8638	-75.9776	dead	U	98
VAQS20162197	9/27/2016	loggerhead	Hampton	37.0271	-76.2956	dead	U	NE
VAQS20162198	9/28/2016	loggerhead	Virginia Beach	36.8537	-75.9748	dead	F	74.1*
VAQS20162199	9/28/2016	loggerhead	Hampton	37.0169	-76.2972	dead	U	NE
VAQS20162200	9/28/2016	loggerhead	Mathews	37.4086	-76.2496	dead	U	NE
VAQS20162201	10/1/2016	Kemp's ridley	Accomack	37.6717	-75.5950	alive	U	25.7
VAQS20162202	10/3/2016	Kemp's ridley	Accomack	37.7684	-75.5399	dead	U	27.7*
VAQS20162204	10/3/2016	loggerhead	Accomack	37.9783	-75.2808	dead	U	NE
VAQS20162203	10/4/2016	Kemp's ridley	Norfolk	36.9465	-76.2373	dead	F	39.2
VAQS20162205	10/5/2016	loggerhead	Norfolk	36.9320	-76.1959	dead	M	96.7
VAQS20162206	10/5/2016	loggerhead	Virginia Beach	36.6571	-75.9039	dead	U	92.1
VAQS20162207	10/5/2016	loggerhead	Virginia Beach	36.6563	-75.9034	dead	U	63.2
VAQS20162209	10/5/2016	loggerhead	Virginia Beach	36.6278	-75.8898	dead	U	91.7*
VAQS20162208	10/7/2016	Kemp's ridley	Virginia Beach	36.9149	-76.0670	dead	M	46
VAQS20162210	10/14/2016	loggerhead	Hampton	37.0641	-76.2812	dead	U	68.0*
VAQS20162211	10/15/2016	Kemp's ridley	Virginia Beach	36.9037	-75.9881	dead	U	59.8*
VAQS20162212	10/17/2016	Kemp's ridley	Norfolk	36.9407	-76.2260	dead	F	40.5
VAQS20162213	10/17/2016	loggerhead	Northampton	37.2734	-75.7962	dead	U	71.3*
VAQS20162214	10/17/2016	Kemp's ridley	Northampton	37.4764	-75.9628	dead	M	57.5*
VAQS20162215	10/18/2016	loggerhead	Northampton	37.4903	-75.9605	dead	U	NE
VAQS20162217	10/18/2016	unidentified	Virginia Beach	36.6944	-75.9219	alive	U	NE
VAQS20162216	10/20/2016	green	Northampton	37.1618	-75.9804	dead	U	39.9
VAQS20162218	10/22/2016	green	Northampton	37.1655	-75.9854	dead	U	NE
VAQS20162219	10/23/2016	loggerhead	Poquoson	37.1589	-76.3980	dead	F	67
VAQS20162220	10/24/2016	loggerhead	Northampton	37.1889	-75.9993	dead	F	83.1
VAQS20162221	10/24/2016	loggerhead	Norfolk	36.9478	-76.3361	dead	U	72.5*
VAQS20162222	10/24/2016	Kemp's ridley	Norfolk	36.9629	-76.2585	alive	U	27.5
VAQS20162223	10/24/2016	green	Northampton	37.1632	-75.9818	dead	F	30
VAQS20162224	10/24/2016	loggerhead	Northampton	37.1632	-75.9818	dead	F	78.5
VAQS20162225	10/25/2016	loggerhead	Northampton	37.0867	-75.9763	dead	U	78.4*
VAQS20162226	10/30/2016	Kemp's ridley	Northampton	37.0361	-76.2896	alive	U	29.8
VAQS20162227	11/2/2016	Kemp's ridley	Norfolk	36.9369	-76.2141	dead	F	52.1*
VAQS20162228	11/6/2016	green	Virginia Beach	36.9266	-76.0039	dead	U	31.7*
VAQS20162229	11/6/2016	loggerhead	Virginia Beach	36.9138	-76.1139	dead	F	59.5
VAQS20162230	11/6/2016	Kemp's ridley	Virginia Beach	36.9674	-76.1144	alive	U	36.8
VAQS20162231	11/9/2016	Kemp's ridley	Hampton	37.0447	-76.2881	dead	U	26.6*
VAQS20162232	11/9/2016	loggerhead	Northampton	37.2803	-76.0122	alive	U	81.3
VAQS20162233	11/11/2016	loggerhead	Northampton	37.2821	-76.0103	dead	F	58.7
VAQS20162235	11/11/2016	green	Northampton	37.1566	-75.9770	dead	U	30.3
VAQS20162234	11/12/2016	loggerhead	Norfolk	36.9563	-76.2527	dead	M	60.8*
VAQS20162236	11/15/2016	loggerhead	Northampton	37.3476	-75.9998	dead	U	61.4
VAQS20162237	11/16/2016	loggerhead	Northampton	37.3872	-76.1097	alive	U	56
VAQS20162238	11/16/2016	loggerhead	Northampton	37.1656	-75.9879	alive	U	53
VAQS20162239	11/19/2016	loggerhead	Northampton	37.4222	-75.9835	dead	F	58.6
VAQS20162243	11/20/2016	Kemp's ridley	Northampton	37.1563	-75.9769	dead	M	46.4
VAQS20162240	11/23/2016	loggerhead	Virginia Beach	36.9031	-76.0701	alive	U	NE

Table 3: Sea turtle strandings *cont.*

<u>Field Number</u>	<u>Date</u>	<u>Species</u>	<u>Location</u>	<u>Latitude</u>	<u>Longitude</u>	<u>Condition</u>	<u>Sex</u>	<u>Length</u>
VAQS20162241	11/23/2016	Kemp's ridley	Accomack	37.8320	-75.6581	alive	U	42.8
VAQS20162242	11/25/2016	green	Accomack	37.8871	-75.3461	alive	U	28.1
VAQS20162247	11/29/2016	loggerhead	Northampton	37.2845	-76.0143	dead	U	NE
VAQS20162244	12/3/2016	loggerhead	Northampton	37.1231	-75.9694	dead	F	80.6
VAQS20162245	12/4/2016	loggerhead	Northampton	37.0942	-75.9806	dead	F	84.5
VAQS20162248	12/4/2016	green	Northampton	37.1877	-75.9978	dead	U	30.0*
VAQS20162246	12/5/2016	loggerhead	Northampton	37.2413	-76.0177	dead	F	59.2
VAQS20162249	12/10/2016	loggerhead	Northampton	37.0833	-75.9667	dead	F	57.7
VAQS20162250	12/10/2016	loggerhead	Northampton	37.0833	-75.9667	dead	F	57.7
VAQS20162251	12/13/2016	Kemp's ridley	Virginia Beach	36.8891	-76.0162	alive	U	23.2
VAQS20162252	12/18/2016	Kemp's ridley	Virginia Beach	36.8696	-76.0086	alive	U	27.3
VAQS20162253	12/19/2016	loggerhead	Accomack	37.7548	-75.7808	dead	U	79.8
VAQS20162254	12/20/2016	loggerhead	Virginia Beach	36.8684	-76.0048	dead	U	61.3
VAQS20162255	12/22/2016	Kemp's ridley	York	37.2738	-76.5828	dead	F	37
VAQS20162256	12/22/2016	loggerhead	Northampton	37.1533	-75.9760	dead	M	70.2
VAQS20162257	12/24/2016	loggerhead	Northampton	37.0965	-75.9805	alive	U	60.7
VAQS20162258	12/30/2016	loggerhead	Northampton	37.1037	-75.9786	dead	F	74.2
VAQS20162259	12/30/2016	loggerhead	Northumberland	37.8489	-76.2537	dead	F	82.7
VAQS20162260	12/30/2016	loggerhead	Northampton	37.1695	-75.9874	dead	F	67.2

Table 4: Live stranded sea turtles recorded by VAQS in 2016, n=84.

