



**BALTIMORE CANYON URBAN NATIONAL  
MARINE SANCTUARY NOMINATION**

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## **Section I – Basics**

**Title:** Baltimore Canyon Urban National Marine Sanctuary Nomination

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## **Section II – Introduction**

### **Narrative Description**

The National Aquarium is pleased to nominate the Baltimore Canyon as our nation's first urban national marine sanctuary. Our nomination will demonstrate the ecological significance of this canyon along with the opportunity to create a movement of ocean literacy in our urban areas.

Baltimore Canyon is among the largest of more than 70 submarine canyons found along the continental shelf of the Mid-Atlantic and is home to fragile, slow-growing deep-sea corals not typically found in other Mid-Atlantic habitats. The delicate, slow-growing nature of these deep-sea corals makes them particularly vulnerable and once damaged, may take centuries to recover and regrow. The Baltimore Canyon was the first place in the Mid-Atlantic with documented presence of *Lophelia pertusa*, an important structure-forming cold-water scleractinian coral. Discovered during a research cruise in September 2012, this coral was determined to be genetically distinct from other populations of *L. pertusa* in the Gulf of Mexico, southeastern United States and the New England seamounts (Brooke & Ross, 2014). Using measured and inferred growth rates, the age of *L. pertusa* colonies in the Baltimore Canyon was determined - the largest colony estimated to have a maximum age of 400 years.

The canyon itself is dense with biologically important nutrients and chemicals that support a robust food web of bacteria, corals, mussels, sponges, anemones, crabs, lobsters and fish. Moreover, the Baltimore Canyon is home to the first methane cold seep discovered in the Mid-Atlantic as well as to one of the largest seeps in the region. Deep-sea corals and rare methane seeps form the basis of a unique ecosystem that nourishes and supports a rich food chain extending upwards more than a mile into the water column. The Baltimore Canyon is an ecological treasure, unique in its attributes, and deserves protective sanctuary designation.

While Baltimore Canyon itself is not easily accessible by large audiences, we have an unprecedented opportunity with this sanctuary designation to connect diverse urban communities to the science of deep-sea exploration through cutting edge technology, thus making it a truly urban national marine sanctuary – and creating an opportunity to change our paradigm of how we perceive distance and connectivity to our deep seas.

Designating the Baltimore Canyon as our nation's first urban national marine sanctuary will appropriately recognize and protect its ecological diversity while sustaining appropriate uses. It will also catalyze partnerships between a wide array of stakeholders including educational institutions, conservation organizations and technology companies (many of whom are listed as

supporters in the appendix), to expose, educate and prepare our youth for the next frontier of exploration, creating much needed new STEM career pathways.

The National Aquarium has amassed over 2,900 petition signatures from residents in 38 states, the District of Columbia, Puerto Rico, and eight other countries all expressing support for the designation of the Baltimore Canyon as our nation's first urban national marine sanctuary. We have also met with and sought input from a wide array of stakeholders in preparing this nomination, and have received strong support from educational and research institutions, the technology, energy, maritime, and tourism industries, conservation organizations, civic groups and philanthropic foundations. All agree it is time to invest in our urban areas and our deep seas.

### **Goals Description**

The goals associated with the nomination of the Baltimore Canyon as a national marine sanctuary are as follows:

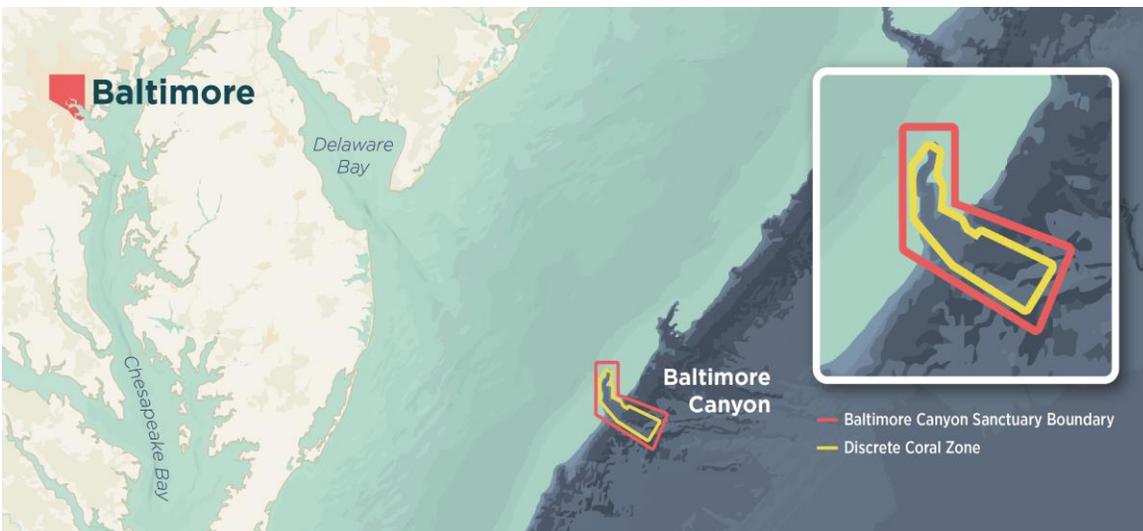
- 1. Protect important marine habitats and the ecosystems that depend on them.** The hard substrate of the Baltimore Canyon is home to a variety of deep-sea corals, methane cold seeps and a wide diversity of life. These important benthic habitats sustain bottom-dwelling marine life and support pelagic animals, including highly migratory species of recreationally and commercially important fish in the upper water column. Deep-sea corals and methane seep communities are slow growing, making them highly susceptible to disturbance and damage.
- 2. Increase ocean literacy, particularly amongst urban youth, by creating new and expanded opportunities for engagement with ocean research and exploration through technology.** By developing partnerships between Baltimore's educational and scientific communities and researchers exploring the Canyon, national marine sanctuary status would provide an opportunity to expose the public, particularly young people, to ocean exploration technology while sparking new STEM career pathways. An urban national marine sanctuary will be accessible to everyone, but programs will intentionally engage youth from historically under-resourced communities.
- 3. Encourage research to improve our understanding of the Baltimore Canyon ecosystem and the threats associated with its ability to thrive.** Less than 1 percent of our ocean has been explored. While recent ocean exploration missions have partially focused on the Baltimore Canyon, relatively little is known about the myriad of environmental factors that lead to the rich biodiversity within the Canyon walls and the threats they face. Sanctuary designation could facilitate additional research.
- 4. Build a regional hub of public and private partners to support marine exploration, environmental education, job skills training and ocean stewardship.** Sanctuary designation for the Baltimore Canyon will incentivize private investments to complement public resources toward a more ocean-literate public. Already, several representatives from marine industries, technology companies and education institutions have begun to form a unique consortium supporting the concept of the Baltimore Canyon as the first urban national marine sanctuary. This diverse and growing group of public and private partners, focused on a common purpose, will be able to build and implement a robust set of educational programs designed to inspire conservation of our deep seas and foster a sense of connectedness.
- 5. Support and catalyze economic opportunities through the promotion and development of current and future sustainable activities around Baltimore Canyon.** The multi-use

nature of national marine sanctuaries will allow the current uses of the Baltimore Canyon to continue while promoting additional initiatives to spark future economic growth. Sanctuary status could positively influence technology, research, exploration, maritime, tourism, hospitality and recreation industries as place-based programs are developed and initiated. Moreover, protection of the Baltimore Canyon will ensure this area remains a viable resource for fishermen.

- 6. Establish and maintain a transparent and participatory sanctuary management process.** Designation of Baltimore Canyon as a sanctuary will complement other ocean resource management by bringing together diverse stakeholders to advise science-based management and community-focused programs. Sanctuary designation provides both a process and forum for collaborative decision-making, which is necessary to meet the needs of multiple users and achieve common ground.

### Location Description

The Baltimore Canyon is among the largest of more than 70 submarine canyons found along the continental shelf of the Mid-Atlantic. An example of a shelf-sourced submarine canyon, it was formed millions of years ago by an ancient channel of what is now the Delaware River. The Canyon is 45 km (28 miles) long and over 8 km (5 miles) wide at the mouth. The head, or shallowest part of the canyon, is 109 km (68 miles) east of Ocean City, Maryland, and 122 km (76 miles) southeast of the mouth of the Delaware Bay. By extension, the Canyon lies less than 109 km (68 miles) off the coast of Maryland and close to the over 9 million people currently living in the Baltimore-Washington, D.C. corridor. The incision of the Canyon in the continental shelf begins at approximately 70 meters (230 feet) depth and extends well beyond 1,800 meters (5,906 feet) at the mouth. NOAA co-sponsored preliminary exploration of the Baltimore Canyon by the NOAA ship *Nancy Foster* in 2011 (sonar mapping only) and 2012 (via deep-sea remote operated vehicle). This exploration informed our knowledge of the ecological significance and educational value of the Baltimore Canyon, while also demonstrating how much is left to be explored.



Proposed sanctuary boundaries for Baltimore Canyon.

The proposed Baltimore Canyon Urban National Marine Sanctuary boundaries would encompass 386 km<sup>2</sup> (149 square miles) of ocean area. The boundary is depicted in the map above and is defined by the following coordinates; A. 38° 26' N, 73 ° 89' W, B. 38° 08' N, 73° 89' W, C. 37° 97' N, 73° 66' W, D. 38° 07' N, 73° 58' W, E. 38° 16' N, 73° 81' W, and F. 38° 26' N, 73° 81' W. The proposed boundary encompasses a high concentration of known deep-sea coral locations (NOAA, n.d. a), a methane cold seep site (Dr. Steve Ross, pers. comm., 2016), deep-sea coral habitat designated as *very high* in predictive models (Kinlan et al., 2013) and additional shelf area surrounding the canyon incision necessary to maintain the integrity of the physical and biological processes in and around the canyon (Dr. Steve Ross, pers. comm., 2016). Given that the Baltimore Canyon is located offshore, its proposed boundaries will not be adjacent to any terrestrial areas, but will remain within the U.S. Exclusive Economic Zone.

### **Section III – Criteria Information**

**Criteria 1:** *The area's natural resources and ecological qualities are of special significance and contribute to: biological productivity or diversity; maintenance or enhancement of ecosystem structure and function; maintenance of ecologically or commercially important species or species assemblages; maintenance or enhancement of critical habitat, representative biogeographic assemblages, or both; or maintenance or enhancement of connectivity to other ecologically significant resources.*

Formed by an ancient river millions of years ago, the Baltimore Canyon is dense with biologically important nutrients and chemicals that support a robust food web of bacteria, corals, mussels, sponges, anemones, crabs, lobsters and fish. Deep-sea corals and rare methane seeps form the basis of a unique ecosystem that nourishes and supports a rich food chain that extends more than a mile above in the water column. Scientists have made new discoveries during recent research cruises to Baltimore Canyon. Important discoveries of note include: the first documented colony of *Lophelia pertusa* (an important structure-forming cold water scleractinian coral, some estimated to be at least 400 years old), the first methane cold seep documented in the Mid-Atlantic and new ranges for several species of demersal fish. The resources of the benthic Canyon ecosystem support life throughout the water column, including migratory species as diverse as tunas, sharks, billfish, marine mammals, sea turtles and seabirds – some of which are endangered. The Baltimore Canyon is an ecological treasure and deserves protective designation so that it will remain intact.

#### **Deep-Sea Corals**

The hard substrate at the head and along the walls of Mid-Atlantic submarine canyons—rare in the mostly sandy continental shelf and slope of the Mid-Atlantic Bight—provides suitable habitat for corals, sponges and anemones to attach (Brooke et al., 2016). The Baltimore Canyon supports high coral abundance, which in turn supports a diverse coral-associated community and a high diversity of animals around the corals (Brooke et al., 2016).

Cold-water corals provide critical three-dimensional habitat structures that create biodiversity hot spots in the deep ocean (Kellogg et al., 2016). The Baltimore Canyon is home to fragile, slow-growing deep-sea corals not typically found in other Mid-Atlantic habitats (NOAA, n.d. a). This

delicate, nature of deep-sea corals makes them particularly vulnerable. Once damaged, it may take these corals centuries to recover and regrow.

The Baltimore Canyon was the first place in the Mid-Atlantic with documented presence of *Lophelia pertusa*, an important structure-forming cold-water scleractinian coral. Discovered during a research cruise in September 2012, this coral was determined to be genetically distinct from other populations of *L. pertusa* in the Gulf of Mexico, southeastern United States and the New England seamounts (Brooke & Ross, 2014). Using measured and inferred growth rates, the age of *L. pertusa* colonies in the Baltimore Canyon was determined. The largest colony observed in the canyons would have a maximum age of approximately 400 years (Brooke & Ross, 2014). These research findings showcase the importance of the Baltimore Canyon as a deep-sea coral habitat and underscore the need for additional research.



First *Lophelia pertusa* colony seen in Baltimore Canyon (Image courtesy of Deepwater Canyons 2012 Expedition, NOAA-OER/BOEM).

The following coral species represent a sampling of those that have been documented thus far in the Baltimore Canyon: *Acanthogorgia armata*, *Anthothela grandiflora*, *Anthomastus grandiflorus*, *Desmophyllum dianthus* (cockscomb cup coral), *Duva florida*, *Flabellum alabastrum*, *Lophelia pertusa*, *Paragorgia arborea* (bubblegum coral), *Paramuricea placomus*, and *Primnoa resedaeformis* (red tree coral) (Brooke et al., 2016; Chase et al., 2014; Hecker et al., 1980; Kellogg et al., 2016; MARCO Data Portal, 2016; NEFMC, 2012).

### **Methane Cold Seeps**

Baltimore Canyon is home to the first methane cold seep discovered in the Mid-Atlantic (Hecker et al., 1980). Methane cold seeps are natural gas leaks on the seafloor that release methane into the surrounding water column (Ruff et al., 2015). Because organisms living at the depths at the bottom of the canyon cannot rely on photosynthetic energy from the sun, many instead use alternative chemosynthetic energy sources. A unique ecosystem has been created by the methane cold seeps within the Baltimore Canyon because of the methane that it provides for chemosynthetic species. “Cold seeps are distinct seafloor ecosystems that are defined by upward advection of methane and other hydrocarbons from the subsurface seabed to the seafloor. Gas-emitting methane seeps... are separated by large expanses of energy-limited, aerobic, deep-sea seafloor where the benthic communities depend on sparse detritus flux. These seeps can be regarded as patches of a certain habitat type, offering niches that differ strongly from the surrounding seafloor” (Ruff et al., 2015).

Microorganisms that inhabit methane seeps convert the chemical energy in methane to products that sustain rich benthic communities. Chemosynthetic organisms consume the methane and form the base of a food web for a variety of invertebrates and fish, fueling a hotspot of biomass

and diversity in the deep sea (Ruff et al., 2015). Cold seep ecosystems and sulfate methane transition zones provide critical ecosystem function towards natural mitigation of climate change. It is estimated that globally, seep ecosystems consume 75 percent of methane emitted along the seafloor (Ruff et al., 2015).

The Baltimore Canyon cold seep community was found to be dominated by the mussel *Bathymodiolus childressi*, which have chemosynthetic bacteria in their tissues. These animals are endemic to cold seeps and cannot survive in other environments. The Baltimore Canyon encompasses the northernmost known occurrence of this mussel species (Dr. Sandra Brooke, pers. comm., 2016).

### **Fish and Invertebrates**

The corals present in the Baltimore Canyon provide natural refuges for fish and invertebrates. These complex habitats are areas of high biodiversity and activity for commercial fish and other marine species (NOAA, 2016a). Research surveys conducted in the Baltimore and Norfolk Canyons yielded a total of 123 fish species, 12 of which were either new records for the region or previously unknown distributional range data (Ross et al., 2015). Of these 12 new species records for the region, the following five species were found specifically in the Baltimore Canyon: catshark (*Apristurus sp.*), cutthroat eel (*Dysommia rugose*), graceful grenadier (*Hymenogadus gracilis*), cusk (*Brosme brosme*), and blotchfin tonguefish (*Symphurus stigmatosus*) (Ross et al., 2015). Commercially important fishes are also common in the Baltimore Canyon, as is fishing activity. The commercially important goosefish, cusk, blackbelly rosefish, and black seabass species have all been seen in the Baltimore Canyon (Brooke & Ross, 2016). More research is needed to determine the full diversity and assemblage of fish species present in Baltimore Canyon.

Invertebrates, an important food source for many fish species, are also present. In September 2012, researchers conducted a remotely operated underwater vehicle dive in the Baltimore Canyon and found an abundant sessile community of sponges (demosponges and hexactinellids) and anemones. Motile fauna included crabs (Jonah crabs and hermit crabs), squat lobsters and small shrimp (Brooke & Ross, 2014). Other invertebrate species found included sea pens and sea spiders.

### **Migratory and Protected Species**

Underwater canyons are physically complex with outcrops, steep slopes, and diverse sediments and provide a high flux of fine-particle nutrients and areas of upwelling associated with high biological productivity (MARCO, 2014). As such, they likely serve an ecologically significant role in connecting highly migratory species such as blue marlin, tuna, pelagic birds and cetaceans across feeding, breeding, nursery and overwintering grounds. Many migratory species have been listed as protected species according to U.S. law under the Endangered Species Act (ESA) and the Marine Mammal Protection Act (MMPA). Migratory data is limited, especially further offshore, but data gathered recently by the Mid-Atlantic Regional Council on the Oceans have shown that the following groups and species are relevant:

### *Cetaceans*

Marine mammals have been documented in high abundance along the Mid-Atlantic shelf (MARCO Data Portal, 2016). Within 72 km (45 miles) of the center of Baltimore Canyon, 17 species of marine mammals have been documented including: minke whale, sei whale, fin whale, North Atlantic right whale, long-finned pilot whale, humpback whale, sperm whale, Sowerby's beaked whale, Cuvier's beaked whale, and eight different species of dolphin. Of these species, the sei, fin, North Atlantic right, and sperm whales are all listed as endangered under the Endangered Species Act (ESA) (Halpin et al., 2009; MAMFC, 2016).