<u>Field Number</u>	<u>Strand Date</u>	<u>Species</u>	<u>State</u>	<u>Final Disposition</u>
VAQS20162002	1/7/2016	Kemp's ridley	VA	released by NAIB April 15, 2016
VAQS20162003	1/13/2016	green	VA	released by NAIB April 15, 2016
VAQS20162004	1/14/2016	Kemp's ridley	VA	released by NAIB April 15, 2016
VAQS20162005	1/14/2016	green	VA	released by NC Aquarium - Roanoke, November 16, 2016
VAQS20162006	1/15/2016	green	VA	dead on arrival, frozen for later necropsy
VAQS20162008	1/15/2016	Kemp's ridley	VA	released by NAIB April 15, 2016
VAQS20162009	1/16/2016	Kemp's ridley	VA	released by NC Aquarium - Roanoke May 7, 2016
VAQS20162010	1/16/2016	Kemp's ridley	VA	died, necropsied January 18, 2016
VAQS20162013	1/20/2016	green	VA	released by NC Aquarium - Roanoke May 7, 2016
VAQS20162016	4/30/2016	Kemp's ridley	VA	released offshore VA July 26, 2016
VAQS20162017	5/9/2016	Kemp's ridley	VA	released from capture location by fisher May 9, 2016
VAQS20162018	5/9/2016	Kemp's ridley	VA	released from Virginia Beach Oceanfront May 22, 2016
VAQS20162019	5/10/2016	Kemp's ridley	VA	released from Virginia Beach Oceanfront May 20, 2016
VAQS20162020	5/11/2016	Kemp's ridley	VA	released from Virginia Beach Oceanfront May 17, 2016
VAQS20162021	5/11/2016	unidentified	VA	released from capture location by fisher May 11, 2016
VAQS20162022	5/11/2016	Kemp's ridley	VA	released from Virginia Beach Oceanfront May 20, 2016
VAQS20162023	5/11/2016	Kemp's ridley	VA	released from capture location by fisher
VAQS20162024	5/12/2016	Kemp's ridley	VA	released from Virginia Beach Oceanfront May 28, 2016
VAQS20162025	5/12/2016	Kemp's ridley	VA	released from Virginia Beach Oceanfront May 22, 2016
VAQS20162026	5/14/2016	unidentified	VA	released from capture location by fisher May 14, 2016
VAQS20162027	5/15/2016	Kemp's ridley	VA	released from Virginia Beach Oceanfront June 27, 2016
VAQS20162028	5/15/2016	Kemp's ridley	VA	released from Virginia Beach Oceanfront July 2, 2016
VAQS20162029	5/15/2016	Kemp's ridley	VA	released from Virginia Beach Oceanfront July 22, 2016
VAQS20162030	5/15/2016	Kemp's ridley	VA	released from Virginia Beach Oceanfront May 20, 2016
VAQS20162031	5/15/2016	Kemp's ridley	VA	released from Virginia Beach Oceanfront May 28, 2016
VAQS20162032	5/15/2016	Kemp's ridley	VA	released from Virginia Beach Oceanfront May 28, 2016
VAQS20162033	5/16/2016	Kemp's ridley	VA	released from Virginia Beach Oceanfront May 31, 2016
VAQS20162034	5/17/2016	unidentified	VA	released from capture location by fisher May 17, 2016
VAQS20162035	5/18/2016	Kemp's ridley	VA	released from Virginia Beach Oceanfront May 31, 2016
VAQS20162036	5/19/2016	Kemp's ridley	VA	released from Virginia Beach Oceanfront July 21, 2016
VAQS20162039	5/19/2016	Kemp's ridley	VA	released from Virginia Beach Oceanfront July 22, 2016
VAQS20162040	5/20/2016	Kemp's ridley	VA	released from Virginia Beach Oceanfront May 31, 2016
VAQS20162041	5/20/2016	Kemp's ridley	VA	released from Virginia Beach Oceanfront June 7, 2016
VAQS20162043	5/22/2016	Kemp's ridley	VA	released from Virginia Beach Oceanfront June 7, 2016
VAQS20162047	5/24/2016	Kemp's ridley	VA	released from Virginia Beach Oceanfront June 17, 2016
VAQS20162049	5/25/2016	Kemp's ridley	VA	released from Virginia Beach Oceanfront May 31, 2016
VAQS20162050	5/26/2016	Kemp's ridley	VA	released from Virginia Beach Oceanfront October 20, 2016
VAQS20162051	5/27/2016	leatherback	VA	disentangled from pound net May 27, 2016
VAQS20162054	5/28/2016	Kemp's ridley	VA	released from Virginia Beach Oceanfront June 27, 2016
VAQS20162055	5/28/2016	Kemp's ridley	VA	released from Virginia Beach Oceanfront July 22, 2016
VAQS20162056	5/29/2016	Kemp's ridley	VA	released from Virginia Beach Oceanfront June 17, 2016
VAQS20162057	5/29/2016	Kemp's ridley	VA	current VAQS patient
VAQS20162058	5/29/2016	Kemp's ridley	VA	released from Virginia Beach Oceanfront June 27, 2016
VAQS20162060	5/29/2016	leatherback	VA	unknown (pound net entanglement)
VAQS20162061	5/31/2016	Kemp's ridley	VA	current VAQS patient
VAQS20162062	6/1/2016	Kemp's ridley	VA	released from Virginia Beach Oceanfront June 27, 2016
VAQS20162064	6/1/2016	Kemp's ridley	VA	released from Virginia Beach Oceanfront July 1, 2016
VAQS20162067	6/2/2016	unidentified	VA	released from capture location by fisher June 2, 2016
VAQS20162072	6/2/2016	unidentified	VA	released from capture location by fisher June 2, 2016
VAQS20162080	6/4/2016	green	VA	released from Virginia Beach Oceanfront June 17, 2016
VAQS20162081	6/4/2016	unidentified	VA	released from capture location by fisher June 4, 2016
VAQS20162082	6/4/2016	leatherback	VA	disentangled from pound net June 4, 2016
VAQS20162095	6/4/2016	leatherback	VA	disentangled from pound net June 4, 2016
VAQS20162089	6/6/2016	Kemp's ridley	VA	released from Virginia Beach Oceanfront July 2, 2016
VAQS20162093	6/6/2016	loggerhead	VA	released from capture location by fisher June 6, 2016
VAQS20162096	6/8/2016	unidentified	VA	released from capture location by fisher June 8, 2016
VAQS20162099	6/9/2016	leatherback	VA	disentangled from pound net June 9, 2016
VAQS20162101	6/10/2016	leatherback	VA	disentangled from pound net June 10, 2016
VAQS20162102	6/11/2016	loggerhead	VA	unable to recover
VAQS20162123	6/18/2016	unidentified	VA	released from capture location by fisher June 18, 2016
VAQS20162137	6/25/2016	unidentified	VA	released from capture location by fisher June 25, 2016
VAQS20162136	6/26/2016	unidentified	VA	released from capture location by fisher June 26, 2016

Table 4: Live stranded sea turtles *cont.*

Field Number	Strand Date	Species	State	Final Disposition
VAQS20162149	7/10/2016	loggerhead	VA	released from Virginia Beach Oceanfront July 29, 2016
VAQS20162155	7/12/2016	unidentified	VA	released from capture location by fisher July 12, 2016
VAQS20162157	7/13/2016	Kemp's ridley	VA	released from Virginia Beach Oceanfront July 22, 2016
VAQS20162167	8/4/2016	loggerhead	VA	released from Virginia Beach Oceanfront Sept 21, 2016
VAQS20162170	8/8/2016	loggerhead	VA	released from capture location by fisher August 8, 2016
VAQS20162185	9/2/2016	loggerhead	VA	died, frozen for later necropsy
VAQS20162186	9/3/2016	loggerhead	VA	dead on arrival, necropsied
VAQS20162192	9/17/2016	loggerhead	VA	current VAQS patient
VAQS20162201	10/1/2016	Kemp's ridley	VA	current VAQS patient
VAQS20162217	10/18/2016	unidentified	VA	released from capture location by fisher October 18, 2016
VAQS20162222	10/24/2016	Kemp's ridley	VA	released from Virginia Beach Oceanfront October 28, 2016
VAQS20162226	10/30/2016	Kemp's ridley	VA	released from Dare, NC November 1, 2016
VAQS20162230	11/6/2016	Kemp's ridley	VA	current VAQS patient
VAQS20162232	11/9/2016	loggerhead	VA	current VAQS patient
VAQS20162237	11/16/2016	loggerhead	VA	current VAQS patient
VAQS20162238	11/16/2016	loggerhead	VA	current VAQS patient
VAQS20162240	11/23/2016	loggerhead	VA	unable to recover
VAQS20162241	11/23/2016	Kemp's ridley	VA	current VAQS patient
VAQS20162242	11/25/2016	green	VA	current VAQS patient
VAQS20162251	12/13/2016	Kemp's ridley	VA	died, frozen for later necropsy
VAQS20162252	12/18/2016	Kemp's ridley	VA	current VAQS patient
VAQS20162257	12/24/2016	loggerhead	VA	current VAQS patient