### *Sea Turtles*

Both leatherback (*Dermochelys coriacea*) and loggerhead (*Caretta caretta*) sea turtles have been documented within and surrounding the Baltimore Canyon. The leatherback sea turtle is listed as endangered under the ESA. The Northwest Atlantic Ocean Distinct Population Segment (DPS) of loggerhead sea turtles is listed as threatened (Halpin et al., 2009; MAMFC, 2016).

### *Birds*

The Atlantic Flyway, an important bird migration route, overlaps the location of the Baltimore Canyon. Coastal and near shore bird species are very abundant along the Atlantic coastline. Further out at sea, offshore and pelagic species of seabirds are also found. More than 27 species of birds have been recorded in the area surrounding the Baltimore Canyon, with herring gulls, Wilson's storm petrels, Northern gannets, great black-backed gulls and the black-legged kittiwake being the most abundant species in the region. Also present were great shearwaters, common tern, and roseate tern (Halpin et al., 2009). The following bird species are found within a 72 km (45 mile) radius of Baltimore Canyon and appear on the International Union for Conservation of Nature (IUCN) Red List: Northern fulmar (critically endangered), herring gull (near threatened), and the black-legged kittiwake (vulnerable) (Halpin et al., 2009). No bird species in the selected range are currently listed under the ESA (Halpin et al., 2009).

### *Highly Migratory Fish Species*

Highly migratory species (HMS) including tunas, sharks, swordfish and billfish aggregate above canyons, which are likely productive feeding grounds. Submarine canyons are areas where density fronts between water masses occur, which along with currents in the canyon promote biological productivity (NOAA, 2016b). Atlantic HMS cross national boundaries and so are managed by NOAA's Atlantic HMS Management Division in cooperation with multiple international agreements, including the Food and Agriculture Organization of the United Nations (FAO), International Convention for the Conservation of Atlantic Tuna (ICCAT), and Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES). Of the Atlantic HMS, the following are known to have essential fish habitat (EFH) overlapping with the Baltimore Canyon: albacore tuna, bigeye tuna, bluefin tuna, skipjack tuna, yellowfin tuna, swordfish, blue marlin, longbill spearfish, roundscale spearfish, sailfish, white marlin and multiple shark species (MARCO Data Portal, 2016; NOAA EFH Mapper, 2016).

Criteria 1 serves as the primary rationale for designation of the Baltimore Canyon as a national marine sanctuary. Designation will complement existing protections and ensure that the benthic habitat is protected, which sustains the many populations of fragile deep-sea corals, endangered species, migratory fish and birds that rely on the resource.

**Criteria 2:** *The area contains submerged maritime heritage resources of special historical, cultural, or archaeological significance, that: individually or collectively are consistent with the criteria of eligibility for listing on the National Register of Historic Places; have met or which would meet the criteria for designation as a National Historic Landmark; or have special or sacred meaning to the indigenous people of the region or nation.*

The Baltimore Canyon's surrounding waters act as an important historical and cultural link to people living on the Atlantic coast. The Mid-Atlantic region has a lengthy and rich maritime history connected to exploration, trade, military operations, fishing and recreation. This region also encompasses current and historic pathways to the Chesapeake Bay and the Delaware Bay, in addition to vital ports such as Norfolk, Philadelphia, Wilmington and Baltimore (Mather, 2013). The National Aquarium believes it is not unreasonable to assume submerged resources could be found with future exploratory research, although limited submerged maritime heritage resources have been located in the Baltimore Canyon to date. Designation of the Baltimore Canyon as an urban national marine sanctuary will not be based primarily on Criteria 2 at this time.

### **Early Human Populations and State Recognized Tribes**

Roughly 15,000 – 20,000 years ago, sea level was approximately 100 meters (328 feet) lower than it is today in the Mid-Atlantic region. It is likely that early human populations (Paleoindians) occupied the region but their nomadic lifestyle likely left few clues as to their lifestyle and very little is known about these early inhabitants. A 2011 NOAA cruise that mapped several submarine canyons, including the Baltimore Canyon, discovered multiple features of a “submerged landscape that 10,000 years ago might have provided suitable sites for human habitation” (Mather, 2013).

In the present day, there are two state-recognized tribes in Delaware (the Lenape Indian Tribe and Nanticoke Indian Association) and two state-recognized tribes in Maryland (the Piscataway Indian Nation and the Piscataway Conoy Tribe). There are no federally recognized tribes in Maryland or Delaware. At this time, there are no known submerged historical or archeological sites connected to these tribes.

### **Submerged Cultural Resources**

One post-World-War-II-era Grumman Hellcat plane was found in the Baltimore Canyon during cruise expeditions in the 1980s (Dr. Steve Ross, pers. comm., 2016). Since then, the plane has not been rediscovered. There are no known shipwrecks located within the Baltimore Canyon. While the proposed sanctuary boundary does not contain documented submerged cultural resources; including paleoindian or Native American tribal artifacts or archeological sites, or contemporary shipwrecks, given the activity in the area, further research is warranted.

Sanctuary designation will serve not only to protect benthic habitat but also to preserve the opportunity for future archeological finds. Sanctuary designation may facilitate submerged heritage research.

**Criteria 3:** *The area supports present and potential economic uses, such as: tourism; commercial and recreational fishing; subsistence and traditional uses; diving; and other recreational uses that depend on conservation and management of the area's resources.*

### **Coastal and Ocean Economy**

With a tidal and coastal shoreline of just over 3,000 miles, Maryland's economy is tied to the coast and ocean. In 2013, 6.7 billion (4 percent) of the state's GDP relied on activities that directly or indirectly took place in the ocean, used outputs from the ocean, or put goods and services into marine activities (NOAA OCM, 2016). Maryland's ocean economy, ranked 11 out of 30 coastal states, is dominated by marine recreation and tourism, along with marine transportation (e.g. deep-sea freight, marine passenger transportation, pipeline transportation, marine transportation services, search and navigation equipment and warehousing) (NOEP, 2016). Across the Mid-Atlantic region in 2013, the ocean economy was \$48 billion of the nation's GDP (NOAA OCM, 2016). Maryland and the Mid-Atlantic region rely on coastal economies. In 2015, Maryland's coastal counties generated more than 2.5 million jobs and \$326 billion in state GDP. Across the Mid-Atlantic, coastal counties generated nearly 15 million jobs and over 2 trillion of the country's GDP (NOEP, 2016).

### **Recreational Fishing**

Recreational fishing is of significant economic importance to the state of Maryland and the Mid-Atlantic region as a whole, and is essential to coastal and ocean economies. A recent report by NOAA's National Marine Fisheries Service (NMFS) detailed 2014 data relating to the annual economic impact of recreational marine anglers in the United States. Across the U.S., almost \$50 billion in sales impacts were documented as well as the creation of more than 358,000 jobs. More than 705,000 anglers were documented in Maryland, 45 percent of which were from out of state. Marine recreational fishermen spent \$622 million in durable goods in the state, supported 5,883 jobs and contributed more than \$494 million to Maryland's GDP (Lovell et al., 2016). A significant portion of angler spending occurs during the state's 15 fishing tournaments in Ocean City, Maryland, where popular species targets include bluefin tuna, yellowfin tuna, longfin albacore, tilefish, mahi mahi and white marlin. A 2009 economic impact study of the White Marlin Open in Ocean City, a five-day fishing tournament, found that the single tournament provided more than \$16 million in total economic impact to the state of Maryland (DBED, 2010) that year alone. Considering the age of the study and the conservative nature of the data collection, the economic impact of the White Marlin Open is anticipated to be more significant today. In addition to economic impacts related directly to fishing, the indirect impacts of recreational fishing activities on the tourism and hospitality industry are substantial. For example, during a two-day time period during the 2016 White Marlin Open, housing rental revenue in Ocean City exceeded \$16.4 million and the food and beverage taxes for those same days equaled \$383,000 (Shawn Harman, pers. comm., 2016). Sanctuary designation will help to ensure the long-term sustainability and viability of the White Marlin Open.

### **Commercial Fishing**

Over the past decade (2005-2015), commercial fisheries' catch in Maryland for all species averaged approximately 64.7 million pounds per year, with landings valued around \$78.2 million annually. Despite its relatively short coastal shoreline, the average annual value of the Maryland catch is roughly 35 percent of the average value of commercial catch of the Mid-Atlantic region over the same timeframe. Commercial species caught in the areas surrounding the Baltimore Canyon include longfin squid, illex squid, summer flounder, scup, black sea bass, golden tilefish, hake (whiting), deep sea red crab, American lobster, Jonah crab and scallops (MAMFC, 2016). Based on vessel trip report data, the Baltimore Canyon falls within an area of high cumulative estimated fishing revenue for red crab and squid (MAMFC, 2016).

### **Offshore Energy Development**

Currently, there are no active leases for oil and gas in the Baltimore Canyon or its vicinity. One exploratory well was drilled in 1984 (Shell Baltimore Rise) and proposals continue to be raised to open the Mid-Atlantic to offshore drilling. The Mid-Atlantic shelf is not included in lease sale schedules through 2022, but future proposals to expand oil and gas development are likely. Development of renewable energy, particularly wind, is proceeding along the Mid-Atlantic coast. The Maryland wind energy area is comprised of two leases auctioned by the Bureau of Ocean Energy Management (BOEM) in 2014 for \$8.7 million. Off the coast of Delaware, one lease was auctioned for just over \$289,000 in annual fees in 2012. The Baltimore Canyon lies within the 'transition' wind energy zone; however, it is 80 km (50 miles) east of the active planning area for wind energy (MARCO Data Portal, 2016).

### **Shipping**

According to the MARCO Data Portal, the area surrounding the Baltimore Canyon is trafficked by cargo, passenger and tanker vessels. Shipping is an important economic driver in the state of Maryland. The Port of Baltimore alone estimates it contributes \$2.2 billion in business revenues, \$2.9 billion in personal income and \$310 million in state, county and municipal taxes (MPA & Martin Associates, 2015). It is important that while safeguards are in place to prevent environmental damage, shipping is not restricted near the sanctuary. The National Aquarium has consulted with the Maryland Port Administration, and received a support letter for sanctuary designation of the Baltimore Canyon (see appendix).

### **Other Active Offshore Commercial Activity**

From a security perspective, the Baltimore Canyon lies within the Virginia Capes Range Complex. There are no active submarine transmission cables in or near the canyon (MARCO Data Portal, 2016).

Sanctuary designation will complement the multiple uses currently present in the Baltimore Canyon, while limiting potential activities, such as oil and gas extraction, that would be disruptive to the resource upon which these current uses are predicated.

**Criteria 4:** *The publically-derived benefits of the area, such as aesthetic value, public recreation, and access to places depend on conservation and management of the area's resources.*

### **Recreational Fishing**

The benthic habitats and unique physical characteristics of Baltimore Canyon support a marine food web that is the foundation for a robust offshore recreational fishing industry. Nutrient-rich currents and coral and seep communities provide food and shelter for a diversity of animals that attract recreationally important fish species. Beyond its inherent ecological value, designating the Baltimore Canyon as a sanctuary will help ensure that it continues to support migratory fish populations that are popular with offshore recreational fishermen. Nearly one third of offshore charter boats leaving Ocean City, Maryland, head towards Baltimore Canyon during the prime fishing season (May-October) (Jim Motsko, pers comm., 2016). According to a recent report on the economic contributions of marine anglers across the U.S., there are more than 3 million recreational marine fishermen in the Mid-Atlantic (from New York to Virginia) (Lovell et al., 2016). In Ocean City, Maryland, alone, more than 15 recreational fishing tournaments annually attract thousands of participants. Included in this count is the White Marlin Open, which is open to anglers from Virginia to New Jersey and is reported by *Marlin* magazine to be the world's largest billfish tournament (White, 2016). In 2016, the White Marlin Open attracted 329 boats for a record purse of \$4.45 million. The cultural aspect of recreational fishing along the Mid-Atlantic cannot be overstated. Many coastal communities rely on opportunities to fish offshore as a way of life handed down through generations.

### **Ecotourism**

Public non-consumptive recreation on the ocean is not as well-documented as other uses, but there is an emerging offshore ecotourism industry that offers birding and/or whale-watching trips. A 2011 study by the U.S. Fish and Wildlife Service estimated there were more than 1.3 million wildlife-watching participants that spent more than \$483 million in wildlife watching activities in the state of Maryland that year (U.S. Department of the Interior et al., 2013). While the entire Atlantic coastline of the Delmarva peninsula is considered an [Important Bird Area of global significance](#) (National Audubon Society, n.d.) impressive species lists extend to offshore areas as well. A recent survey related to Mid-Atlantic coastal and ocean recreational activities indicated that approximately 9 percent of respondents participated in such offshore trips in a year (Surfrider, 2014). Designating the Baltimore Canyon as a national marine sanctuary would provide greater opportunities for entrepreneurs to establish programs and businesses related to recreational wildlife viewing.

### **Educational Value**

The National Aquarium, which sees 1.3 million visitors annually, recognizes the importance of connecting people, particularly urban youth, to the ecological wonders of the canyon and the deep seas, as well as to ocean exploration technology, and is committed to creating interpretive exhibits and educational programming related to the Baltimore Canyon. Beyond our exhibits, we will share information with our online audiences and the 1.2 million people we reach through various social media channels. In addition to building an ocean-literate public, future partnerships are focused on increasing our capacity to reach young people, especially under-resourced youth, in Baltimore City. Educational institutions have committed to join us in

incorporating Baltimore Canyon data into their current programs as a means to support Maryland's Next Generation Science Standards. Collaborating technology companies have also committed to develop immersive and interactive experiences that will engage young audiences. Most notably, the Challenger Center has committed to bringing their ocean-themed experiential learning programs to Baltimore City schools in 2018 and will be working with the National Aquarium to develop ocean exploration and conservation activities that will help build a STEM workforce and STEM-literate society.

### **Urban-Ocean Connectedness**

For most Americans, unless they are physically seeing or touching the ocean, they perceive the ocean to be disconnected from their daily life. This is particularly true in our urban areas. Re-establishing a sense of connectedness to the ocean, via expanding ocean literacy, is an opportunity afforded by designating the Baltimore Canyon as our nation's first urban national marine sanctuary.

### **Section IV – Consideration Information**

**Consideration 1:** *The area provides or enhances opportunities for research in marine science, including marine archaeology.*

Submarine canyons are the next great American frontier, possessing untapped potential for exploration and research. There has been significant research investment in the Baltimore Canyon on which to expand upon through future exploration expeditions. The Baltimore Canyon has been an area of focus for several deep-sea research cruises spanning from 1979 to 2014. The first of these research studies was led by Dr. Barbara Hecker, who documented deep-sea fauna on the rugged hard bottom near the head of Baltimore Canyon, including bubblegum corals (*Paragorgia arborea*) and red tree corals (*Primnoa resedaeformis*). Her most notable finding was the methane cold seeps in the Baltimore Canyon, which were the first to be discovered in the Mid-Atlantic (Hecker et al., 1980).

Several decades after Dr. Hecker's initial research efforts, the Deep-Water Mid-Atlantic Canyons Exploration began in 2011. This mission investigated deep-water canyons, hard bottom habitats, and shipwrecks off the coasts of Virginia and Maryland. Multibeam sonar was used to map a series of Mid-Atlantic canyons to establish the foundation of information needed to inform future multidisciplinary efforts (NOAA, 2012). In the years following, the Atlantic Canyons Undersea Mapping Expedition, the Northeast and Mid-Atlantic Canyons Expedition and the East Coast Mapping Expedition further expanded these mapping efforts.

The Deepwater Canyons: Pathways to the Abyss expeditions in 2012 and 2013 accomplished a wide variety of scientific objectives. The Deepwater Canyons 2012 expedition investigated the biology and ecology of different types of seafloor communities, oceanography and archeological sites. Innovative technologies—including Benthic Landers, used to collect long-term water quality data, and remotely operated vehicles—were utilized during this mission. The Deepwater Canyons 2013 expedition revisited the same sites as the 2012 expedition to further expand initial research efforts. These studies, among many other achievements, significantly increased the

number of recorded deep-sea corals for the Baltimore Canyon and the surrounding Mid-Atlantic region (Brooke et al., 2016). The below is a timeline of research expedition cruises to date:

<b>Baltimore Canyon Research Expeditions Timeline</b>				
<b>Expedition</b>	<b>Date</b>	<b>Ship</b>	<b>Research Focus</b>	<b>Research Partners</b>
N/A	1979	<i>RV Eastward</i>	Epifaunal zonation and community structure	DOI BLM, Dr. Barbara Hecker
Deep-Water Mid-Atlantic Canyons Exploration 2011	Spring 2011	<i>Nancy Foster</i>	Baseline information for future multidisciplinary investigations	BOEM, USGS, NOAA-OER
Atlantic Canyons Undersea Mapping Expeditions 2012	Spring and Summer 2012	<i>Okeanos Explorer, Ferdinand R. Hassler, Henry B. Bigelow</i>	High-resolution mapping and baseline data gathering for NOAA and non-NOAA partners	NOAA, BOEM, USGS, VA Sea Grant, MARCO, Continental Shelf Associates
Deepwater Canyons 2012: Pathways to the Abyss	Summer 2012	<i>Nancy Foster</i>	Biological and ecological investigation of different types of seafloor communities	BOEM, USGS, NOAA-OER
Northeast and Mid-Atlantic Canyons Expedition	Fall 2012	<i>Okeanos Explorer</i>	Additional survey mapping efforts to improve existing data	NOAA-OER
Deepwater Canyons 2013: Pathways to the Abyss	Spring 2013	<i>Ronald H. Brown</i>	Biological research of Baltimore Canyon with ROV dives and benthic landers	BOEM, USGS, NOAA-OER
East Coast Mapping	Spring 2014	<i>Okeanos Explorer</i>	High-resolution multibeam sonar mapping	NOAA-OER

The Baltimore Canyon has a solid body of research on which to expand and much remains to be discovered to better understand the canyon ecosystem. Sanctuary designation will benefit future research efforts by preserving the Baltimore Canyon site and encouraging the NOAA Office of Ocean Exploration and Research to prioritize the Baltimore Canyon for further research. Future research focus areas could include:

- Deep-sea coral biology and ecology
- Coral and methane seep microbial community composition and function
- Effects of climate change and ocean acidification on deep-sea corals and methane seep communities
- Nutrient cycling and food web dynamics in deep-sea ecosystems
- Interdependence of species throughout the water column and on habitat and oceanographic processes
- Interdependence of species and processes throughout the Atlantic submarine canyons

- Long-term impacts from local and global threats (energy exploration and development, marine debris, climate change, ocean acidification, etc.) on deep-sea ecosystems and the ability for these ecosystems to recover
- Diversity and distribution of methane seeps

Very little is currently known about deep-sea habitats, and even less is known about the potential negative effects of climate change and other anthropogenic stressors on these unique communities. The baseline data collected by the Baltimore Canyon research cruises to date are a resource for tracking climate change impacts in the future and could lay the foundation for using the Baltimore Canyon as a sentinel site for future deep-sea research.

Beyond the inherent value of increased scientific knowledge, future research opportunities would also enhance corresponding education programs by allowing real time participation by students, direct connections to researchers and access to data and technology for further study. Education partners would also be able to develop and evaluate programs that are most effective for using national marine sanctuaries and their resources as a tool for improving ocean literacy through technology connections and focused on urban youth. Conversations with researchers at the Institute of Marine and Environmental Technology in downtown Baltimore have sparked interest in being able to expand their current work on the microbial communities of methane cold seeps, sponges and corals to help train another generation of young scientists. Additionally, sanctuary designation will provide opportunities to connect future research findings to urban audiences. Ocean literacy is lacking in the United States, particularly in urban areas. As the first urban national marine sanctuary, the Baltimore Canyon has the potential to foster ocean literacy and connect urban areas to the ocean.

**Consideration 2:** *The area provides or enhances opportunities for education, including the understanding and appreciation of the marine and Great Lakes environments.*

Imagine students in a middle school classroom in inner-city Baltimore asking questions in real-time with an oceanographer aboard a research vessel above the Baltimore Canyon, the nation's first urban national marine sanctuary. Over the summer, the students' teacher joins other City Schools teachers to participate in NOAA's Teacher-at-Sea Program, conducting deep canyon research in the sanctuary, learning about the canyon's ecology and creating educational curricula to use back in their classrooms. As they move on to high school, these students can build their own remotely operated vehicle and enter it into a competition, under the guidance of experts from a local technology company that build ROVs for underwater exploration.

These are just a few of the examples of the rich educational opportunities that sanctuary designation could bring to students in Baltimore City and other schools throughout the region.

### **Enhanced Place-Based Ocean Education**

Building upon the opportunities the sanctuary designation will bring to area classrooms are the resources of the National Aquarium. For more than 35 years, the National Aquarium has educated over 50 million people, and is uniquely poised to provide a comprehensive portal to the national marine sanctuaries program through a focus on the Baltimore Canyon. The Aquarium has extensive marine education expertise and experience, and serves as an important educational

resource to 130,000 students and teachers from pre-K to graduate school, who visit annually from across the nation and the world. Approximately 60,000 Maryland school children visit the Aquarium free of charge every year. Over 90 percent of teachers rate the Aquarium's educational components as highly valued. The Aquarium also provides science-based curriculum to schools. Sanctuary designation would provide additional opportunities for the Aquarium to create and provide curriculum on a variety of topics including marine science, oceanography and deep-sea exploration.

In Maryland alone there are 24 accredited engineering schools. Sanctuary designation would provide more access to technology for those students plus learning opportunities for undergraduate and graduate students from diverse fields. The Aquarium is also positioned to interpret the features of the canyon in ways impossible in other settings. The potential of interactive exhibits and web-based curriculum focused on the Baltimore Canyon will allow teachers and students to explore topics such as deep-water corals, oceanography and remotely operated vehicle research. Our award-winning exhibits, animal collections and interactive elements will showcase the canyon depths under the sea. For many of our 1.3 million annual guests, this will be their only opportunity to see the amazing life below the waves.

### **Student and Teacher Engagement**

In partnership with the National Aquarium, the Baltimore Canyon as a sanctuary can provide an important science and technology educational resource for Baltimore City Public Schools and other local school systems. City Schools students as a whole underperform in science and math as compared to the statewide average. Twenty-five percent of City Schools students in third, fifth and eighth grades are proficient or advanced in reading, math and science, as compared to the statewide average of 60 percent (Maryland State Department of Education, 2016). Less than a third of Baltimore City African American students enroll in post-secondary school (Maryland State Department of Education, 2016) and, due to systemic barriers, have lower test scores as they matriculate into historically black colleges and universities, making it financially challenging to complete their degrees (Mussenden, 2016). This further erodes the STEM career pathways for under-resourced students.



National Aquarium staff engaging students (Image courtesy of National Aquarium).

The sanctuary designation will bring needed science and engineering educational resources to City Schools students and others. Having greater access to resources and technology will allow students to be more successful academically. In a report from the Alliance for Excellent Education and the Stanford Center for Opportunity Policy in Education (SCOPE) finds that technology can produce significant gains in student achievement and boost engagement, particularly among students most at risk (Darling-Hammond et al., 2014). We know that nationally there is a need to create higher participation for minority students in STEM related fields. In engineering, for example,

African Americans represented only 3.6 percent of employed engineers in 2010 and 2.5 percent of engineering faculty in 2011 (NACME, 2014).

### **Focus on Urban Youth**

The opportunities to engage urban youth with the sanctuary are numerous. In addition to the programs mentioned above, the National Aquarium provides free summer aquatic science camps to more than 200 hundred Baltimore City youth in the Henry Hall Youth Leadership program, named after the African American engineer from Baltimore who had a life-long passion for the ocean and learning. One of the Henry Hall summer programs takes students on a day-long shark tagging research study off the coast of Ocean City, Maryland. Sanctuary designation would complement our Henry Hall program to more thoroughly include the deep sea in its curricula.

Furthermore, the first urban national marine sanctuary could be a compelling addition to job training programs or modules in both the technology sector as well as maritime industries.

### **Distance Learning**

The National Aquarium's growing expertise in distance learning will be another asset to connect learners to the sanctuary remotely. We are an experienced content provider to virtual field trips conducted by partners. We also have experience broadcasting our own content including Skype sessions featuring Aquarium animals to classrooms from Maryland to Paraguay. In 2013, the Aquarium partnered with the U.S. Department of State's National Programmers' Workshop, Google's Connected Classrooms and the Wolfe Street Academy in Baltimore; connecting students to biologists and animals in our collection.

### **Baltimore Technology Sector**

The global market for marine biotechnology products and processes is a significant and growing opportunity. The market is currently estimated to be around \$2.8 billion and, conservatively is projected to grow to approximately \$4.6 billion by 2017 (OECD, 2013). Baltimore is an emerging technology hub and is well-positioned for further growth, making economic sense to create strong links between the Canyon and deep-sea research and exploration. Baltimore is the largest city in Maryland, which ranked third in the latest Milken Institute's biennial State Technology and Science Index (Milken Institute, 2016). The Baltimore-Washington, D.C. corridor is the most densely concentrated area of the nation for IT professionals (EAGB, 2013), and the region's employment in professional, scientific and technical services is growing faster than the national average (EAGB, 2013). In particular, the Baltimore metro area is well-suited to become a center of educational technology (EAGB, 2013).

### **Socioeconomic Justice**

The U.S. science and engineering workforce has become more diverse, but gender, race, and ethnicity continue to be factors in rates of participation. Women are still underrepresented in the science and engineering workforce (NSF, 2016). Less than 1 in 10 employed scientists and engineers are minority women (National Girls Collaborative Project, n.d.). In 2013, 70 percent of workers in science and engineering occupations were white, which is close to the proportion in the U.S. working age population. Hispanic, African American, and Native American individuals make up 27 percent of U.S. working-age population, but only 11 percent of the science and engineering workforce (NSF, 2016).

Beyond the national trends, a 2016 report states that the City of Baltimore is home to one of the nation's highest proportion of young people ages 16 to 24 who are neither in school nor working. An estimated 18,000 urban youth are in danger of never being able to actualize an earnings potential. "Disconnected youth are an untapped opportunity for Baltimore employers looking for skilled workers and connecting these youth to middle-skilled careers with supporting wage can generate enormous economic benefits for the region" (JOTF & Baltimore's Promise, 2016). Designation of Baltimore Canyon as an urban national marine sanctuary will help spotlight energy around connecting urban youth to STEM learning and career opportunities, benefiting our communities and our ocean.

### **Public and Community Engagement**

The National Aquarium will incorporate information about the Baltimore Canyon into its exhibits and interactive elements. The Aquarium can also provide opportunities for children and families to learn about the Baltimore Canyon through its community programming. Aquarium on Wheels is an Aquarium-sponsored work-study program for Baltimore area teenagers. One of the responsibilities of program students is to create a theatrical play about an environmental topic and perform it to more than 1,000 children and families at Baltimore City libraries in partnership with the Enoch Pratt Free Library System. The mysteries of the Baltimore Canyon could be an exciting and educational subject matter for a play.

The Aquarium also partners with the Enoch Pratt Free Library System on a newly established community program, Read to Reef. Children in fifth grade and below read five aquatic or conservation-themed books and in turn receive complimentary tickets to visit the Aquarium with their families. In its first season, Read to Reef engaged over 2,700 children in reading over 13,500 books. October 2016 marked the start of a second season of Read to Reef, and has already engaged over 1,000 students, educating children about the aquatic world and providing access to the National Aquarium. Future Read to Reef seasons could encourage books focused on ocean exploration and the deep sea, helping to bring the work of sanctuary science into the homes of thousands of City residents.

Special events at the National Aquarium, including the Marjorie Lynn Bank Lecture Series, provide additional venues to share information about the Baltimore Canyon and national marine sanctuaries. In 2014, the lecture series proudly featured the national marine sanctuary system through nine lectures, which were attended by more than 1,400 guests. In 2015, the National Aquarium was honored to host the National Ocean Exploration Forum. Future events and lectures could provide welcome updates and exciting new discoveries from the deep sea.

The National Aquarium is also an important member of Baltimore's arts and culture community. Opportunities exist with sanctuary designation to bring art and science together through visual arts, digital media, lectures and public events to attract broader communities.

### **Leveraging National Marine Sanctuaries Program Assets**

The National Aquarium is one of just a few host sites in the nation for NOAA's Ocean Exploration Teacher Workshops. In these workshops, teachers are introduced to the latest NOAA ocean exploration research conducted aboard the *Okeanos Explorer*. The Baltimore Canyon Urban National Marine Sanctuary could be a candidate for a research expedition, similar to the

2016 expedition to Pacific Remote Islands Marine National Monument (PRIMNM). The *Okeanos Explorer* has the capability to connect with classrooms via live feeds during expeditions, and can allow students to experience the excitement of live exploration via recorded video clips. This may include listening to explorers communicating with one another from the ship and at remote locations on land, seeing discoveries take place via live video, or seeing bathymetric data as it is being processed in the ship's control room (NOAA, n.d. b).

Ocean Today is a multi-media, educational kiosk that features videos about ocean exploration and scientific marine life discoveries. The kiosk at the National Aquarium is available to be viewed by the 1.3 million people who visit annually. New videos are added continually, and the designation of the Baltimore Canyon as the nation's first urban national marine sanctuary would provide opportunities for new videos to be created about the research and discoveries.

Ocean Guardians is a nationwide program for schools sponsored by National Marine Sanctuaries. As part of the Aquarium's Baltimore Canyon educational outreach, we will work with City Schools to disseminate information about the Ocean Guardians program through the City Schools Green School Program. By leveraging existing resources from NOAA and other partners, the National Aquarium will expand access to, and build capacity for, urban residents to connect with the Baltimore Canyon as an urban national marine sanctuary.

### **Connections to Other Sanctuaries**

With sanctuary designation, Baltimore Canyon would join a vibrant network of 13 other national marine sanctuaries working together to “create an ocean-literate public making informed environmental decisions” (NOAA, n.d. c). We propose to work with the others in the network to advance the National Marine Sanctuaries 2010-2020 Strategic Plan by enhancing ocean and climate literacy and developing and strengthening strategic educational partnerships.

**Consideration 3:** *Adverse impacts from current or future uses and activities threaten the area's significance, values, qualities, and resources.*

### **Offshore Energy and Extraction**

There is currently no extraction activity in the Baltimore Canyon or its vicinity. One exploratory well [Shell Baltimore Rise] was drilled in 1984. While offshore drilling in the Atlantic is not an option through 2022, future lease sales parameters are dependent on future administrations and proposals to open the Atlantic for drilling continue to be offered. Undersea methane deposits represent an as-of-yet-untapped source of energy, which raises questions about not only habitat disturbance and pollution, but also how removal of methane would affect cold seep communities along with the overall stability of the canyon itself (Rona, 2002). While its depth makes the Baltimore Canyon currently unsuitable for offshore wind energy development, future technological advancements in siting are continually advancing. Sanctuary designation would protect sensitive habitats and species from the adverse impacts of future energy exploration and extraction activities.

## **Fishing**

Recreational and commercial fishing is the primary human use in and around the Baltimore Canyon. Fisheries are currently managed by NOAA National Marine Fisheries Service (NMFS) in conjunction with the Mid-Atlantic Fishery Management Council (MAFMC), and regulations have been put in place to protect fish stocks and the habitats they depend on through gear restrictions, trip limits, catch limits, etc. In September 2016, NOAA Fisheries issued a proposed rule for the Deep Sea Corals Amendment to the Mid-Atlantic Fishery Management Council Mackerel, Squid, Butterfish Fishery Management Plan. Based on the outcomes of a multi-stakeholder workshop, this proposed rule incorporates stakeholder recommendations for a broad coral zone as well as 15 discrete coral zones in the Mid-Atlantic. In these zones, all bottom-tending fishing gear is prohibited, with exemptions for the red crab fishery and a provision for vessel transit across zones. Protecting deep-sea coral habitats will help conserve fishery resources in the region. Detailed information about the amendment and proposed rule is available: <http://www.mafmc.org/actions/msb-am16>. Sanctuary designation will complement existing management efforts by NMFS and MAFMC as well as supplement ongoing enforcement, education and outreach and research. Sanctuary designation will also exclude uses incompatible to healthy ecosystems and key fish habitat, like energy exploration and extraction.

## **National Security**

The Mid-Atlantic is an active use area for the U.S. Military and Baltimore Canyon lies just within the Northeastern-most boundary of the Virginia Capes Military Range Complex (VACAPES) and its offshore operating area (OPAREA). This complex is used for training and research, development, test and evaluation (RDT&E) activities. According to the VACAPES environmental impact statement, the primary effect of the Navy's training activities in the VACAPES study area are explosions in the water and the deposition of expended training materials on the ocean bottom and their accumulation over time. Additionally, less than 16 km (10 miles) east of the Baltimore Canyon lies an area of unexploded ordnances (MARCO Data Portal, 2016). The Navy recently completed an extensive environmental impact study for the VACAPES Range Complex. The detailed VACAPES EIS process began in 2004 and recognized the ecological significance of the deep-sea corals as well as other endangered species in the region. The Navy issued a record of decision in June 2016 that clarified its future training needs in the VACAPES Range OPAREA. Therefore, any Baltimore Canyon sanctuary designation processes would be able to proceed with a detailed understanding of the Navy's training needs from this recent EIS and record of decision.

## **Pollution**

Marine debris has been visually documented in Baltimore Canyon, and includes plastics and derelict fishing gear. Further studies are needed, yet marine plastic pollution has become a recent yet crucial area of research worldwide. While there is general understanding as to the pervasive nature of plastic pollution in the ocean, we do not yet understand the fate of plastic in aquatic environments, and their effects on marine biota. National marine sanctuary designation of the Baltimore Canyon would spur greater awareness of marine debris, and could help catalyze necessary research.

**Consideration 4:** *A national marine sanctuary would provide unique conservation and management value for this area or adjacent areas.*

The Baltimore Canyon is an ecological hot spot, home to chemosynthetic methane seep ecosystems and slow-growing deep-sea corals, which, if damaged, would take centuries to regrow. These fragile and vibrant deep-sea ecosystems are worthy of sanctuary designation to ensure their existence into the future as the demand for ocean resources continues to increase. At present, there is no national marine sanctuary designation within the Mid-Atlantic region; therefore, naming the Baltimore Canyon as the first urban national marine sanctuary would present an opportunity for strategic conservation providing connectivity between Baltimore Canyon and other Atlantic submarine canyons like Hudson Canyon, as well as helping to ensure migratory pathways for certain species. A sanctuary ‘hotspot’ is needed in the Mid-Atlantic region.

**Consideration 5:** *The existing regulatory and management authorities for the area could be supplemented or complemented to meet the conservation and management goals for the area.*

Due to the Baltimore Canyon’s distance from the U.S. coastline, the proposed national marine sanctuary lies outside of state and territorial waters but well within the Exclusive Economic Zone (EEZ). Within the EEZ, the U.S. has sovereign rights for the purpose of exploring, exploiting, conserving and managing natural resources, whether living and nonliving, of the seabed and subsoil and the superjacent waters and with regard to other activities for the economic exploitation and exploration of the zone, such as the production of energy from the water, currents and winds. It also has jurisdiction for the establishment and use of marine scientific research, and the protection and preservation of the marine environment.

### **Offshore Energy and Mineral Extraction**

The Bureau of Ocean Energy Management (BOEM) is responsible for the management of the Outer Continental Shelf (OCS) of the United States for energy (oil, gas and renewables) and mineral resources. BOEM’s mission is to manage these resources in an environmentally and economically responsible way.