NAIB = National Aquarium in Baltimore

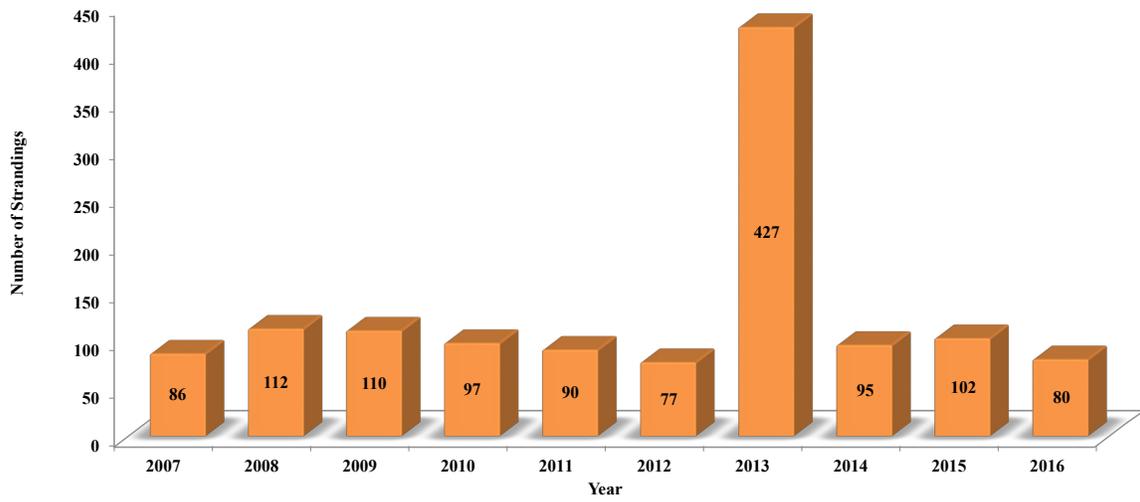


Figure 1: Yearly frequency of marine mammal strandings in Virginia, 2007-2016.

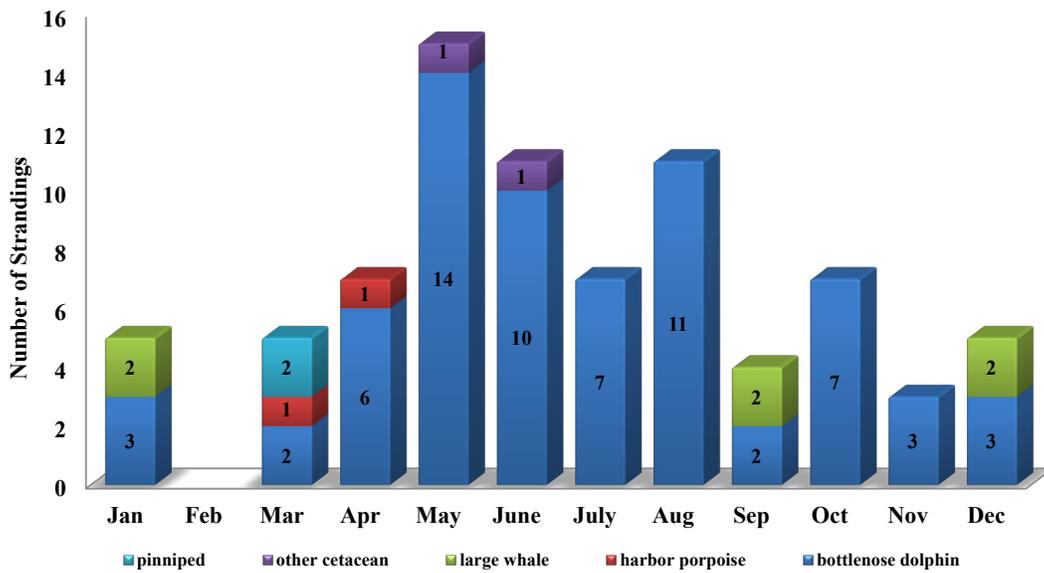


Figure 2: Monthly frequency of marine mammal strandings in Virginia from 2016.

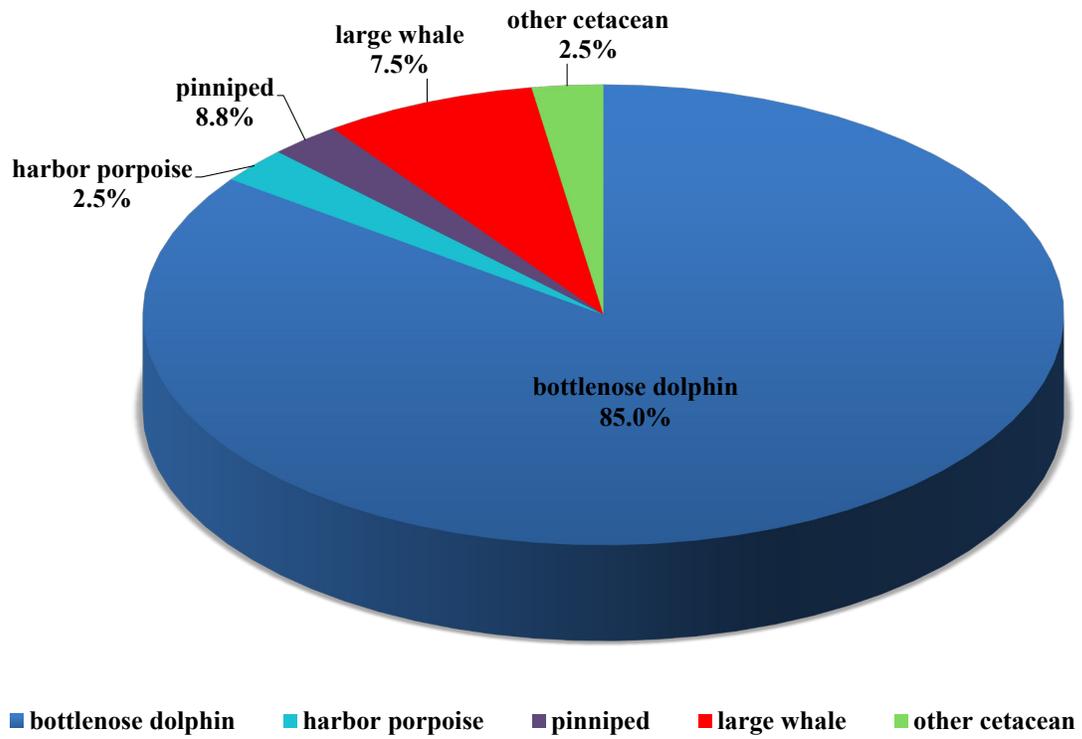


Figure 3: Marine mammal strandings in Virginia from 2016.