While the Baltimore Canyon lies within BOEM’s jurisdiction (within the Mid-Atlantic planning area), no current oil and gas leases exist in the Atlantic and no lease sales are proposed under their five-year leasing program, covering 2017-2022. In addition to energy leases, BOEM also manages geological and geophysical activities associated with energy exploration. Multiple recent requests for seismic air gun surveys in support of oil and gas exploration and interest by the industry to expand activities into Atlantic offshore waters have prompted BOEM to proactively determine possible environmental impacts. A programmatic environmental impact statement is currently being developed in order to address potential environmental effects of these activities through 2020.

BOEM also coordinates renewable energy activities offshore with federal, state, local and tribal government partners. In 2014, two commercial lease sales were awarded offshore of Maryland to US Wind Inc. for a total of 324 km<sup>2</sup> (80,000 acres). This wind energy area lies approximately 16 km (10 miles) east of the Ocean City, Maryland, coastline and extends at most an additional

19km (12 miles). In 2012, 390 km<sup>2</sup> (96,430 acres) of the OCS was leased to Bluewater Wind Delaware for offshore wind development. This lease area is also close to the coastline and does not extend to the area of the Baltimore Canyon. Additionally, BOEM manages the extraction of offshore minerals from the OCS. Primarily, these consist of sand and gravel used in beach replenishment and restoration. There are two federal sand and gravel lease areas off the coast of Maryland. Both of these sites are approximately 80 km (50 miles) west of the Baltimore Canyon, lying close to the shoreline.

### **Fisheries**

Commercial and recreational fishing in federal waters is regulated by NOAA National Marine Fisheries Service (NMFS), with significant input through the Mid-Atlantic Fisheries Management Council (MAFMC) and NOAA's Atlantic Highly Migratory Species Management Division. In recent years, the MAMFC has developed a number of proactive management strategies in order to protect important marine resources. Specifically, in September 2016, a proposed rule for the Deep Sea Corals Amendment to the Mid-Atlantic Fishery Management Council Mackerel, Squid, Butterfish Fishery Management Plan was published. If the amendment is implemented as proposed, important benthic habitats in submarine canyons in the Mid-Atlantic will be protected from the impacts of fishing gear while compatible recreational and commercial fishing practices will be allowed to continue. The Baltimore Canyon lies within both the discrete and broad coral zones of the proposed amendment.

In addition to managing highly migratory species, NMFS has identified essential fish habitats (EFH) in the western Atlantic. This includes habitats that are necessary to fish for spawning, breeding, feeding or growth to maturity. Of the Atlantic HMS, the following are known to have EFH overlapping with the Baltimore Canyon: albacore tuna, bigeye tuna, bluefin tuna, skipjack tuna, yellowfin tuna, swordfish, blue marlin, longbill spearfish, roundscale spearfish, sailfish, white marlin, and multiple shark species (NOAA EFH Mapper, 2016). NMFS and the regional fishery management councils use the EFH provisions established in Section 303 (a)(7) of the Magnuson-Stevens Fishery Conservation and Management Act to prevent, mitigate or minimize adverse effects from fishing on EFH.

While these regulations to protect important marine resources with Baltimore Canyon are in place, the National Aquarium recommends that fishing continue in this economically important area and that national marine sanctuaries work with NMFS to effectively manage fisheries using existing management authorities.

### **Marine Mammals and Threatened and Endangered Species**

NOAA's Office of Protected Resources (OPR) is responsible for the protection of marine mammals (Marine Mammal Protection Act (MMPA)) and endangered/threatened marine life (Endangered Species Act (ESA)). Of the 17 species of marine mammals documented near the Baltimore Canyon, four are listed as endangered under the ESA (sei, fin, North Atlantic right, and sperm whales) (Halpin et al., 2009; MAMFC, 2016). In addition, leatherback (*Dermochelys coriacea*) and loggerhead (*Caretta caretta*) sea turtles have been documented within and surrounding the Baltimore Canyon. (Halpin et al., 2009; MAMFC, 2016). Leatherback sea turtles are listed as endangered under the ESA. The Northwest Atlantic Ocean Distinct Population Segment of loggerhead sea turtles is listed as threatened under the ESA. Sanctuary

designation would help complement current management authorities through increased education and outreach.

### **National Security**

In June 2016, the Navy Facilities and Engineering Command (NAVFAC) recently completed a detailed 12-year Environmental Impact Study (EIS) of their VACAPES Range Complex that clearly documents the Navy's future training needs. Therefore, sanctuary designation could proceed with a clear understanding of those needs.

### **Dredged Materials Placement**

The U.S. Army Corps of Engineers (USACE) and U.S. Environmental Protection Agency (EPA) have jurisdiction over disposal of materials in our ocean. USACE currently manages the disposal of dredged material removed from the bottoms of the navigable waters of the United States to maintain navigation channels and docks. There are currently four dredge material ocean disposal sites in this region. Two are located adjacent to the mouth of the Chesapeake Bay (Dam Neck and Norfolk, Virginia), one is located at the mouth of the Delaware Bay (Cold Spring Inlet, New Jersey) and the final site is located at Absecon Inlet, New Jersey. All four sites are situated close to the coastline to mitigate for the cost of transport to deeper waters and do not extend to the area surrounding Baltimore Canyon.

### **Management Recommendations**

Management of the resources in and around the Baltimore Canyon will be essential to protecting the vital habitats in the Canyon and the ecosystem that depends on them. It is the recommendation of the National Aquarium that:

- the closure of the Baltimore Canyon to energy and mineral exploration and extraction is necessary and warranted to ensure protection of the fragile ecosystem that supports a thriving diversity of life,
- commercial and recreational fishing continues to be allowed in the canyon under existing regulations and
- federal agencies prioritize expanded research into how living marine resources rely on deep-sea ecosystems such as the Baltimore Canyon.

**Consideration 6:** *There are commitments or possible commitments for partnerships opportunities such as cost sharing, office space, exhibit space, vessel time, or other collaborations to aid conservation or management programs for the area.*

The National Aquarium has amassed diverse and wide-ranging support for designating the Baltimore Canyon as our nation's first urban national marine sanctuary. The National Aquarium will continue to engage both existing and potential partners beyond the nomination process. With emphasis on education, interpretation and outreach programming related to a new sanctuary, future collaborations also span the realm of scientific research, technology as an education and engagement tool, tourism, jobs training and conservation. Specifically, the National Aquarium seeks to establish a consortium of existing marine technology and education partners to leverage resources and achieve the goals of the sanctuary designation. The following opportunities have already been discussed with the identified parties:

- The National Aquarium will explore the possibility of both a permanent and temporary exhibit focusing on the Baltimore Canyon. The first step would be to insert message points about the Canyon and deep-sea exploration into daily informal education talks.
- The National Aquarium and its partners commit to finding office space for sanctuary staff in Baltimore.
- The National Aquarium will develop and deliver educational programming focused on the Baltimore Canyon through our current venues (on-site programs, teacher trainings, distance learning opportunities, school-based programs, youth-based programs and digital media).
- The Baltimore City Public Schools System (City Schools) serves 83,666 students in K-12 education; 90 percent of which are non-white/minority students and 85 percent of which are considered low-income. City Schools has expressed interest in helping to develop and provide access to classroom initiatives, curriculum material and teacher trainings focused on the Baltimore Canyon, similar to those that have been developed for other sanctuaries.
- Towson University Center for STEM Excellence (TUCSE) reaches thousands of students annually through on-site visits to their SciTech Student Learning Lab, Maryland Loaner Lab and Teacher Professional Development workshops. They have committed to working with researchers, educators and sanctuaries staff to develop educational resources focused on the Baltimore Canyon and help bring them directly to Maryland's urban teachers and students.
- The Institute of Marine and Environmental Technology (IMET) is a joint University System of Maryland research institute located in Baltimore that combines the research and education programs of the University of Maryland Center for Environmental Science, the University of Maryland Baltimore County and the University of Maryland Baltimore. IMET utilizes the research, training and technology transfer capabilities of these partner institutes to conduct marine and environmental research and create technologies designed to foster the protection and restoration of coastal marine systems and their watersheds, sustainable use of their resources and improvement of human health. They hope to expand their current research programs in microbial communities of methane cold seeps, and deep-water sponges and corals and use these opportunities to invest in promoting careers in science to Baltimore's urban youth.
- The Challenger Center and its global network of Challenger Learning Centers use space-themed simulated learning and role-playing strategies to help students bring their classroom studies to life and cultivate skills needed for future success, such as problem solving, critical thinking, communication and teamwork. They have recently expanded their focus to include deep-sea exploration and providing school-based experiential programs. In 2018, they are expanding their programming into Baltimore City and will be working with the National Aquarium to incorporate learning opportunities focused on the Baltimore Canyon as part of their curriculum.
- Oceaneering® is a global oilfield provider of engineered services and products primarily to the offshore oil and gas industry, with a focus on deep-water applications. They are the owner of the world's largest collection of remotely operated vehicles (ROVs). They have committed their engineering services to help forward the education and social justice goals of the sanctuary nomination including working with the Challenger Center to focus on deep-sea exploration and research.

- Balti Virtual, a software studio based in Baltimore, employs 3-D experts who create state-of-the-art virtual and augmented reality experiences. They have committed to providing design and pre-production services to create virtual-reality and/or augmented-reality experiences that would enable new audiences to explore, learn about and understand the wonders of the Baltimore Canyon.
- The National Wildlife Federation (NWF) is the nation’s largest wildlife conservation organization. They promote healthy ecosystems as vital to public health, the economy, wildlife and quality of life, and support the right to enjoy sustainable and responsible outdoor recreation including hunting, fishing, camping, birding, wildlife watching, hiking, climbing, swimming, boating and gardening. They have committed to working with the National Aquarium and sanctuary partners to support and provide additional educational and outreach opportunities tied to the Baltimore Canyon and focused on providing STEM education and career pathways to urban youth.
- Mission Blue is an ocean conservation organization focused on generating public support for the protection of Hope Spots—special places that are vital to the health of the ocean. They are committed to working with the National Aquarium and other global partners to spotlight the Baltimore Canyon in their mission to ignite support for marine protected areas around the planet.

**Consideration 7:** *There is community-based support for the nomination expressed by a broad range of interests.*

The National Aquarium has met with and sought input from members of a wide array of stakeholders in preparing our sanctuary nomination. Most strongly support the nomination and have committed to helping develop programs to promote ocean health and ocean literacy if the nomination is accepted. These include representatives from education and research institutions, the technology, energy, and tourism industries, conservation organizations, civic groups and philanthropic foundations. We are pleased with the diversity of support the nomination is receiving. We are also actively listening to stakeholders such as the fishing industry that have concerns about possible future restrictions. We believe we have an opportunity through this designation to both retain and enhance the ecological, economic and cultural value of the Baltimore Canyon. Specifically, we have directly engaged the following groups (complete list available upon request):

- |   |  |
|---|--|
| Academic Institutions and Researchers*                  | Deep Sea Technology industry             |
| American Fisheries Society                              | Energy Industry*                         |
| Aquariums across the U.S.                               | Fishing Tournament Directors             |
| Association of Zoos and Aquariums                       | Light Tackle Clubs                       |
| Atlantic States Marine Fisheries Commission             | Maryland State Legislators               |
| Charter Boat Captains                                   | Maryland Congressional Delegation*       |
| Chesapeake Bay Program                                  | Maryland Department of the Environment   |
| Commercial Fishermen                                    | Maryland Department of Natural Resources |
| Conservation Organizations* (national, state and local) | Maryland Department of Transportation    |
|   | Maryland Port Administration*            |
|   | Maryland Public School Systems*          |

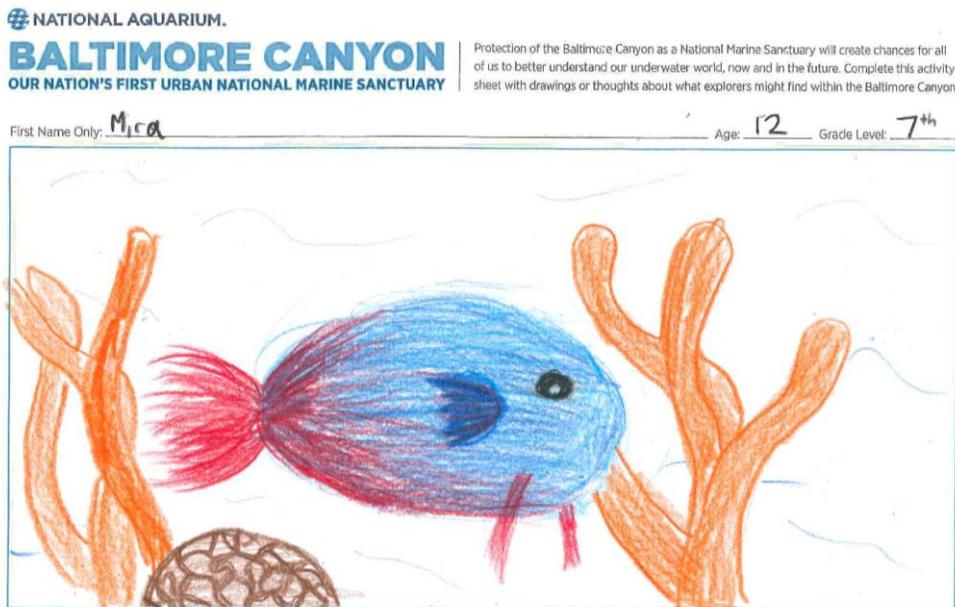
Marine Operations Training Industry\*  
Marina Owners  
Mid-Atlantic Fisheries Management Council  
Mid-Atlantic Regional Council on the  
Oceans  
Mid-Atlantic Regional Planning Body  
Museums  
NOAA Office of Ocean Exploration and  
Research

Ocean City Office of Tourism  
Ocean Monitoring Industry\*  
Philanthropic Foundations\*  
Recreational Fishermen and Clubs  
Restaurant and Hotel Associations  
Technology industry\*  
U.S. Fish and Wildlife Service  
Virtual Reality Industry\*

\*Letter of Support provided

We have also reached the general public through on-site programming and digital media interactions for guests visiting the Aquarium. For a period of two months, the Aquarium highlighted the Baltimore Canyon in our on-site and online education programs. As a result, we collected 434 creative expressions of support from young audiences under the age of 18 and 2,900 signatures on a petition requesting designation of the Baltimore Canyon as the first urban national marine sanctuary (available upon request). Support included signatures from residents spanning 38 states plus the District of Columbia and Puerto Rico, as well as eight other countries. We requested comments and support through digital and traditional media, including developing a webpage and online petition, print articles including an editorial in the *Baltimore Sun*, and outreach through social media outlets. To date more than 255,700 users have read about the Baltimore Canyon on the National Aquarium website, official Facebook, Twitter and Instagram pages.

*“We need to protect coral so we can protect biodiversity. We need to protect the Canyon before we hurt it.”* – Joseph, age 13, National Aquarium visitor.





# NATIONAL AQUARIUM®

501 East Pratt Street  
Baltimore, Maryland 21202-3194

John C. Racanelli  
Chief Executive Officer  
410-576-3821  
jracanelli@aqua.org

[aqua.org](http://aqua.org)

Mr. John Armor  
Director  
Office of National Marine Sanctuaries  
1305 East-West Highway, 11th Floor  
Silver Spring, MD 20910

Subject: Nomination of Baltimore Canyon and our nation's first Urban National Marine Sanctuary

Dear Director Armor:

On behalf of the National Aquarium and a wide range of partners, I am pleased to submit the attached proposal and letters of support to nominate Baltimore Canyon as our nation's first Urban National Marine Sanctuary. Our nomination will demonstrate the ecological significance of this canyon along with the opportunity to create a movement of ocean literacy in our urban areas.

Our mission at the National Aquarium is "to inspire conservation of the world's aquatic treasures," and with this sanctuary nomination, we will put that mission into practice by building awareness of the treasures in the Baltimore Canyon. They merit our protection, stewardship, exploration, and public education.

Located less than 70 miles off the coast of Maryland, the Baltimore Canyon is a 28-mile-long, 5-mile-wide submarine canyon situated at the edge of the Mid-Atlantic continental shelf. Within its depths, an entire ecosystem thrives based upon fragile corals and biological phenomena known as methane cold seeps. In fact, the Baltimore Canyon is home to the first methane cold seep discovered in the Mid-Atlantic as well as to one of the largest seeps in the region making it particularly dense with biologically important nutrients and chemicals that support a robust food web of bacteria, corals, mussels, sponges, anemones, crabs, lobsters and fish. The Canyon also supports fragile, slow-growing deep-sea corals not typically found in other Mid-Atlantic habitats. The delicate, slow-growing nature of these deep-sea corals makes them particularly vulnerable and once damaged, they may take centuries to recover and regrow. Quite simply, these deep-sea corals and rare methane seeps form the basis of a unique ecosystem that nourishes an entire food chain extending upwards more than a mile into the water column. The resources developed through this benthic Canyon ecosystem, in turn support a diversity of migratory species including tunas, sharks, billfish, marine mammals, sea turtles and



seabirds. Sanctuary designation will ensure this important benthic habitat is protected from extraction industries while allowing other traditional uses of the Canyon to continue and flourish.

While Baltimore Canyon itself is not easily accessible by large audiences, we have an unprecedented opportunity with this sanctuary designation to connect diverse urban communities to the science of deep-sea exploration through cutting edge technology, thus making it a truly urban national marine sanctuary. This also creates an opportunity to change the paradigm of how we perceive distance and connectivity to our deep seas.

Designating the Baltimore Canyon as our nation's first urban national marine sanctuary will not only recognize and protect its ecological diversity while sustaining appropriate uses, it will also catalyze partnerships between an array of stakeholders including educational institutions, conservation organizations and technology companies to both expose, educate and prepare our youth for the next frontier of exploration, creating much needed new STEM career pathways.