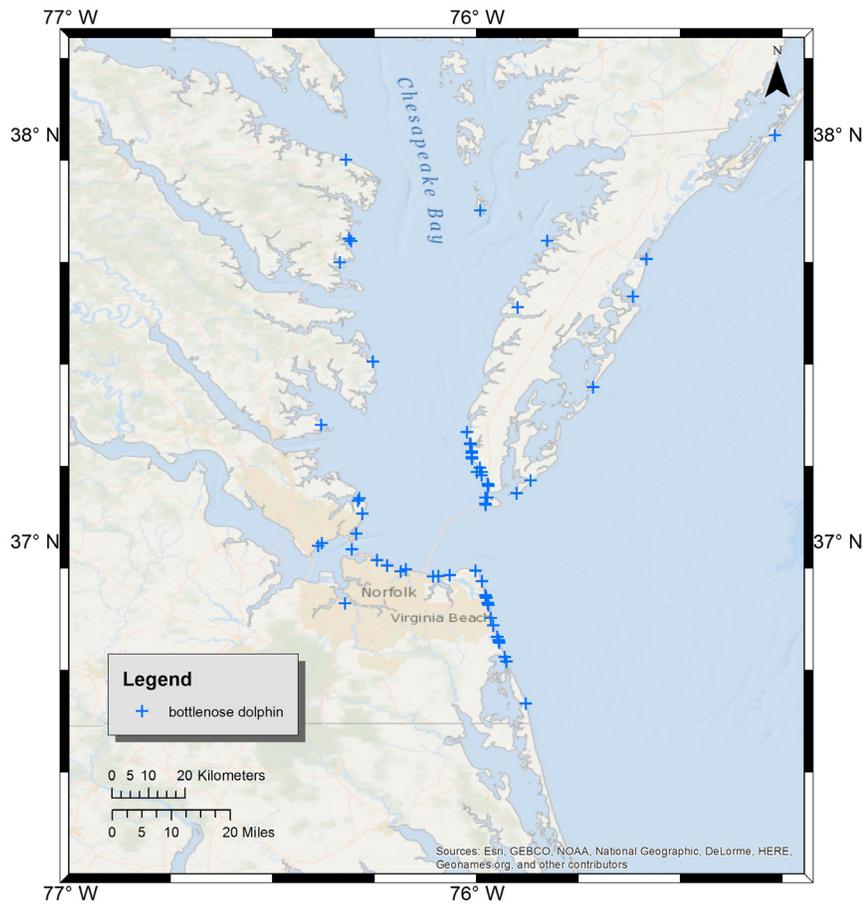


Figure 4: Location of Virginia bottlenose dolphin strandings from 2016.

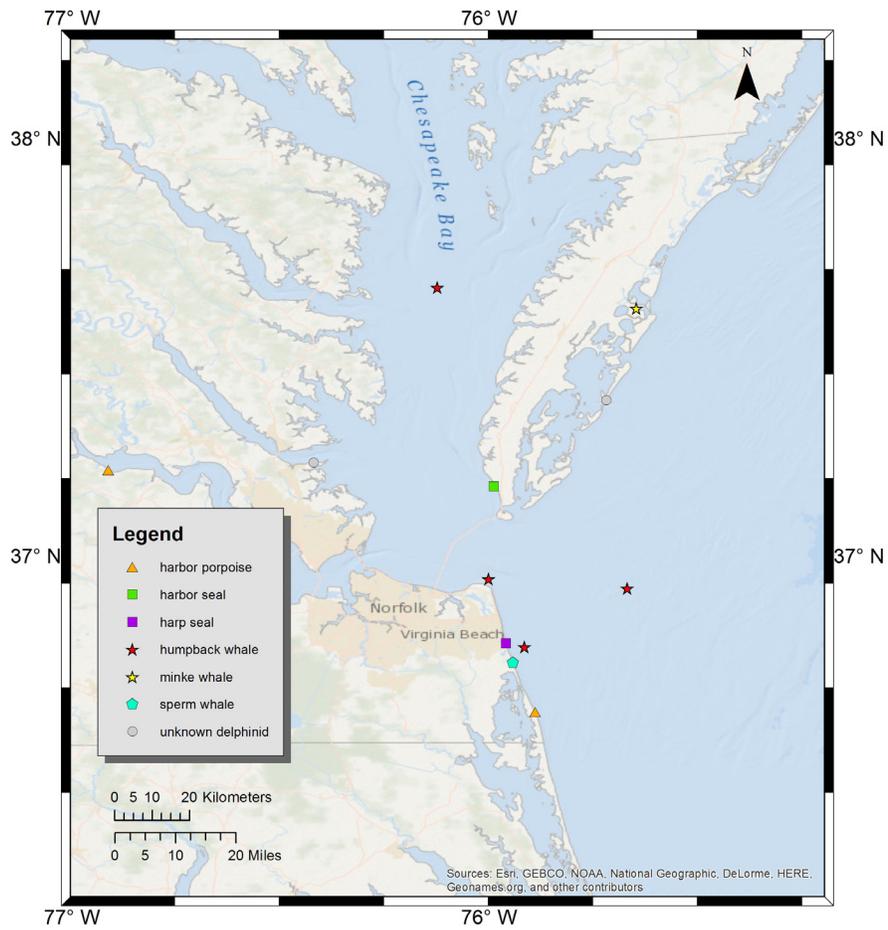
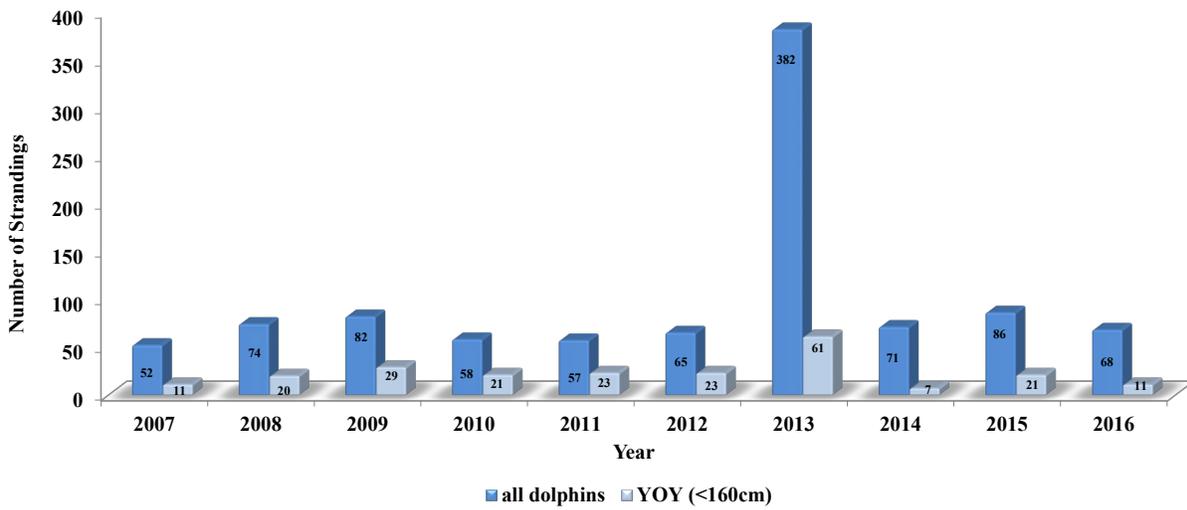


Figure 5: Location of Virginia non-bottlenose dolphin marine mammal strandings from 2016.

A. Bottlenose dolphin



B. Harbor porpoise

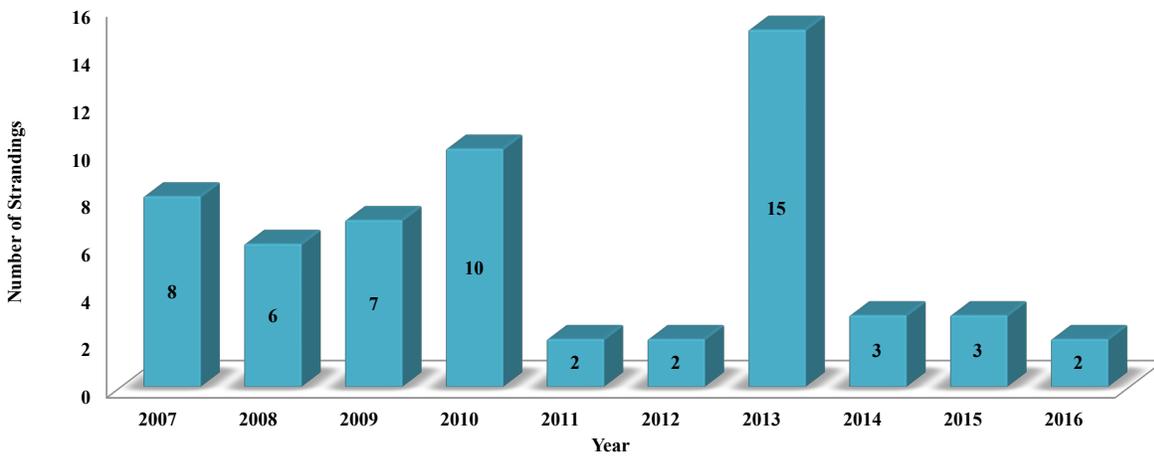
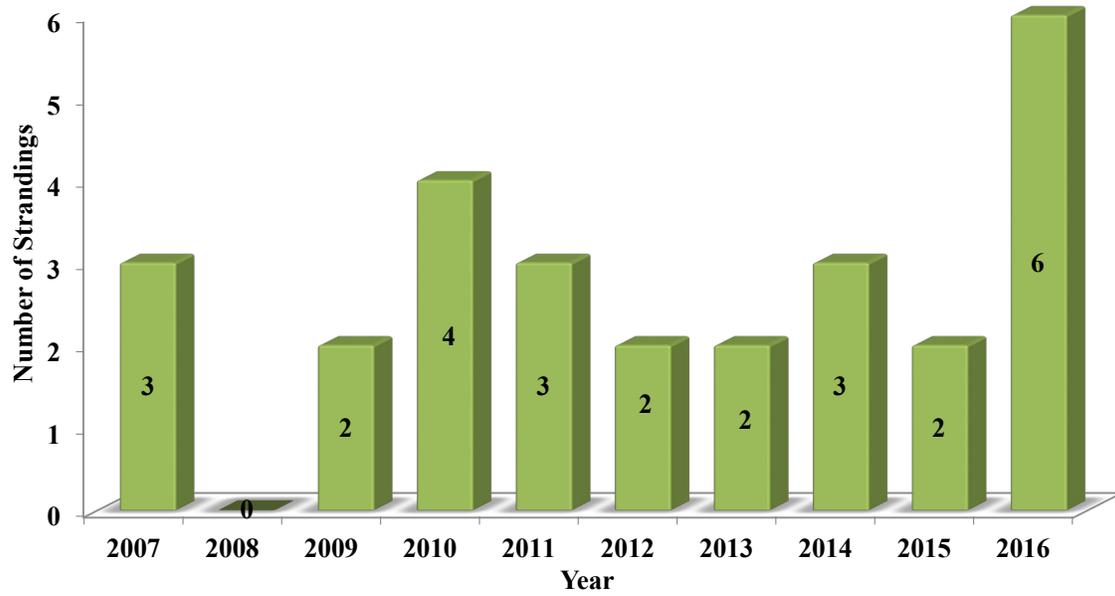


Figure 6 A-B: Yearly stranding frequency for bottlenose dolphin and harbor porpoise in Virginia, 2007-2016 (YOY = young of the year).

C. Large whales



D. Phocids

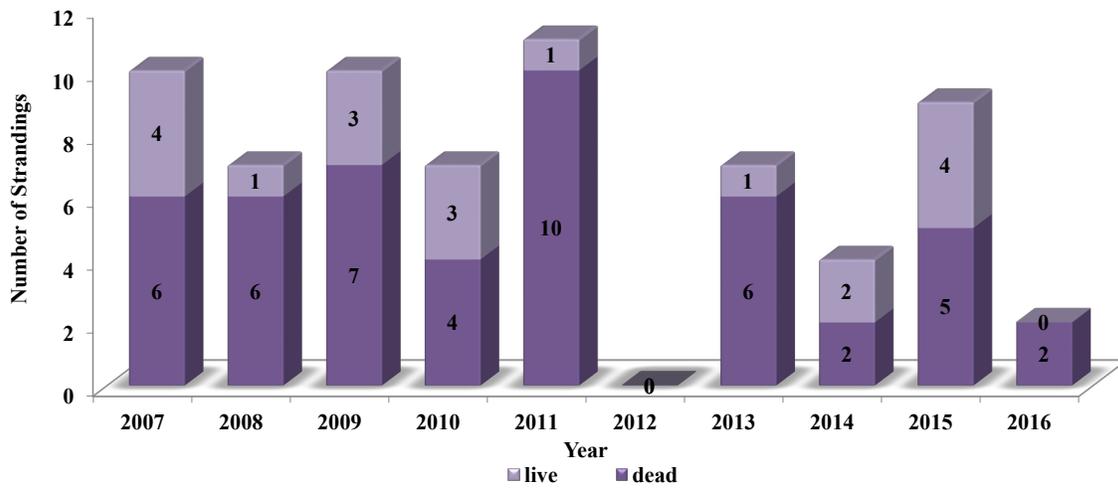


Figure 6 C-D: Yearly stranding frequency for large whales and phocids in Virginia, 2007-2016.

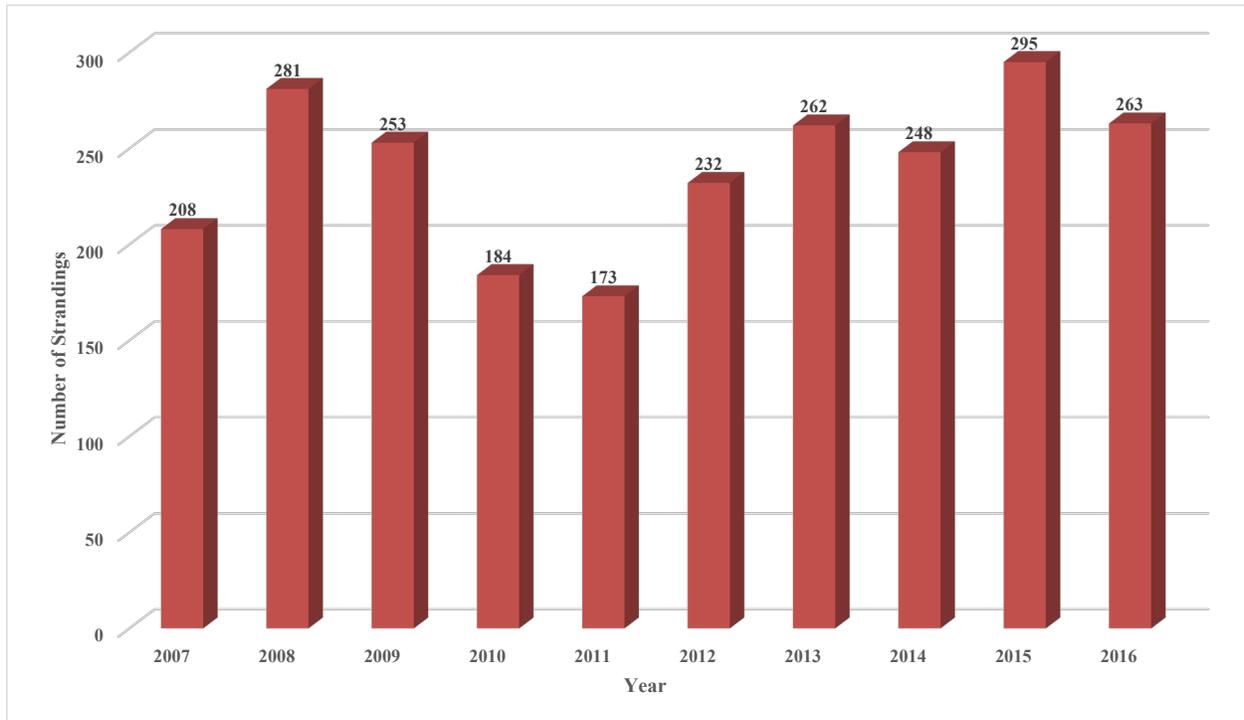


Figure 7: Yearly frequency of sea turtle strandings in Virginia, 2007-2016.