The National Aquarium has amassed over several thousand signatures from residents in 38 states, the District of Columbia, Puerto Rico, and eight other countries, all expressing support for the designation of the Baltimore Canyon as our nation's first urban national marine sanctuary. We have also met with and gained input from many of stakeholders in preparing this nomination, and have received strong support from educational and research institutions, the technology, energy, maritime, and tourism industries, conservation organizations, civic groups and philanthropic foundations. All agree it is time to invest in our urban areas and our deep seas.

Enclosed you will find:

- A Nomination Proposal
- Support letters expressing support and commitments of resources.

As stewards of our global ocean, the National Aquarium believes that the time is right to designate our nation's first Urban National Marine Sanctuary. We look forward to working with you on this important opportunity.

Sincerely,

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**Congress of the United States**  
**House of Representatives**  
**Washington, DC 20515-2003**

[www.sarbanes.house.gov](http://www.sarbanes.house.gov)

November 29, 2016

The Honorable Kathryn D. Sullivan  
Administrator  
National Oceanic and Atmospheric Administration  
Herbert C. Hoover Building, Room 6811  
14th Street & Constitution Avenue, NW  
Washington, DC 20230

Dear Dr. Sullivan:

I write to express my support for the proposed nomination of Baltimore Canyon to become our nation's first urban national marine sanctuary under the National Marine Sanctuaries Act.

Located just 70 miles off the coast of Maryland, the Baltimore Canyon is a 28-mile-long, 5-mile-wide submarine canyon at the edge of the Mid-Atlantic continental shelf. Within the canyon's depths, an entire ecosystem thrives based upon fragile corals and rare biological phenomena. Designating the Baltimore Canyon as our nation's first urban national marine sanctuary will recognize and protect its ecological diversity while preserving access for appropriate uses including recreational and commercial fishing. It also creates an invaluable opportunity to expand ocean literacy through partnerships with educational institutions, conservation organizations and technology companies. For example, the National Aquarium in Baltimore aspires to create partnerships on education and exploration with students in urban areas to raise their awareness of the oceans and the environment. With the Baltimore Canyon as their classroom and living laboratory, Baltimore's youth will enter the next frontier of exploration and learn about emerging STEM career pathways.

Strong public and stakeholder engagement is vital to creating a sanctuary with broad community support. This is especially true in Maryland, with our vibrant maritime tradition and strong link to the ocean through the Chesapeake Bay and Atlantic Coast communities. I know that the National Aquarium has met with the renewable energy industry, the maritime industry and members of the fishing community to ensure that 'users' of the ocean understand the proposed sanctuary nomination. I also understand that the Baltimore Canyon sanctuary nomination will not recommend any changes to the current fisheries management structure or seek any additional restrictions on fisheries. During the designation process, I encourage you to engage a fully representative group of stakeholders, including the fishing community - an important part of Maryland's economy.

I urge you to accept Baltimore Canyon's community-based nomination, and I look forward to a transparent, public dialogue to come should NOAA consider designating the canyon as a national marine sanctuary. Thank you for your attention to this matter.

Sincerely,



John P. Sarbanes  
Member of Congress



Larry Hogan  
*Governor*  
Boyd K. Rutherford  
*Lieutenant Governor*

**Maryland Port Commission**  
Pete K. Rahn  
*Chairman*

November 30, 2016

Brenda Dandy  
Christian R. Dean  
J. Robert Huber, Sr.  
Rev. Dr. John A. Lunn, Sr.  
David M. Richardson  
Walter Tilley, Jr.

James J. White  
*Executive Director*

The Honorable Kathryn D. Sullivan  
Administrator  
National Oceanic and Atmospheric Administration  
Herbert C. Hoover Building, Room 6811  
14th Street & Constitution Avenue, NW  
Washington, DC 20230

Dear Dr. Sullivan:

On behalf of the Maryland Port Administration, I am writing to support the nomination of the Baltimore Canyon as our nation's first Urban National Marine Sanctuary. Situated less than 70 miles off the coast of Maryland, the Baltimore Canyon is a major submarine canyon with unprecedented ecological value. The proximity of the Baltimore Canyon to Baltimore City, a burgeoning technology hub, presents a unique opportunity to connect an urban population to a deep-sea ecological treasure via cutting edge technology.

The deep seas are the next great American frontier, possessing untapped potential for exploration and research. The Baltimore Canyon is a 28-mile-long, 5-mile-wide major submarine canyon along the edge of the Mid-Atlantic continental shelf. Within its depths, an entire ecosystem thrives based upon fragile corals and biological phenomena rarely seen anywhere in the world. With so much to be learned, this fascinating ecosystem is both a natural classroom and living laboratory. As such, it deserves protective designation while continuing to allow innocent passage of vessels so that it will remain intact, providing an opportunity to connect urban youth, citizens and visitors to this next frontier. National Marine Sanctuary designation will provide such protection.

The Maryland Port Administration and the National Aquarium have worked together on various maritime projects over the years, including the Masonville Environmental Education Center at our Masonville Dredged Material Containment Facility. National Marine Sanctuary designation of the Baltimore Canyon will provide additional opportunities for urban youth to learn about the importance of the deep seas and maritime activities to the world. Such a designation and the connection via technology would enrich current programming activities at the Masonville Environmental

The Honorable Kathryn D. Sullivan  
November 30, 2016  
Page 2

Education Center. The Maryland Port Administration supports the nomination of the Baltimore Canyon for Sanctuary designation provided that such designation would not hinder innocent passage of vessels. The Maryland Port Administration and the National Aquarium believe the time is right to designate Baltimore Canyon as our nation's first Urban National Marine Sanctuary. This designation will not only protect a national ecological treasure, but serve as a national model for engaging our urban youth who otherwise might not have access to ocean literacy, creating valuable STEM career pathways. It is time to invest in Baltimore, our urban youth and our deep seas.

Sincerely,



Kathy Broadwater  
Deputy Executive Director  
Maryland Port Administration



**The Florida State University**  
**Coastal and Marine Laboratory**

---

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The Honorable Kathryn D. Sullivan  
Administrator  
National Oceanic and Atmospheric Administration  
Herbert C. Hoover Building, Room 6811  
14th Street & Constitution Avenue, NW  
Washington, DC 20230

Dear Dr. Sullivan:

December 1st, 2016

I am writing to support the nomination of Baltimore Canyon as a new National Marine Sanctuary. Situated less than 70 miles off the coast of Maryland, Baltimore Canyon is one of the largest submarine canyons that incise the continental shelf and slope of the mid-Atlantic Bight. Most of this region is featureless soft sediment, but the canyons are different; they generate fast currents as they funnel water and organic material between the shallow shelf and the abyssal plain. These currents not only carry food into the canyons, they also remove sediments and expose the underlying rocky substrates that provide habitats for communities not found on the muddy adjacent shelf and slope. These communities include sessile fauna such as deep sea corals and sponges, which support abundant and diverse invertebrates and fishes, are long-lived and slow growing, and are highly vulnerable to anthropogenic impacts.

Until fairly recently, little was known of the ecology of the submarine canyons of the Mid-Atlantic Bight, but historical explorations had revealed the presence of some hard substrate fauna, including 'bubblegum' corals and rare stony corals. I was the co-lead investigator on the multi-disciplinary BOEM/NOAA/USGS Atlantic Deepwater Canyons project, and Baltimore Canyon was one of our two target research areas. During the project it became clear that the early work had just begun to reveal the complexity and diversity of ecosystems within the canyons. We discovered extensive coral and sponge communities including giant bubblegum corals (5 m tall) and several species of stony corals, including the first observation of *Lophelia pertusa* in this region. We also discovered a new species of giant fileshell (*Acesta cryptadelphe*) at 1400 m depth, several range extensions of fishes and invertebrates, and most exiting of all, a new methane seep on the flanks of Baltimore Canyon. Several species of fishes that are targeted heavily on the shelf and slope were common within the canyons. Red crab, also a fishery species in the region, were the most common mobile invertebrates. Because of their rugged topography and fast currents, the canyons are avoided by fishers, who are justifiably concerned about losing their gear. The canyons therefore may provide important refuges from fishing for economically valuable species. Geological and physical studies of Baltimore Canyon showed an unusual current regime within the canyon that was most likely driving the development of benthic communities. These kinds of studies, although not glamorous, help us understand ecosystem functioning. It is rare to be able to study these interactions in a relatively pristine system. Beyond the benthos, canyons also support a highly productive pelagic ecosystem as they concentrate and funnel food for marine fauna. During our cruises, we saw dense clouds of krill, large schools of squid and pods of whales that feed on this rich food supply.

The Mid-Atlantic Fishery Management Council has recognized the ecological value of the Mid-Atlantic canyons by proposing large deep coral protection zones<sup>1</sup> to prevent potential fishing damage to these ancient and fragile benthic communities. Restrictions on bottom fishing however do not confer comprehensive protection. The National Marine Sanctuaries Act is the premier legislation for marine ecosystem conservation and management, and Baltimore Canyon is an excellent candidate for National Marine Sanctuary Status given its ecological and economic value, and its exposure to potential human impact given its proximity to urban development. We have barely begun to understand the incredibly diverse and productive ecosystems within Baltimore Canyon, or the roles they play in maintaining regional diversity and connectivity and their value to endangered species and endemic fauna. Baltimore Canyon is a national treasure and we now have an opportunity to provide the protection it deserves, and to preserve it for future generations as a National Marine Sanctuary.

Thank you for your consideration of this nomination

Sincerely,

A handwritten signature in black ink that reads "Sandra Brooke". The signature is written in a cursive, flowing style.

Sandra Brooke Ph.D.

---

<sup>1</sup> Deep Sea Corals Amendment to the Atlantic Mackerel, Squid, and Butterfish Fishery Management Plan, approved by the MAFMC June 2015.



**Institute of  
Marine and  
Environmental  
Technology**

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November 16, 2016

The Honorable Kathryn D. Sullivan  
Administrator  
National Oceanic and Atmospheric Administration  
Herbert C. Hoover Building, Room 6811  
14th Street & Constitution Avenue, NW  
Washington, DC 20230

Dear Dr. Sullivan:

On behalf of the Institute of Marine and Environmental Technology, I am writing to support the nomination of the Baltimore Canyon as our nation's first Urban National Marine Sanctuary. Situated less than 70 miles off the coast of Maryland, the Baltimore Canyon is a major submarine canyon of great ecological value. The proximity of the Baltimore Canyon to Baltimore City, a burgeoning technology hub, presents a unique opportunity to connect an urban population to a deep-sea ecological treasure via cutting edge technology.

The deep seas are the next great American frontier, possessing untapped potential for exploration and research. The Baltimore Canyon is a 28-mile-long, 5-mile-wide major submarine canyon along the edge of the Mid-Atlantic continental shelf. Within its depths, an entire ecosystem thrives based upon fragile corals, sponges and novel biological phenomena. This fascinating ecosystem is both a natural classroom and living laboratory. It deserves protective designation so that it will remain intact, providing an opportunity to connect urban youth, citizens and visitors to this next frontier. National Marine Sanctuary designation will provide such protection.

Our research at the Institute of Marine and Environmental Technology includes work on microbes found under extreme conditions, such as the microbial communities of deep-sea methane seeps such as those found in the Baltimore Canyon. We also have scientists interested in sponges and corals that grow in the deep ocean. We have existing research partnerships with the NA and look forward to expanding those partnerships with joint research on the Baltimore Canyon. Also, we are active in outreach and communication of the excitement of careers in science to school kids from Baltimore City. Baltimore Canyon designated as an Urban National Marine Sanctuary will provide us with additional educational opportunities.





**Institute of  
Marine and  
Environmental  
Technology**

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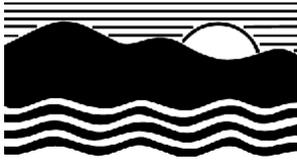
The Institute of Marine and Environmental Technology supports the National Aquarium in their effort to designate Baltimore Canyon as our nation's first Urban National Marine Sanctuary. This designation will not only protect a national ecological treasure, but serve as a national model for engaging our urban youth who otherwise might not have access to ocean literacy, creating valuable STEM career pathways. It is time to invest in Baltimore, our urban youth and our deep seas.

Sincerely,

Russell T. Hill, Ph.D.

Director and Professor





**University of Maryland  
CENTER FOR ENVIRONMENTAL SCIENCE  
CHESAPEAKE BIOLOGICAL LABORATORY**

POST OFFICE BOX 38  
SOLOMONS, MD 20688-0038  
(410) 326-4281  
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<http://www.umces.edu>

December 2, 2016

The Honorable Kathryn D. Sullivan  
Administrator, National Oceanic and Atmospheric Administration  
Herbert C. Hoover Building, Room 6811  
14th Street & Constitution Avenue, NW  
Washington, DC 20230

Dear Dr. Sullivan:

On behalf of the Alliance for Coastal Technologies (ACT), I am writing to support the nomination of the Baltimore Canyon as our nation's first Urban National Marine Sanctuary. Situated less than 70 miles off the coast of Maryland, the Baltimore Canyon is a major submarine canyon with unprecedented ecological value. The proximity of the Baltimore Canyon to Baltimore City, a burgeoning technology hub, presents a unique opportunity to connect an urban population to a deep-sea ecological treasure via cutting edge technology.

The deep sea is the next great American frontier, possessing untapped potential for exploration, research and environmental stewardship. The Baltimore Canyon is a 28-mile-long, 5-mile-wide major submarine canyon along the edge of the Mid-Atlantic continental shelf. Within its depths, an entire ecosystem thrives based upon fragile, long-lived corals and biological phenomena rarely seen anywhere in the world. With so much to be learned, this fascinating, pristine ecosystem is both a natural classroom and living laboratory. As such, it deserves protective designation so that it will remain intact, providing an opportunity to connect urban youth, citizens and visitors to this next frontier. National Marine Sanctuary designation will provide such protection.

I am so passionate about this effort because back in 1999, I was selected for the first joint Monterey Bay Aquarium Research Institute (MBARI) and NOAA Monterey Bay National Marine Sanctuary (MBNMS) Research Fellowship, with the task of designing and implementing a coordinated monitoring network for the MBNMS. The result of my two-year fellowship was the David and Lucile Packard Foundation-funded, Sanctuary Integrated Monitoring Network (SIMoN), which has now been distributed to other marine sanctuaries around the country. SIMoN has become a valuable center for initiating and integrating critical data collection efforts and for disseminating information to managers, policy makers, researchers, and the public. The development of SIMoN occurred during the reauthorization process for the MBNMS and I was very fortunate to also be deeply involved collecting the scientific data required to support the decision to include the Davidson Seamount as part of this preeminent Sanctuary. I see very similar, rare opportunities to be truly transformative with designate Baltimore Canyon as our nation's first Urban National Marine Sanctuary. This designation will not only protect a national ecological treasure, but also serve as a national model for engaging our urban youth who otherwise might not have access to ocean literacy and support new technological innovations.

Sincerely,

Mario N. Tamburri, PhD  
Director, Alliance for Coastal Technologies  
Research Professor, Chesapeake Biological Laboratory UMCES  
Phone: 410-326-7440, Email: [tamburri@umces.edu](mailto:tamburri@umces.edu)

# BALTIMORE CITY PUBLIC SCHOOLS

**Stephanie Rawlings-Blake**  
*Mayor, City of Baltimore*

**Marnell A. Cooper**  
*Chair, Baltimore City Board of  
School Commissioners*

**Dr. Sonja Brookins Santelises**  
*Chief Executive Officer*

November 11, 2016

Kathryn D. Sullivan  
Administrator  
National Oceanic and Atmospheric Administration  
Herbert C. Hoover Building, Room 6811  
14th Street & Constitution Avenue, NW  
Washington, DC 20230

Dear Dr. Sullivan:

I am writing to support the nomination of the Baltimore Canyon as our nation's first Urban National Marine Sanctuary. Situated less than 70 miles off the coast of Maryland, the Baltimore Canyon is a major submarine canyon with unprecedented ecological value. The proximity of the Baltimore Canyon to Baltimore City, a burgeoning technology hub, presents a unique opportunity to connect an urban population to a deep-sea ecological treasure via cutting edge technology.

The deep seas are the next great American frontier, possessing untapped potential for exploration and research. The Baltimore Canyon is a 28-mile-long, 5-mile-wide major submarine canyon along the edge of the Mid-Atlantic continental shelf. Within its depths, an entire ecosystem thrives based upon fragile corals and biological phenomena rarely seen anywhere in the world. With so much to be learned, this fascinating ecosystem is both a natural classroom and living laboratory. As such, it deserves protective designation so that it will remain intact, providing an opportunity to connect urban youth, citizens and visitors to this next frontier. National Marine Sanctuary designation will provide such protection.

We are excited about the educational possibilities a Baltimore Canyon sanctuary could catalyze. Following the designation of the existing 13 National Marine Sanctuaries and 2 marine monuments, a variety of classroom initiatives, curriculum materials, and teacher training have been created. For example, the Thunder Bay National Marine Sanctuary created a curriculum about the history of ship wrecks on the Great Lakes. Another example is the Navigating Change Teacher's Guide, a 4th-5th grade standards-aligned curriculum focused on the Northwestern Hawaiian Islands Marine Sanctuary that gets students to understand human impacts to the Hawaiian Archipelago. At Grays Reef National Marine Sanctuary off the coast of Georgia, a high school teacher participated in a research cruise aboard RV Nancy Foster through the Teacher-at-Sea program. The Baltimore Canyon sanctuary could spur the development of similar educational opportunities, with a particular focus towards connecting underserved students to science and technology fields.

The time is right to designate Baltimore Canyon as our nation's first Urban National Marine Sanctuary. This designation will not only protect a national ecological treasure, but serve as a national model for engaging our urban youth who otherwise might not have access to ocean literacy,

creating valuable STEM career pathways. It is time to invest in Baltimore, our urban youth and our deep seas.

Sincerely,

A handwritten signature in blue ink that reads "Ryan Reid Salta". The signature is written in a cursive, flowing style.

Ryan Reid Salta  
STEM Director  
Baltimore City Public Schools  
RReidSalta@bcps.k12.md.us



701 East Pratt Street, Suite 200 • Baltimore, Maryland 21202

Ph: 410.385.6318

Fax: 410.385.6367

[www.towson.edu/cse](http://www.towson.edu/cse)

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November 4, 2016

The Honorable Kathryn D. Sullivan  
Administrator  
National Oceanic and Atmospheric Administration  
Herbert C. Hoover Building, Room 6811  
14th Street & Constitution Avenue, NW  
Washington, DC 20230

Dear Dr. Sullivan:

On behalf of the Towson University Center for STEM Excellence, I am writing to support the nomination of the Baltimore Canyon as our nation's first Urban National Marine Sanctuary. Situated less than 70 miles off the coast of Maryland, the Baltimore Canyon is a major submarine canyon with unprecedented ecological value. The proximity of the Baltimore Canyon to Baltimore City, a burgeoning technology hub, presents a unique opportunity to connect an urban population to a deep-sea ecological treasure via cutting edge technology.

The deep seas are the next great American frontier, possessing untapped potential for exploration and research. The Baltimore Canyon is a 28-mile-long, 5-mile-wide major submarine canyon along the edge of the Mid-Atlantic continental shelf. Within its depths, an entire ecosystem thrives based upon fragile corals and biological phenomena rarely seen anywhere in the world. With so much to be learned, this fascinating ecosystem is both a natural classroom and living laboratory. As such, it deserves protective designation so that it will remain intact, providing an opportunity to connect urban youth, citizens and visitors to this next frontier. National Marine Sanctuary designation will provide such protection.

The Towson University Center for STEM Excellence (TUCSE) has a strong history of supporting and serving the Maryland K-12 community. Thousands of Maryland students visit our SciTech Student Learning Lab annually, where they engage in hands-on, inquiry based bioscience activities that complement and enhance their classroom learning. In addition, hundreds of teachers across Maryland have come to rely on our equipment loan program, the Maryland Loaner Lab, to engage their students in high quality, equipment intensive scientific explorations right in their own classrooms. TUCSE is also a valued partner of school systems for the professional development opportunities they provide to in-service teachers across the state. TUCSE is excited about the educational opportunities associated with the designation of the Baltimore Canyon as an Urban National Marine Sanctuary. We look forward to partnering with researchers and other educators to develop educational resources focused on this unique ecosystem. Our existing educational programs (SciTech, Maryland Loaner Lab, Teacher Professional Development workshops) provide the perfect vehicles for bringing these educational resources focused on the Baltimore Canyon directly to Maryland's urban teachers and students. We fully support the nomination for the Baltimore Canyon to become the first Urban National Marine Sanctuary and are excited by the educational opportunities that will come from such a designation.

Towson University and the National Aquarium believe the time is right to designate Baltimore Canyon as our nation's first Urban National Marine Sanctuary. This designation will not only protect a national ecological treasure, but serve as a national model for engaging our urban youth who otherwise might not have access to ocean literacy, creating valuable STEM career pathways. It is time to invest in Baltimore, our urban youth and our deep seas.

Sincerely



Mary Stapleton, PhD  
Director, Bioscience Education and Outreach  
Towson University Center for STEM Excellence



# CHALLENGER CENTER FOR SPACE SCIENCE EDUCATION

December 1, 2016

The Honorable Kathryn D. Sullivan  
Administrator  
National Oceanic and Atmospheric Administration  
Herbert C. Hoover Building, Room 6811  
14th Street & Constitution Avenue, NW  
Washington, DC 20230

Dear Dr. Sullivan:

On behalf of Challenger Center, I am writing to support the nomination of the Baltimore Canyon as our nation's first Urban National Marine Sanctuary. Situated less than 70 miles off the coast of Maryland, the Baltimore Canyon is a major submarine canyon with unprecedented ecological value. The proximity of the Baltimore Canyon to Baltimore City, a burgeoning technology hub, presents a unique opportunity to connect an urban population to a deep-sea ecological treasure via cutting edge technology.

The deep seas are one of the next great American frontiers, possessing untapped potential for exploration and research. The Baltimore Canyon is a 28-mile-long, 5-mile-wide major submarine canyon along the edge of the Mid-Atlantic continental shelf. Within its depths, an entire ecosystem thrives based upon fragile corals and biological phenomena rarely seen anywhere in the world. With so much to be learned, this fascinating ecosystem is both a natural classroom and living laboratory. As such, it deserves protective designation so that it will remain intact, providing an opportunity to connect urban youth, citizens and visitors to this next frontier. National Marine Sanctuary designation will provide such protection.

For 30 years, Challenger Center has delivered high quality, impactful science, technology, engineering, and math (STEM) education programs to students around the world. Through our experiential science missions, we take students on journeys to outer space or the ocean depths. We give them a big goal – like finding life on Mars or determining why the Hawaiian Monk Seal population is declining. We give them real jobs like biologist or engineer, and in teams, they work through data and hands-on labs to achieve their mission goals. What we've learned in three decades is this: If STEM education is delivered in context of a real world setting and real world scenarios, it not only results in learning but it also inspires students to continue exploring STEM. Building a STEM workforce and STEM-literate society is critical to our country's – and our world's – goals, including our conservation goals.

In recent years, with support from the U.S. Department of Education, Challenger Center has developed EngiLearn, a new platform for delivering its unique experiential learning programs in school classrooms. The first science mission developed for the EngiLearn platform is an ocean-themed mission, Aquatic Investigators, which is designed to introduce students to ocean science and conservation issues. This mission, designed for late elementary and early middle school-aged students, was developed with data

and expert knowledge provided by the NOAA. Challenger Center believes this program could be used to introduce urban students in Baltimore to ocean science and conservation concepts, providing a base of knowledge for them to build upon as they start to study the Baltimore Canyon – an ocean ecosystem in their own backyard. **By designating Baltimore Canyon as an urban sanctuary, NOAA will be providing students an unparalleled opportunity to engage with STEM in a way that feels personal, relevant, and important. In Challenger Center's experience, those are the key ingredients for creating life-long STEM learners and inspired activists.**

Challenger Center and the National Aquarium believe the time is right to designate Baltimore Canyon as our nation's first Urban National Marine Sanctuary. This designation will not only protect a national ecological treasure, but serve as a national model for engaging our urban youth who otherwise might not have access to ocean literacy, creating valuable STEM career pathways. This is a great opportunity to invest in Baltimore, our urban youth and our deep seas.

Sincerely,

A handwritten signature in dark ink that reads "Lance Bush". The signature is written in a cursive style with a long, sweeping underline that extends to the left.

Lance Bush  
President & CEO  
Challenger Center



11100 Wildlife Center Drive ■ Reston, VA 20190 ■ 703.438.6000 ■ [www.nwf.org](http://www.nwf.org)

## Office of the President

November 15, 2016

The Honorable Kathryn D. Sullivan  
Administrator  
National Oceanic and Atmospheric Administration  
Herbert C. Hoover Building, Room 6811  
14th Street & Constitution Avenue, NW  
Washington, DC 20230

Dear Dr. Sullivan:

On behalf of the National Wildlife Federation, I am writing to support the nomination of Baltimore Canyon as our nation's first Urban National Marine Sanctuary. Formed by an ancient river millions of years ago, Baltimore Canyon is a unique ecosystem, supporting fragile corals, methane cold seeps, and rich biodiversity. Located within 70 miles of the Maryland coast, Baltimore Canyon can serve as a natural classroom to connect urban youth, citizens and visitors to this deep-sea ecological treasure.

As the nation's largest wildlife conservation organization, the National Wildlife Federation's mission is to unite all Americans to ensure wildlife thrive in a rapidly changing world. We are committed to conserving the marine mammals, sharks, sea turtles and the many species of fish and seabirds that rely on the Baltimore Canyon. National Marine Sanctuary designation will help to protect critical habitat while providing opportunities for sport fishing, diving, boating and other recreational activities.

Since our inception in 1936, the National Wildlife Federation has brought together Americans from all walks of life and from all corners of the country, who believe that our air, water, and wildlife habitats are valuable resources to be protected for future generations. Through eleven regional centers across the country, including the Mid-Atlantic Regional Center in Annapolis, Maryland, and 50 state and territorial affiliates, the National Wildlife Federation is able to facilitate on-the-ground projects and build and participate in effective local partnerships and coalitions. We look forward to working closely with our Maryland state affiliate, the National Aquarium, to advance protections for Baltimore Canyon. This proposed designation is a natural extension of our work together to engage Baltimore City residents, through education and community-based outreach, to inspire conservation action and inform citizens' choices about their own practices and the direct impact they have on wildlife and local water quality.

Inspiring  
Americans  
to protect  
wildlife for  
our children's  
future.



The Honorable Kathryn D. Sullivan

Page 2

November 15, 2016

The National Wildlife Federation and the National Aquarium believe the time is right to designate Baltimore Canyon as our nation's first Urban National Marine Sanctuary. This designation will not only protect a major submarine canyon with unprecedented ecological value, but also serve as a national model for increasing ocean literacy and creating valuable Science Technology Engineering and Math (STEM) career pathways.

Thank you for consideration of this important nomination. The National Wildlife Federation looks forward to working with you to protect our cherished ocean treasures for generations to come.

Sincerely,

A handwritten signature in blue ink, appearing to read "Collin O'Mara", with a stylized flourish at the end.

Collin O'Mara  
President and CEO



## Ocean City, MD Chapter

November 14, 2016

The Honorable Kathryn D. Sullivan  
Administrator  
National Oceanic and Atmospheric Administration  
Herbert C. Hoover Building, Room 6811  
14th Street & Constitution Avenue, NW  
Washington, DC 20230

Dear Dr. Sullivan:

On behalf of Surfrider Foundation's volunteer chapter and hundreds of members in Maryland, we are writing to express our support for the nomination of a new National Marine Sanctuary to protect Baltimore Canyon. Surfrider Foundation is a nonprofit environmental organization that engages a volunteer network of ocean users to protect our ocean, waves, and beaches through conservation, activism, research, and education.

The Baltimore Canyon is one of the largest canyons off the Atlantic Coast of the United States, its depths reaching the thousands of feet below the surface. The grand scale, ocean currents, and diverse structure of the canyon make it an ecological hotspot for a vast array of marine wildlife including plankton, corals, fish, sharks, and whales.

Norfolk Canyon also supports our Maryland ocean economy. Commercial and recreational fisheries depend on the fish and invertebrates that are supported by this productive area. Because the canyon is such a valuable economic and ecosystem driver, we agree that certain industrial uses should be prohibited in the area. This includes extraction of oil and gas as well as *exploration* for oil and gas, which includes seismic testing. Oil and gas extraction poses too great a threat to the canyon's ecosystem, as well as to our valuable coastal areas in case of a spill. Other industrial uses such as offshore wind turbines or deep-water ports are also incompatible uses in such a unique area.

The Mid-Atlantic Fishery Management Council has one of the best records managing fisheries in the region with regard to stock status and recovery under its purview. It has also implemented proactive conservation amendments, such as protecting deep sea coral communities from destructive bottom trawls in 15 Mid-Atlantic canyons and preventing the development of new

fisheries for unmanaged forage species until science-based management is in place. We therefore recommend that fishing should continue in this economically valuable area, especially in light of these recent proactive measures.

We appreciate that the nomination process allows stakeholders like ourselves to influence the designation and future management of the nominated sanctuary. This “bottom-up” model has worked well for the existing National Marine Sanctuaries, and we believe that this locally driven process will also work for the Baltimore Canyon.

The marine waters of Maryland sustain a thriving economy, rich maritime history, and a rich diversity of marine life, thus deserving recognition as a national treasure. A sanctuary off our coast will provide a special place for us to enjoy and use today, while securing an ecological legacy for generations to come.

We support the nomination of Baltimore Canyon, and urge you to promptly begin the public process for its designation as a National Marine Sanctuary.

Sincerely,

Craig Sibal (Chair@oceancity.surfrider.org)  
Chair, Ocean City Chapter of the Surfrider Foundation



TIMOTHY D. JUNKIN, ESQ.  
FOUNDER

JEFFREY H. HORSTMAN  
EXECUTIVE DIRECTOR  
MILES-WYE RIVERKEEPER

MATTHEW J. PLUTA  
CHOPTANK RIVERKEEPER

[midshoreriverkeeper.org](http://midshoreriverkeeper.org)

[info@midshoreriverkeeper.org](mailto:info@midshoreriverkeeper.org)

October 31, 2016

The Honorable Kathryn D. Sullivan  
Administrator  
National Oceanic and Atmospheric Administration  
Herbert C. Hoover Building, Room 6811  
14th Street & Constitution Avenue, NW  
Washington, DC 20230

Dear Dr. Sullivan:

On behalf of Midshore Riverkeeper Conservancy (MRC), I am writing to support the nomination of the Baltimore Canyon as our nation's first Urban National Marine Sanctuary. Situated less than 70 miles off the coast of Maryland, the Baltimore Canyon is a major submarine canyon with unprecedented ecological value. The proximity of the Baltimore Canyon to Baltimore City, a burgeoning technology hub, presents a unique opportunity to connect an urban population to a deep-sea ecological treasure via cutting edge technology.

The deep seas are the next great American frontier, possessing untapped potential for exploration and research. The Baltimore Canyon is a 28-mile-long, 5-mile-wide major submarine canyon along the edge of the Mid-Atlantic continental shelf. Within its depths, an entire ecosystem thrives based upon fragile corals and biological phenomena rarely seen anywhere in the world. With so much to be learned, this fascinating ecosystem is both a natural classroom and living laboratory. As such, it deserves protective designation so that it will remain intact, providing an opportunity to connect urban youth, citizens and visitors to this next frontier. National Marine Sanctuary designation will provide such protection.

MRC is a non-profit organization dedicated to the restoration and protection of the waterways on the eastern shore of Maryland. We strive to increase environmental awareness through education, outreach, and restoration initiatives. Designating Baltimore Canyon as an Urban National Marine Sanctuary directly supports MRC's mission and creates opportunities for new partnerships and programs to increase environmental literacy and awareness.

MRC and the National Aquarium believe the time is right to designate Baltimore Canyon as our nation's first Urban National Marine Sanctuary. This designation will not only protect a national ecological treasure, but serve as a national model for engaging our urban youth who otherwise might not have access to ocean literacy, creating valuable STEM career pathways. It is time to invest in Baltimore, our urban youth and our deep seas.

Sincerely,

A handwritten signature in blue ink, appearing to read "Jeffrey H. Horstman".

Jeffrey Horstman  
Executive Director



November 3rd, 2016

The Honorable Kathryn D. Sullivan  
Administrator  
National Oceanic and Atmospheric Administration  
Herbert C. Hoover Building, Room 6811  
14th Street & Constitution Avenue, NW  
Washington, DC 20230

Dear Dr. Sullivan:

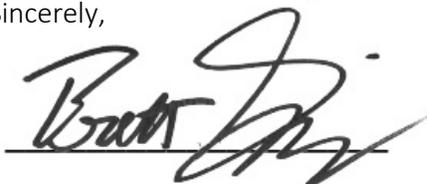
On behalf of Mission Blue, I am writing to support the nomination of the Baltimore Canyon as our nation's first Urban National Marine Sanctuary. Situated less than 70 miles off the coast of Maryland, the Baltimore Canyon is a major submarine canyon with unprecedented ecological value. The proximity of the Baltimore Canyon to Baltimore City, a burgeoning technology hub, presents a unique opportunity to connect an urban population to a deep-sea ecological treasure via cutting edge technology.

The deep seas are the next great American frontier, possessing untapped potential for exploration and research. The Baltimore Canyon is a 28-mile-long, 5-mile-wide major submarine canyon along the edge of the Mid-Atlantic continental shelf. Within its depths, an entire ecosystem thrives based upon fragile corals and biological phenomena rarely seen anywhere in the world. With so much to be learned, this fascinating ecosystem is both a natural classroom and living laboratory. As such, it deserves protective designation so that it will remain intact, providing an opportunity to connect urban youth, citizens and visitors to this next frontier. National Marine Sanctuary designation will provide such protection.

Mission Blue is especially keen to see the Baltimore Canyon become the nation's first Urban National Marine Sanctuary because our core mission is to ignite public support for marine protected areas around the planet. If this proposed sanctuary is created, we would be delighted to communicate about it far and wide through our strong online outreach apparatus which gets up to 80 million impressions per month. We could shine a spotlight on these awesome efforts and educate around the NMS system, marine protected areas and the importance of declaring these zones close to urban areas.

Mission Blue and the National Aquarium believe the time is right to designate Baltimore Canyon as our nation's first Urban National Marine Sanctuary. This designation will not only protect a national ecological treasure, but serve as a national model for engaging our urban youth who otherwise might not have access to ocean literacy, creating valuable STEM career pathways. It is time to invest in Baltimore, our urban youth and our deep seas.

Sincerely,

A handwritten signature in black ink, appearing to read "Brett Garling", written over a horizontal line.

Brett Garling

Director of Communications, Mission Blue

Dec. 1, 2016

The Honorable Kathryn D. Sullivan, Administrator  
National Oceanic and Atmospheric Administration  
Herbert C. Hoover Building, Room 6811  
14th Street & Constitution Avenue, NW  
Washington, DC 20230

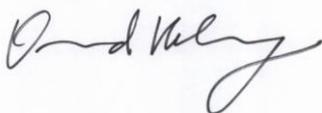
Dear Dr. Sullivan:

On behalf of Blue Frontier ([www.bluefront.org](http://www.bluefront.org)) an ocean conservation and policy organization, I am writing to support the nomination of the Baltimore Canyon as our nation's first Urban National Marine Sanctuary. Situated less than 70 miles off the coast of Maryland, the Baltimore Canyon is a major submarine canyon with unprecedented ecological value. The proximity of the Baltimore Canyon to Baltimore City, a burgeoning technology hub with a revitalized harbor and dynamic waterfront, offers a unique opportunity to connect an economically and ethnically diverse urban population to a deep-sea ecological treasure via cutting edge remote-sensing, video and VR technology.