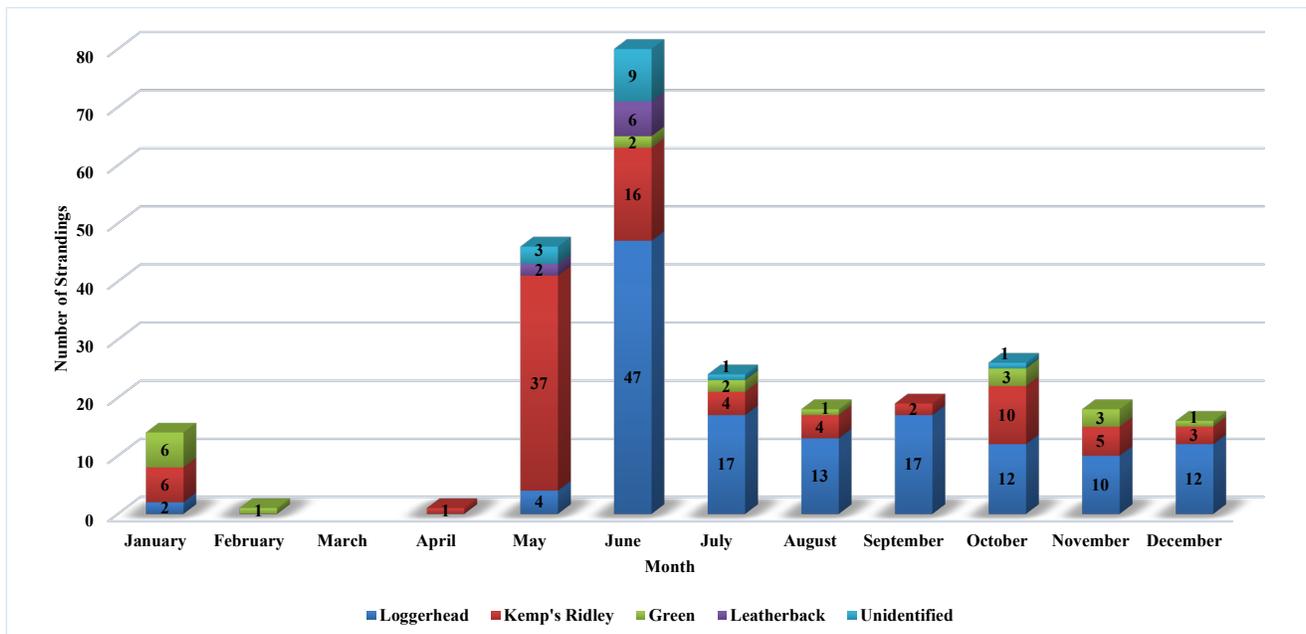


Figure 8: Monthly frequency of sea turtle strandings in Virginia from 2016.

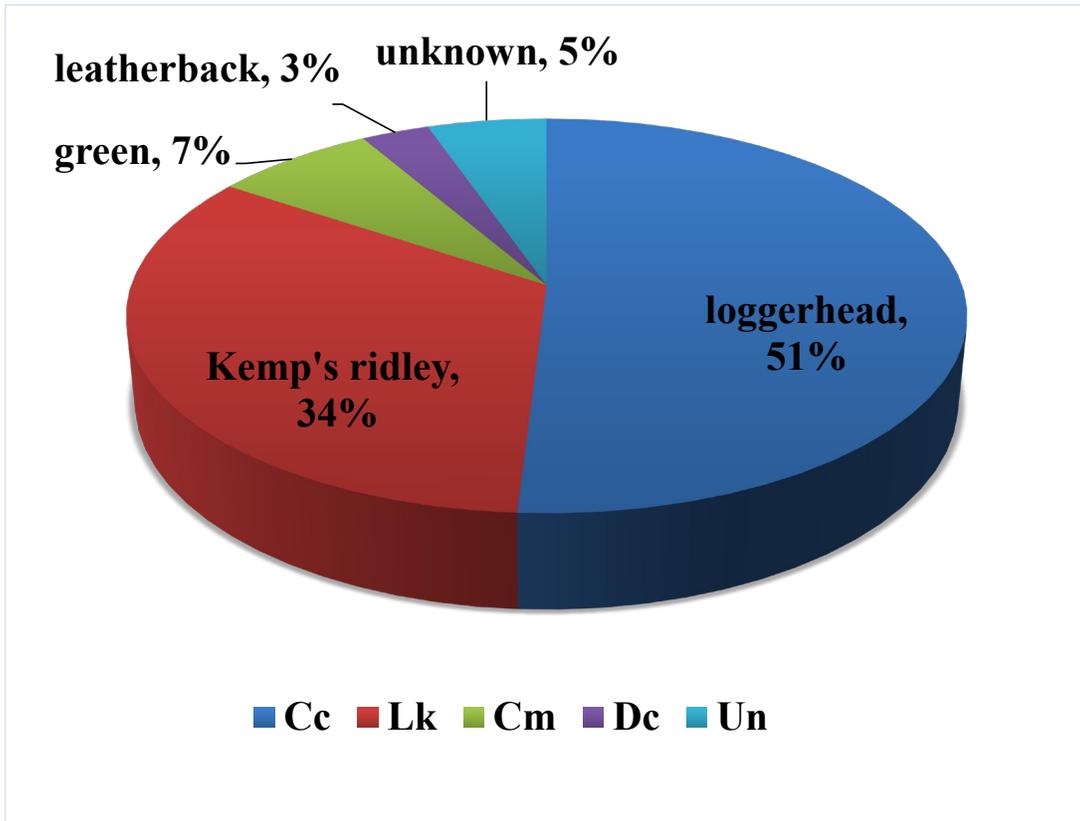


Figure 9: Sea turtle strandings in Virginia from 2016.

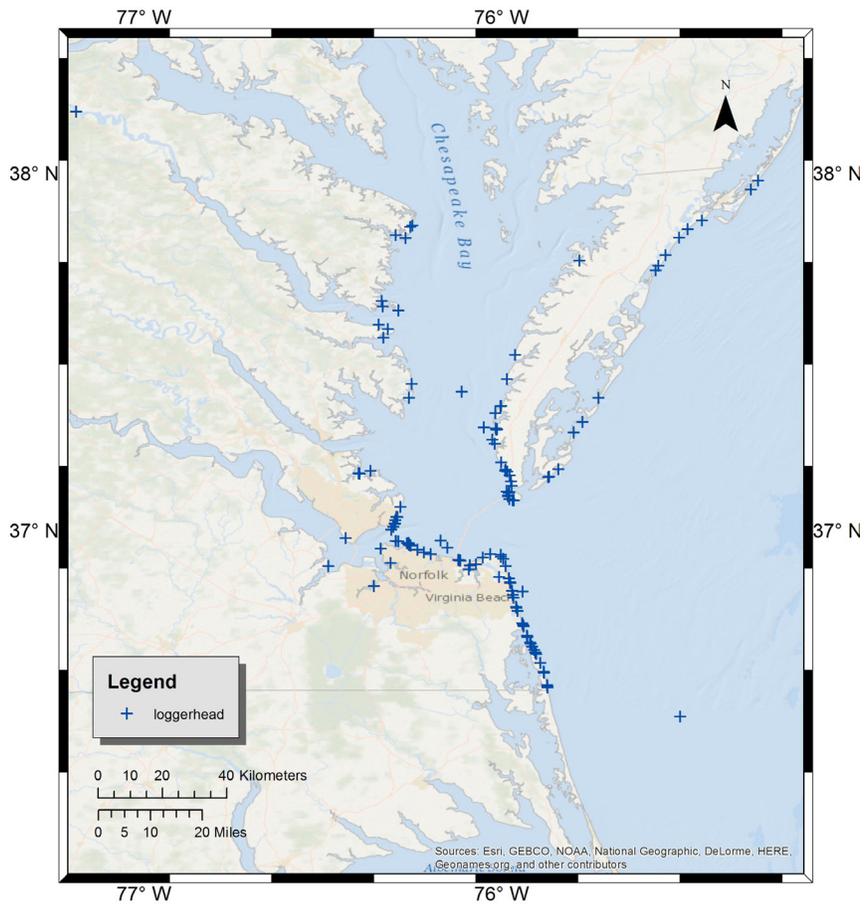


Figure 10: Location of Virginia loggerhead sea turtle strandings from 2016.

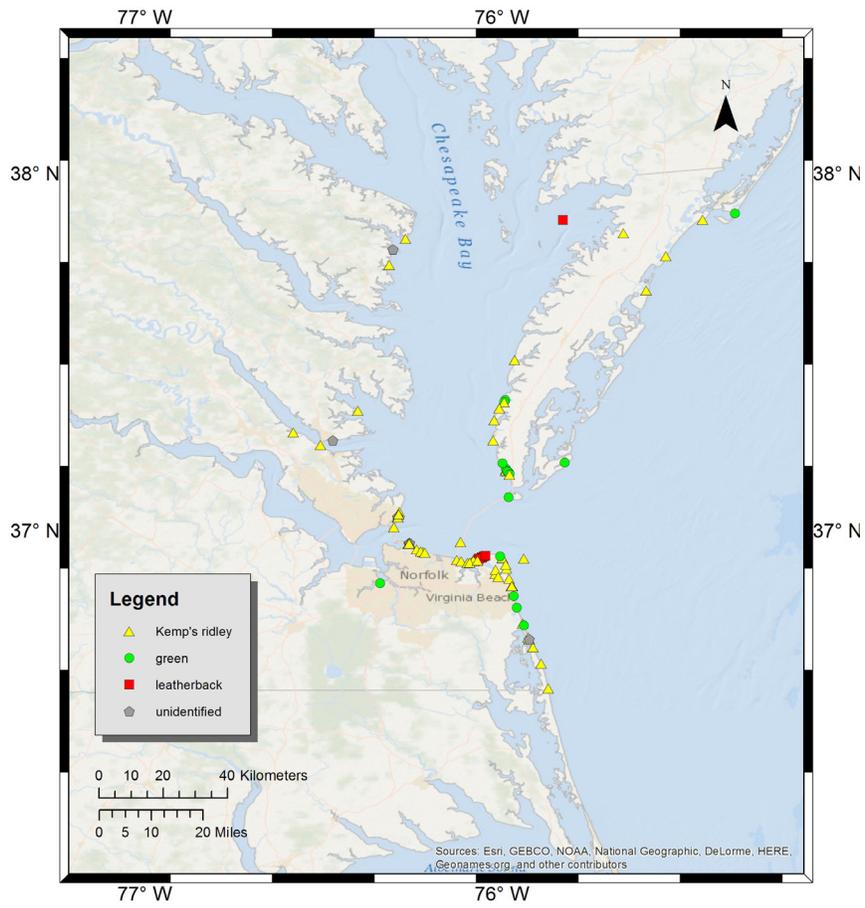


Figure 11: Location of Virginia non-loggerhead sea turtle strandings in 2016.

Appendix I: 2016 Professional and Educational Activities**Educational Activities**

<u>Description</u>	<u>Date</u>	<u>Attendance</u>
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Outreach Opportunities

Winter Wildlife Festival	1/30/2016	1000
VLM Reptile Weekend	2/13-14/2016	2200
VA Audubon Meeting	3/14/2016	ND
Tidewater Master Naturalists	4/4/2016	20
Seatack Party for the Planet	4/19/2016	ND
Earth Day at Mt. Trashmore	4/23/2016	ND
VA Audubon Meeting	5/9/2016	ND
Community Fun Day at Haygood UMC	7/16/2016	ND
Cape Henry Rotary Club Oyster Roast	9/18/2016	400
Eastern Shore Birding Festival	10/8/2016	160
Ducks Unlimited Greenwing Event	10/23/2016	ND
Bayside Library Block Party	11/8/2016	400
Canon Environmental Fair	11/10/2016	ND

Public Presentations

VAQ Research Symposium	4/6/2016	35
Sea Turtle Release	7/22/2016	500

Stranding Center Tours & Group Presentations

Girl Scout Troop 82	2/1/2016	15
Esther Horvath, photojournalist	2/25-27/2016	1
Knee Deep in the Chesapeake	3/1/2016	15
Mentoring Young Scientists	3/19/2016	40
SAIC Visit/tour of MACC	4/2/2016	44
SWAT Camp	7/8/2016	15
SWAT Camp	7/19/2016	15
SWAT Camp	8/2/2016	15
CNWR staff/interns/volunteers	8/3/2016	17
Bayside Elementary	11/21/2016	30
Knee Deep in the Chesapeake	12/1/2016	15

Virginia Aquarium Talks and Events

Volunteer Open House	1/21/2016	200
Homeschool Day (sea turtle presentation)	1/29/2016	50
Princess Anne High School (whale presentation)	3/4/2016	30
Norfolk Tides Video Filming	4/5/2016	20
Staff Stranding Exhibit for Event	9/12/2016	ND
Volunteer Open House	9/22/2016	ND

Staff Training

Helicopter Underwater Egress Training	2/1/16	8
NCTC Class- Scientific Writing for Publication	5/25-29/16	12
Sea Turtle Nesting Training	7/20/2016	8
Boat-based large whale survey training	9/6-10/6	6
NCTC Class- Geographic Information Systems	10/16-21/2016	12

Appendix I: Professional and Education Activities cont.

<u>Description</u>	<u>Date</u>	<u>Attendance</u>
<u>Stranding Response Team & Cooperator Meetings & Trainings</u>		
TRL and Outreach Meeting	3/2/2016	10
Business Meeting	3/11/2016	60
Natural History Training	4/16&20/2016	70
Hands on response training	4/17-24/2016	70
VB Animal Control Stranding and Nesting Training	5/1/2016	12
Advanced Volunteer Necropsy Training	5/16/2016	20
ESNWR Cooperator Training	5/20/2016	15
CNWR Cooperator Training	5/27/2016	15
BBNWR Cooperator Training	6/10/2016	10
TRL Meeting	10/6/2016	6
Cold stun ST / Seal volunteer training	11/3/16	18
Cold stun ST / Seal volunteer training	11/19/16	20
North Carolina Stranding Partners Annual Meeting	12/15/2016	25
<u>Other</u>		
Prescot Technical Review Panel Webinar	1/20-21/2016	NA
Provide support to PMMC for California Sea Lion UME	4/3-9/2016	NA
Provide support to MMCC for California Sea Lion UME	3/20-26/2016	NA
Provide support to NC stranding network	multiple dates	20
Provide support to National Marine Fisheries Service and LA Dept Wildlife (Whale necropsy lead)	12/2-4/2016	10
<u>Scientific Conferences, Professional Meetings and Workshops</u>		
MARCO Mid-Atlantic Ocean Planning MDAT Meeting	1/29/2016	75
AMMPA Annual Meeting	2/7-12/2016	100
Southeast Regional Sea Turtle Meeting (SERSTM)	2/9-12/2016	ND
UME Hotwash	2/21-24/2016	ND
Aquarium Conservation Partnership (ACP) Steering Committee Meeting	2/23-24/2016	20
International Symposium on Sea Turtle Biology and Conservation	2/28-3/5/2016	800
Marco MDAT meeting	3/11/2016	ND
Navy Environmental Monitoring Meeting	3/13/2016	ND
Mid-Atlantic Regional Planning Body Meeting	3/22-24/2016	75
SEAMAMMS Conference (session chair/judging)	4/1/2016	ND
MARCO Submarine Canyons Meeting	4/7/2016	50
IAAAM (hosted by Virginia Aquarium)	5/21-26/2016	400
Scientific Committee Meeting International Whaling Commission (IWC)	6/7-7/17/2016	100
VCN Climate Action Forum	6/14/2016	40
Virginia CZM Balloon Social Marketing Study Meeting	6/22/2016	12
Mid-Atlantic Fisheries Management Council Meeting	8/8-9/2016	50
AZA SAFE Meeting - Developing a NC Sea Turtle Conservation Plan	8/15-16/2016	30
MARCO Mid-Atlantic Ocean Planning Data Analysis Meeting	8/17/2016	50
National Stranding Conference	9/5-9/9/16	200

Appendix I: Professional and Education Activities cont.

Description	Date	Attendance
National Stranding Conference (steering committee & sub-committee co-chair)	9/5-9/9/16	200
National Stranding Conference (workshop instructor)	9/5-9/9/16	120
Association of Zoos and Aquariums (AZA) Annual Conference	9/6-9/2016	1200
Meeting with Monterey Bay National Marine Sanctuary	9/22-23/2016	10
International Aquarium Conference	9/25-29/2016	750
ACP Plastic Pollution Subcommittee Meeting	10/24/2016	20
Virginia CZM Program Coastal Partners Workshop	11/16-17/2016	50