The deep seas are the next great American frontier, possessing untapped potential for exploration and research. The Baltimore Canyon is a 28-mile-long, 5-mile-wide major submarine canyon along the edge of the Mid-Atlantic continental shelf. Within its depths, an entire ecosystem thrives based upon fragile corals and biological phenomena rarely seen anywhere else in the world. With so much to be learned, this fascinating ecosystem is both a natural classroom and living laboratory. As such, it deserves protective designation so that it will remain intact, providing an opportunity to connect urban youth, citizens and visitors to this next frontier. National Marine Sanctuary designation will provide such protection.

We were thrilled that you were able to participate as one of our keynote speakers at our last Blue Vision Summit in Washington D.C. in May of 2015. Blue Frontier's purpose is to build a solution-oriented constituency of concerned citizens for the nation's public seas, coastlines and the blue economy that a healthy ocean provides and that we all depend on. With cleaner waters and greater public engagement we've seen many of our waterfronts including in Baltimore revive and thrive thanks to keystone enterprises such as the National Aquariums, one of the great advocates for the new Baltimore Canyon Sanctuary designation.

Blue Frontier and the National Aquarium believe the time is right to designate Baltimore Canyon as our nation's first Urban National Marine Sanctuary. This designation will not only protect a national ecological treasure, but serve as a national model for engaging our urban youth who otherwise might not have access to ocean literacy, creating valuable STEM career pathways. It is time to invest in Baltimore, our urban youth and our deep seas. Regards,



David Helvarg

Executive Director

Blue Frontier



**CARI BOYCE**  
Vice President  
Policy, Sustainability, and Stakeholder Strategy  
410 S. Wilmington Street, NC RH 12 A  
Raleigh, NC 27601  
Tel: 919-546-7314  
[cari.boyce@duke-energy.com](mailto:cari.boyce@duke-energy.com)

November 18, 2016

The Honorable Kathryn D. Sullivan  
Administrator  
National Oceanic and Atmospheric Administration  
Herbert C. Hoover Building, Room 6811  
14th Street & Constitution Avenue, NW  
Washington, DC 20230

RE: Baltimore Canyon

Dear Dr. Sullivan:

On behalf of Duke Energy Corporation, I am writing to support the nomination of the Baltimore Canyon as our nation's first Urban National Marine Sanctuary. Located less than 70 miles off the coast of Maryland, the Baltimore Canyon is a significant submarine canyon with unprecedented ecological value. The proximity of the Baltimore Canyon to the city of Baltimore presents a unique opportunity to connect a nearby urban population to a deep-sea ecological treasure. As such, the Baltimore Canyon deserves protective designation so that it will remain intact, providing an opportunity to connect urban youth, citizens and visitors to this new frontier. A National Marine Sanctuary designation will provide such protection.

Duke Energy is a leader in the development of wind and solar renewable energy infrastructure. The development of off-shore wind generation is increasing every day, although Duke Energy has not yet explored these possibilities. We understand that sensitive marine environments, such as the Baltimore Canyon, are rare and must be protected, especially ones in such close proximity to urban populations. Duke Energy supports proactive measures to protect ecologically significant national marine sanctuaries before wind or other energy development encroaches into these sensitive areas. Importantly, designation of the Baltimore Canyon as an Urban National Marine Sanctuary would not exclude commercial fishing or recreational activities in the area. In fact, these continued uses will not only be allowed but encouraged.

The National Aquarium believes the time is right to designate Baltimore Canyon as our nation's first Urban National Marine Sanctuary and Duke Energy supports this belief. This designation will not only protect a national ecological treasure, but serve as a national model for engaging our urban youth who otherwise might not have access to ocean literacy, or creating valuable STEM career pathways. It is time to invest in our urban communities and the deep seas.

Sincerely,

A handwritten signature in blue ink that reads "Cari Boyce".

Cari Boyce  
Vice President  
Policy, Sustainability, and Stakeholder Engagement  
Duke Energy Corporation

November 4th, 2016

The Honorable Kathryn D. Sullivan  
Administrator  
National Oceanic and Atmospheric Administration  
Herbert C. Hoover Building, Room 6811  
14th Street & Constitution Avenue, NW  
Washington, DC 20230

Dear Dr. Sullivan:

On behalf of Balti Virtual, I am writing to support the nomination of the Baltimore Canyon as our nation's first Urban National Marine Sanctuary. Situated less than 70 miles off the coast of Maryland, the Baltimore Canyon is a major submarine canyon with unprecedented ecological value. The proximity of the Baltimore Canyon to Baltimore City, a burgeoning technology hub, presents a unique opportunity to connect an urban population to a deep-sea ecological treasure via cutting edge technology.

The deep seas are the next great American frontier, possessing untapped potential for exploration and research. The Baltimore Canyon is a 28-mile-long, 5-mile-wide major submarine canyon along the edge of the Mid-Atlantic continental shelf. Within its depths, an entire ecosystem thrives based upon fragile corals and biological phenomena rarely seen anywhere in the world. With so much to be learned, this fascinating ecosystem is both a natural classroom and living laboratory. As such, it deserves protective designation so that it will remain intact, providing an opportunity to connect urban youth, citizens and visitors to this next frontier. National Marine Sanctuary designation will provide such protection.

Balti Virtual is a software studio based in City Garage here in Baltimore. We build virtual and augmented reality experiences and products. We would be thrilled to partner with the National Aquarium in order to use AR & VR to enable new audiences to explore, learn & understand the wonders of the canyon firsthand. Our technology can bring it to life. Balti Virtual would donate up-front design and pre-production services in order to achieve this. We believe that this Marine Sanctuary is of paramount importance, and would work hard to collaborate with the National Aquarium so that the story of this unique and special environment can be experienced by Baltimore's youth and young adults.

Balti Virtual and the National Aquarium believe the time is right to designate Baltimore Canyon as our nation's first Urban National Marine Sanctuary. This designation will not only protect a national ecological treasure, but serve as a national model for engaging our urban youth who otherwise might not have access to ocean literacy, creating valuable STEM career pathways. It is time to invest in Baltimore, our urban youth and our deep seas.

Sincerely,

Will Gee

Founder & CEO

November 14, 2016

The Honorable Kathryn D. Sullivan  
Administrator  
National Oceanic and Atmospheric Administration  
Herbert C. Hoover Building, Room 6811  
14th Street & Constitution Avenue, NW  
Washington, DC 20230

Dear Dr. Sullivan:

On behalf of the Maritime Institute of Technology and Graduate Studies (MITAGS), and the Pacific Maritime Institute (PMI), I am writing to support the nomination of the Baltimore Canyon as our nation's first Urban National Marine Sanctuary. Situated less than 70 miles off the coast of Maryland, the Baltimore Canyon is a major submarine canyon with unprecedented ecological value. The proximity of the Baltimore Canyon to Baltimore City, a burgeoning technology hub, presents a unique opportunity to connect an urban population to a deep-sea ecological treasure via cutting edge technology.

The deep seas are the next great American frontier, possessing untapped potential for exploration and research. The Baltimore Canyon is a 28-mile-long, 5-mile-wide major submarine canyon along the edge of the Mid-Atlantic continental shelf. Within its depths, an entire ecosystem thrives based upon fragile corals and biological phenomena rarely seen anywhere in the world. With so much to be learned, this fascinating ecosystem is both a natural classroom and living laboratory. As such, it deserves protective designation so that it will remain intact, providing an opportunity to connect urban youth, citizens and visitors to this next frontier. National Marine Sanctuary designation will provide such protection.

The Maritime Institute of Technology and Graduate Studies (MITAGS) and the Pacific Maritime Institute (PMI) are the leading maritime training and simulation centers in the country. The schools are non-profit trusts dedicated to enhancing professionalism through the development of internationally recognized programs in maritime leadership, education, training, and safety. MITAGS-PMI are conveniently located on both Coasts, and offer over 150 courses from ordinary seafarer to unlimited master. With twenty plus years of experience in the integration of full-mission ship simulation for operational research, and mariner skills' assessment, state pilots, masters, and port designers also make extensive use of the simulation capabilities for operational research.

Our MITAGS facility also serves as a Conference Center, the Conference Center at the Maritime Institute (CCMIT), which utilizing our auditorium, classroom resources, on campus hotel, and dining room for a dedicated learning experience. We have recently connected with the National Aquarium to offer our students and conference guests discounted ticket prices.

MITAGS-PMI and the National Aquarium believe the time is right to designate Baltimore Canyon as our nation's first Urban National Marine Sanctuary. This designation will not only protect a national



ecological treasure, but serve as a national model for engaging our urban youth who otherwise might not have access to ocean literacy, creating valuable STEM career pathways. It is time to invest in Baltimore, our urban youth and our deep seas.

Sincerely,

A handwritten signature in black ink, appearing to read "Glen Paine", is positioned below the word "Sincerely,".

Glen Paine  
Executive Director  
MITAGS-PMI-CCMIT

November 15 , 2016

The Honorable Kathryn D. Sullivan  
Administrator  
National Oceanic and Atmospheric Administration  
Herbert C. Hoover Building, Room 6811  
14th Street & Constitution Avenue, NW  
Washington, DC 20230

Dear Dr. Sullivan:

On behalf of The Bunting Family Foundation, I am writing to support the nomination of the Baltimore Canyon as our nation's first Urban National Marine Sanctuary. Situated less than 70 miles off the coast of Maryland, the Baltimore Canyon is a major submarine canyon with unprecedented ecological value. The proximity of the Baltimore Canyon to Baltimore City, a burgeoning technology hub, presents a unique opportunity to connect an urban population to a deep-sea ecological treasure via cutting edge technology.

The deep seas are the next great American frontier, possessing untapped potential for exploration and research. The Baltimore Canyon is a 28-mile-long, 5-mile-wide major submarine canyon along the edge of the Mid-Atlantic continental shelf. Within its depths, an entire ecosystem thrives based upon fragile corals and biological phenomena rarely seen anywhere in the world. With so much to be learned, this fascinating ecosystem is both a natural classroom and living laboratory. As such, it deserves protective designation so that it will remain intact, providing an opportunity to connect urban youth, citizens and visitors to this next frontier. National Marine Sanctuary designation will provide such protection.

The Bunting Family Foundation established in 1991 has a long history of contributing to the development of Baltimore with a special focus on youth, the environment, and social justice. We believe the time is right to designate Baltimore Canyon as our nation's first Urban National Marine Sanctuary. This designation will not only protect a national ecological treasure, but serve as a national model for engaging our urban youth who otherwise might not have access to ocean literacy, creating valuable STEM career pathways. It is time to invest in Baltimore, our urban youth and our deep seas.

Sincerely,

A handwritten signature in black ink, appearing to be the name of the sender, written in a cursive style.

Marc Bunting

Director Bunting Family Foundation



# BALTIMORE CANYON

## OUR NATION'S FIRST URBAN NATIONAL MARINE SANCTUARY

Protection of the Baltimore Canyon as a National Marine Sanctuary will create chances for all of us to better understand our underwater world, now and in the future. Complete this activity sheet with drawings or thoughts about what explorers might find within the Baltimore Canyon.

Isaac

Juarez

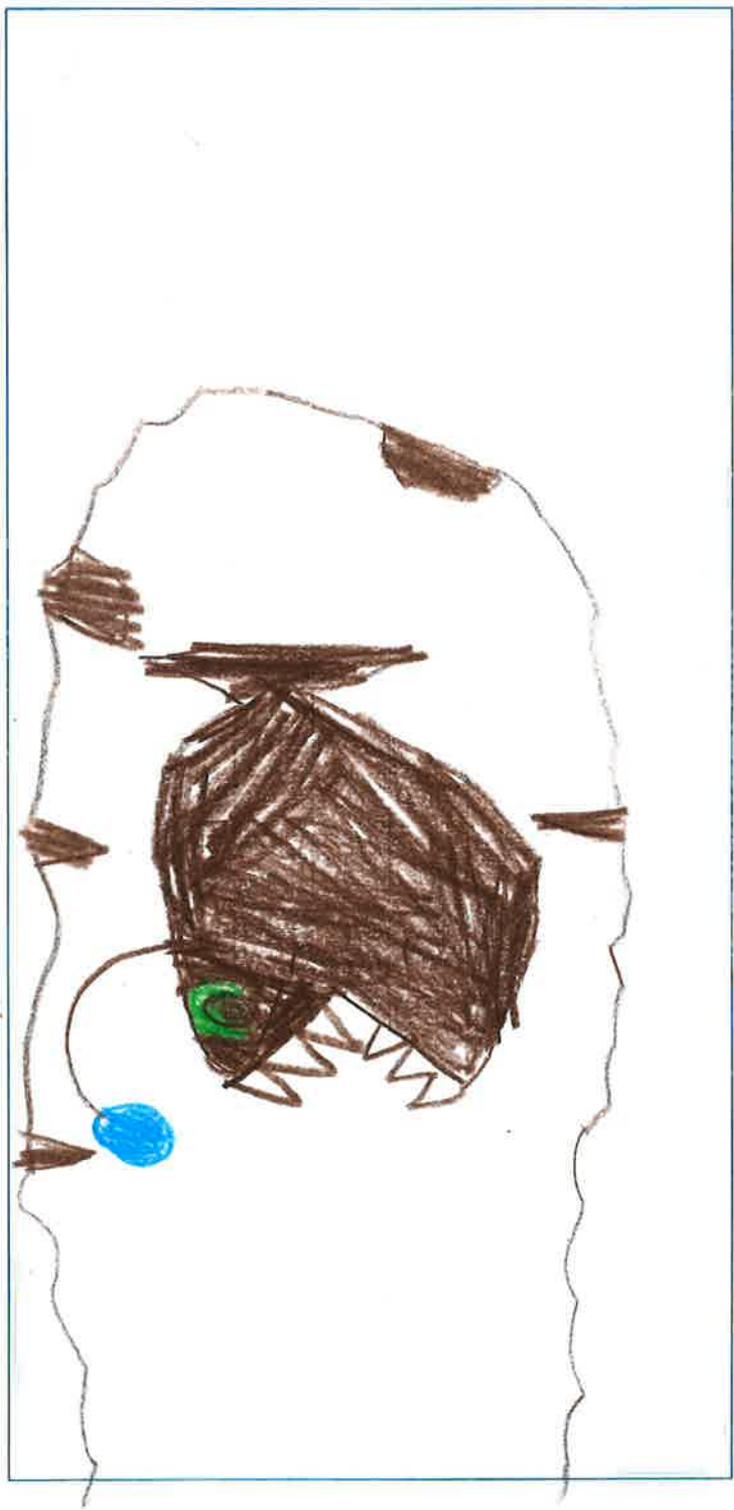
First Name Only:

Age:

6

Grade Level:

1





# BALTIMORE CANYON

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First Name Only: Mica

Age: 12

Grade Level: 7<sup>th</sup>





**NATIONAL AQUARIUM.**  
**BALTIMORE CANYON**  
**OUR NATION'S FIRST URBAN NATIONAL MARINE SANCTUARY**

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First Name Only: \_\_\_\_\_

Age: \_\_\_\_\_

Grade Level: \_\_\_\_\_

Coral, especially green coral, is responsible for most of our oxygen. But more and more coral is dying because of us. Keep the coral safe!