Scientific Publications and Presentations

- Barco, S.G., G.G. Lockhart, J.C. Watterson, A. S.A. Rose, A.D. DiMatteo. Evidence of pier fidelity in hooked and released loggerhead and Kemp's ridley sea turtles using acoustic and satellite telemetry. Oral Presentation at the 2016 Southeast Regional Sea Turtle Meeting, February 9-12, Mobile, AL.
- Barco, S., Law, M., Drummond, B., Koopman, H., Trapani, C., Reinheimer, S., Rose, S., Swingle, W.M., & Williard, A. (2016). Loggerhead turtles killed by vessel and fishery interaction in Virginia, USA, are healthy prior to death. *Marine Ecology Progress Series*, 555, 221-234.
- Costidis, AM and Pabst, DA: Basic Anatomy of Marine Mammals and Sea Turtles. Necropsy workshop instructional lecture. National Marine Animal Health and Stranding Conference, Shepherdstown, VA
- Costidis, AM and Pabst, DA: Advanced Anatomy of Marine Mammals and Sea Turtles. Necropsy workshop instructional lecture. National Marine Animal Health and Stranding Conference, Shepherdstown, VA
- Costidis, A.M. and Rommel, S.A. 2016. The Extracranial Arterial System in the Heads of Beaked Whales, with Implications on Diving Physiology and Pathogenesis. <http://onlinelibrary.wiley.com/doi/10.1002/jmor.20478/abstract>
- Costidis, A.M. and Rommel, S.A. 2016. The Extracranial Venous System in the Heads of Beaked Whales, with Implications on Diving Physiology and Pathogenesis. <http://onlinelibrary.wiley.com/doi/10.1002/jmor.20437/abstract>
- Rose, S.A., K.J. O'Hara, K.M. Williams, S.G. Barco. A seasonal approach for assessing hooked sea turtles. Poster Presentation at 2016 Southeast Regional Sea Turtle Meeting, February 9-12, Mobile, AL.
- Rose, S.A., K.J. O'Hara, K.M. Williams, S.G. Barco. A seasonal approach for assessing hooked sea turtles. Poster Presentation at 2016 International Association of Aquatic Animal Medicine, May 20-27, Virginia Beach, VA.
- Rose, S.A., K.J. O'Hara, K.M. Williams, S.G. Barco. A seasonal approach for assessing hooked sea turtles. Oral Presentation at 2016 Virginia Aquarium Research Symposium, April 6, Virginia Beach, VA.
- Swingle, W. M., Barco, S.G., Lockhart, G.G., Rose, S.A., Mallette, S.D., and Boettcher, R. 2016. Developing an Ecosystem-Based Conservation Plan for Sea Turtles in Virginia and Maryland, USA. Oral presentation at the 36th International Symposium on Sea Turtle Biology and Conservation, Lima, Peru, February 28 – March 5, 2016.
- Williams, K.M., A.L. McNaughton, K.R. Rodrigue, E.B. Bates, E.F. Christiansen. Treatment and rehabilitation of three juvenile loggerheads injured in dredge-take incidents from a single project in Chesapeake Bay. Oral Presentation at 2016 IAAAM. May 22-26, 2016. Virginia Beach, VA.

Appendix II: Highlights of the year – Marine Mammals

Virginia recorded its first live sperm whale (*Physeter macrocephalus*) stranding on Sept 22, 2016. The animal, VAQS20161065, was a female neonate. It was 354 cm long and weighed just over 500 kg. It stranded alive in the Sandbridge area of Virginia Beach and was euthanized by VAQS staff.



There was no obvious cause of the stranding other than that the animal was a dependent calf.

During the 2013 Bottlenose Dolphin Unusual Mortality Event (UME) many more sick animals stranded than healthy animals with signs of Human Interaction (HI) as had occurred prior to 2013. In 2014 and 2015, there continued to be lower proportions of HI positive dolphins than prior to 2013. In 2016, however, the percent of HI positive animals returned to normal levels with approximately 30% of strandings having signs of HI. Mutilation like the removed flukes in the image to the right occurred on at least two bottlenose dolphins that stranded in the fall of 2016. The strandings occurred near the lower eastern shore of Virginia.



Appendix III: Highlights of the year - Sea Turtles



In 2016, like the previous three years, Kemp's ridley turtles hooked by recreational anglers dominated the sea turtle live strandings. The number of live hooked sea turtles has been steadily increasing since 2013. In 2016 we recorded 55 hooked sea turtles. The first report occurred on April 30th, which is fairly early in the season for sea turtle strandings.

Of the 55 turtles that were reportedly hooked by anglers, 38 (69%) were Kemp's ridley turtles, four (7%) were loggerhead turtles and one (2%) was a green turtle. The remaining twelve were not recovered and not identified to species. Most of the turtles were hooked in May and June (n=45; 81%).



Other interesting live strandings included a series of five leatherback entanglements in pound net leaders at Cape Henry in May. The turtles became entangled in the vertical string hedge of the pound net leader and became twisted among the lines as they struggled to free themselves. All of the reportedly entangled turtles were freed by VAQ staff or the general public, two of them at night. One dead leatherback washed ashore near the pound nets but did not have evidence of entanglement.

There was a mild cold stun event in Virginia in late fall, with several loggerhead and Kemp's ridley turtles and one green turtle. The naming theme for cold stuns was Dr. Seuss, so the green turtle to the right was named "Grinch."



Appendix IV: Stranding Network Datasheets

A: Marine Mammal Level A Datasheet

MARINE MAMMAL STRANDING REPORT - LEVEL A DATA

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

COMMON NAME: _____ GENUS: _____ SPECIES: _____

EXAMINER Name: _____ Affiliation: _____

Address: _____ Phone: _____

Stranding Agreement or Authority: _____

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

B: Sea Turtle Level A Datasheet

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 __ __ <hr/> -State coordinator must be notified within 24 hrs; this was done by <input type="checkbox"/> phone (757)385-7575 <input type="checkbox"/> email <input type="checkbox"/> fax (757)437-4933
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SPECIES: (check one)

CC = Loggerhead
 CM = Green
 DC = Leatherback
 EI = Hawksbill
 LK = Kemp's Ridley
 LO = Olive Ridley
 UN = Unidentified

Check Unidentified if not positive. Do Not Guess.

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

SEX:

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

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

 Latitude _____ Longitude _____

CONDITION: (check one)

0 = Alive
 1 = Fresh dead
 2 = Moderately decomposed
 3 = Severely decomposed
 4 = Dried carcass
 5 = Skeleton, bones only

FINAL DISPOSITION: (check)

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

 4 = Pulled up on beach/dune; painted? Yes* No
 6 = Alive, released
 7 = Alive, taken to rehab. facility, where? _____
 8 = Left floating, not recovered; painted? Yes* No
 9 = Disposition unknown, explain _____

**If painted, what color?* _____

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

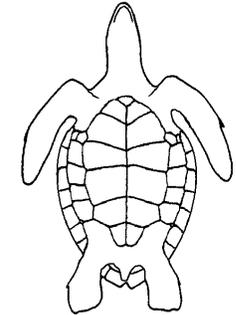
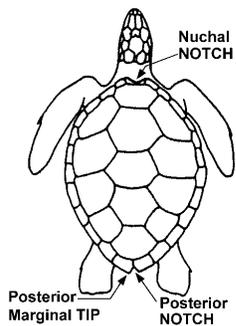
PIT tag scan? Yes No
 If found, record number / tag location

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

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

CARAPACE MEASUREMENTS: (see drawing)

Using calipers Circle unit
 Straight length (NOTCH-TIP) _____ cm / in
 Minimum length (NOTCH-NOTCH) _____ cm / in
 Straight width (Widest Point) _____ cm / in
Using non-metal measuring tape Circle unit
 Curved length (NOTCH-TIP) _____ cm / in
 Minimum length (NOTCH-NOTCH) _____ cm / in
 Curved width (Widest Point) _____ cm / in
 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 2016, Potter 1991).

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

A. Marine mammal species *cont.*

Common Name	Scientific Name	Status
Family: Delphinidae (cont)		
Rough-toothed dolphin	<i>Steno bredanensis</i>	Uncommon
Common dolphin	<i>Delphinus delphis</i>	Common
Striped dolphin	<i>Stenella coeruleoalba</i>	Common
Pantropical spotted dolphin	<i>Stenella attenuata</i>	Common
Atlantic spotted dolphin	<i>Stenella frontalis</i>	Common
Family: Phocoenidae		
Harbor porpoise	<i>Phocoena phocoena</i>	Common
Order: Carnivora		
Suborder: Pinnipedia		
Family: Phocidae		
Harbor seal	<i>Phoca vitulina</i>	Common
Gray seal	<i>Halichoerus grypus</i>	Common
Hooded seal	<i>Cystophora cristata</i>	Common
Harp seal	<i>Pagophilus groenlandica</i>	Common

B. Sea turtle species in stranding records from Virginia, U.S.A. (Virginia Aquarium Sea Turtle Stranding Database 2016).

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