# BALTIMORE CANYON

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First Name Only: \_\_\_\_\_

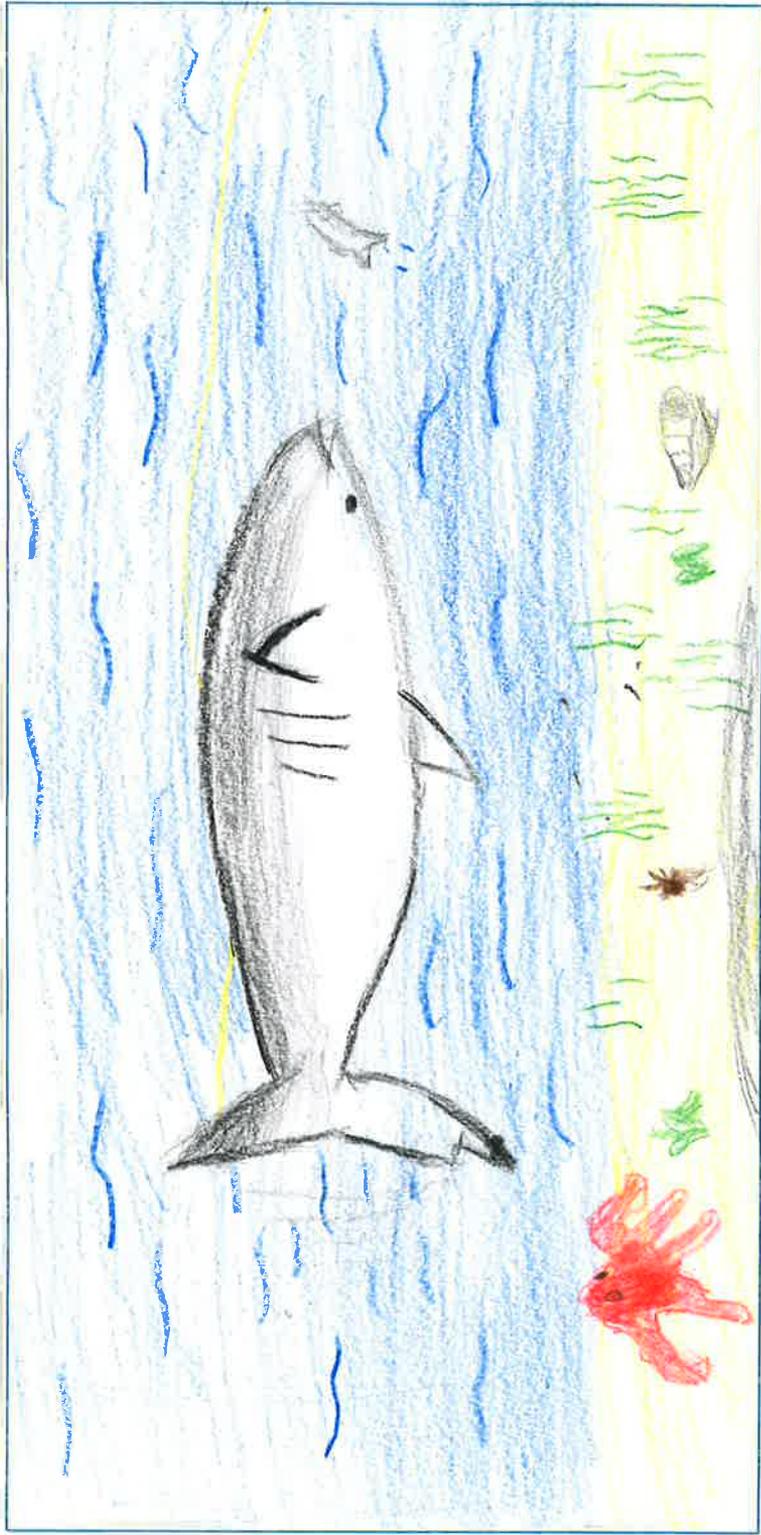
Jacob together

Age: \_\_\_\_\_

10

Grade Level: \_\_\_\_\_

5





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Jack

8

13

First Name Only:

Age:

Grade Level:





# BALTIMORE CANYON

## OUR NATION'S FIRST URBAN NATIONAL MARINE SANCTUARY

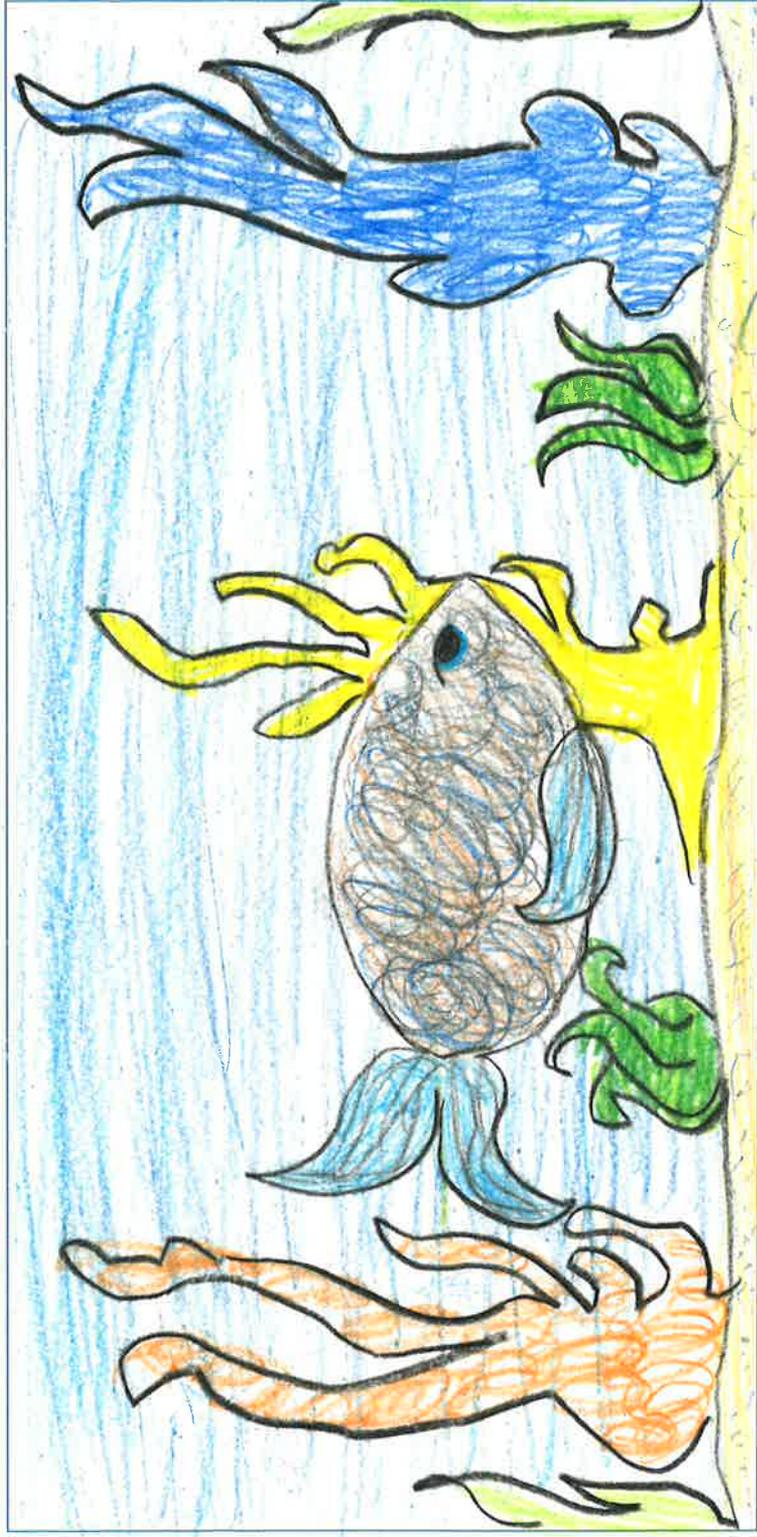
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First Name Only:

Anna 4th 9

Age:

Grade Level:





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First Name Only: \_\_\_\_\_

Heidi

Age: 13 Grade Level: \_\_\_\_\_

8





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# BALTIMORE CANYON

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First Name Only: Joseph

Age: 13

Grade Level: 8

Coral is very important to the habitat for other animals. We need to protect coral so we can protect biodiversity. We need to protect the Canyon before we hurt it.



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# BALTIMORE CANYON

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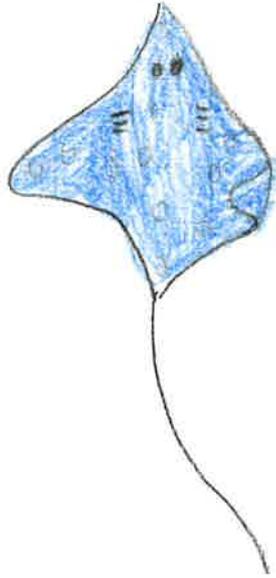
Tori

First Name Only:

Age: 15

Grade Level:

10





NATIONAL AQUARIUM.

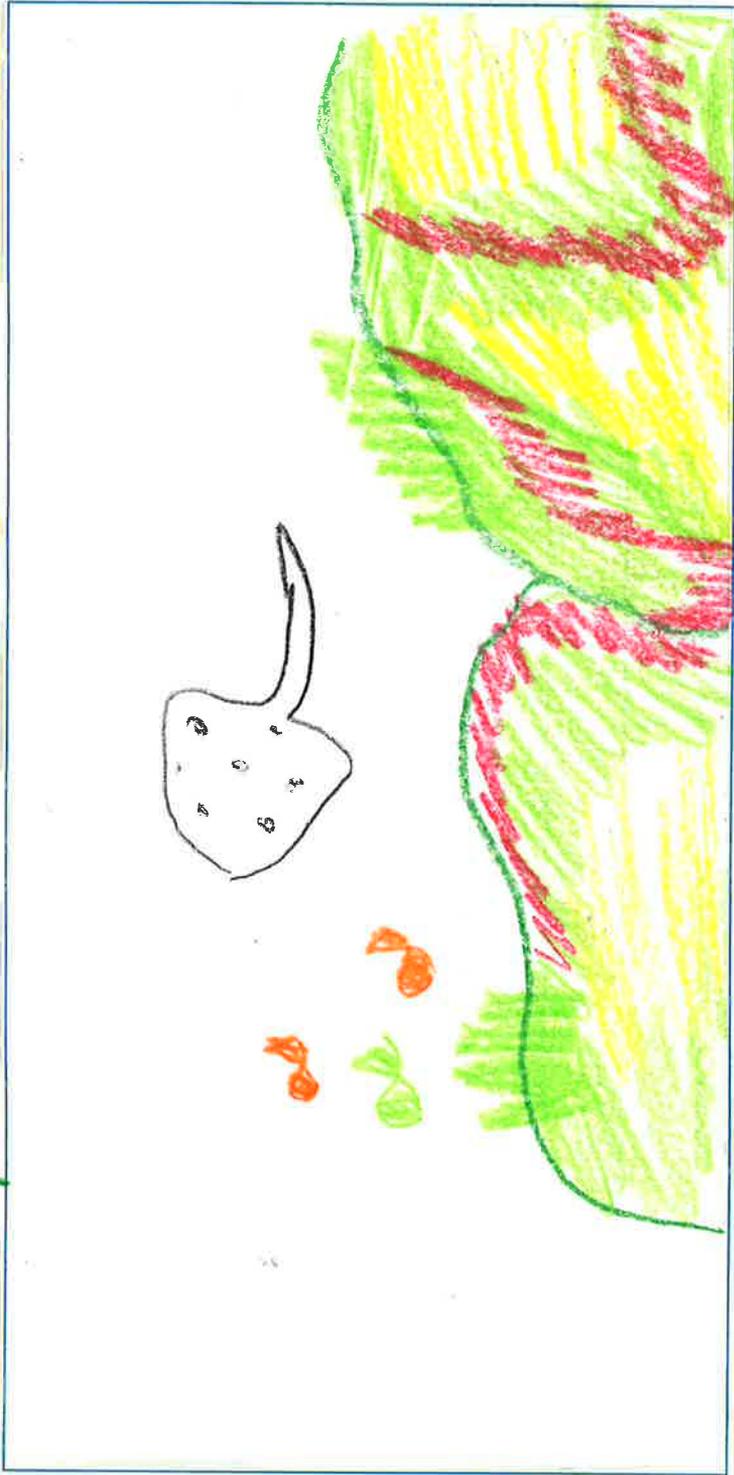
# BALTIMORE CANYON

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First Name Only: Liliya

Age: 13 Grade Level: 8





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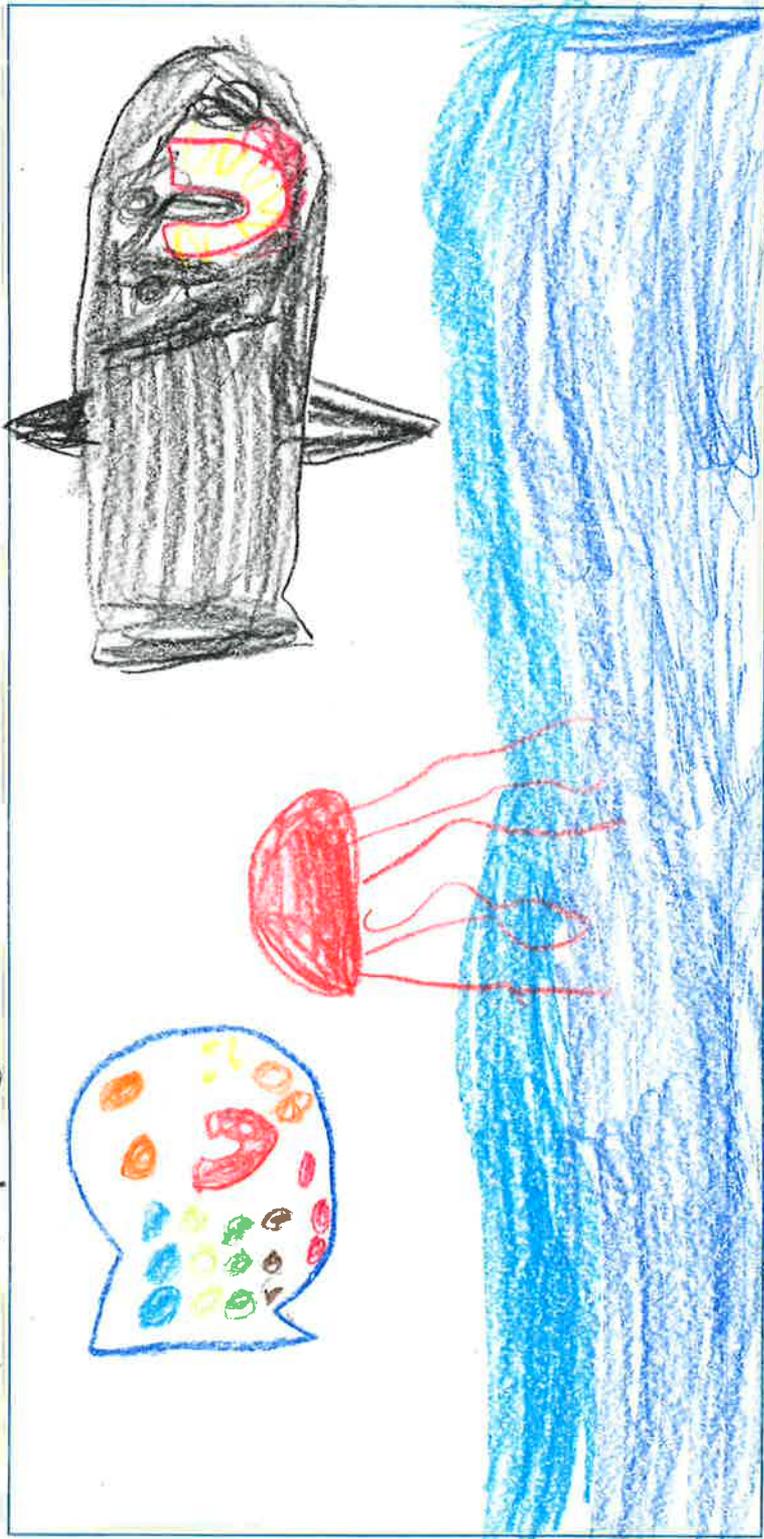
First Name Only:

HORNING

Age:

6

Grade Level:



**BALTIMORE CANYON**  
**OUR NATION'S FIRST URBAN NATIONAL MARINE SANCTUARY**

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First Name Only: \_\_\_\_\_

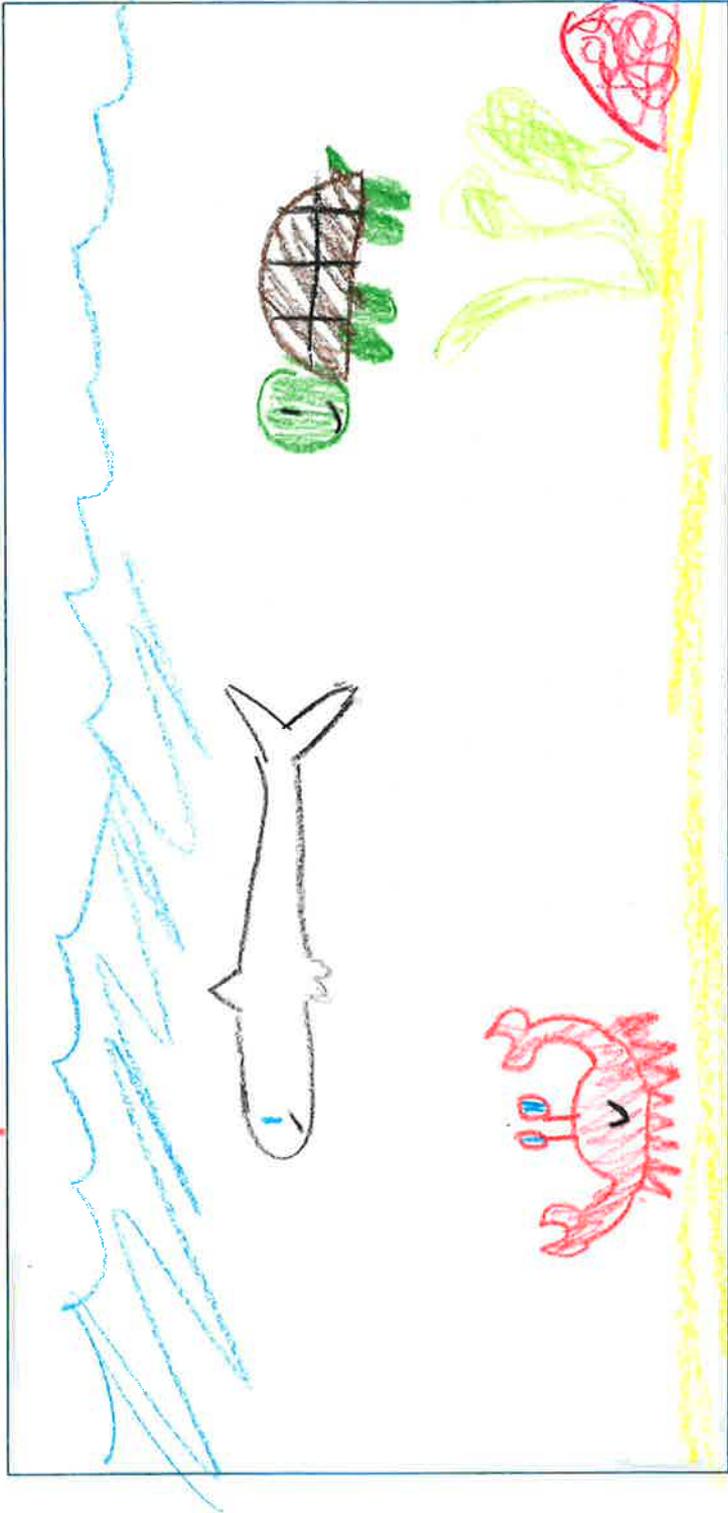
Age: \_\_\_\_\_

Grade Level: \_\_\_\_\_

*Emerp*

*10*

*5-6*





# BALTIMORE CANYON

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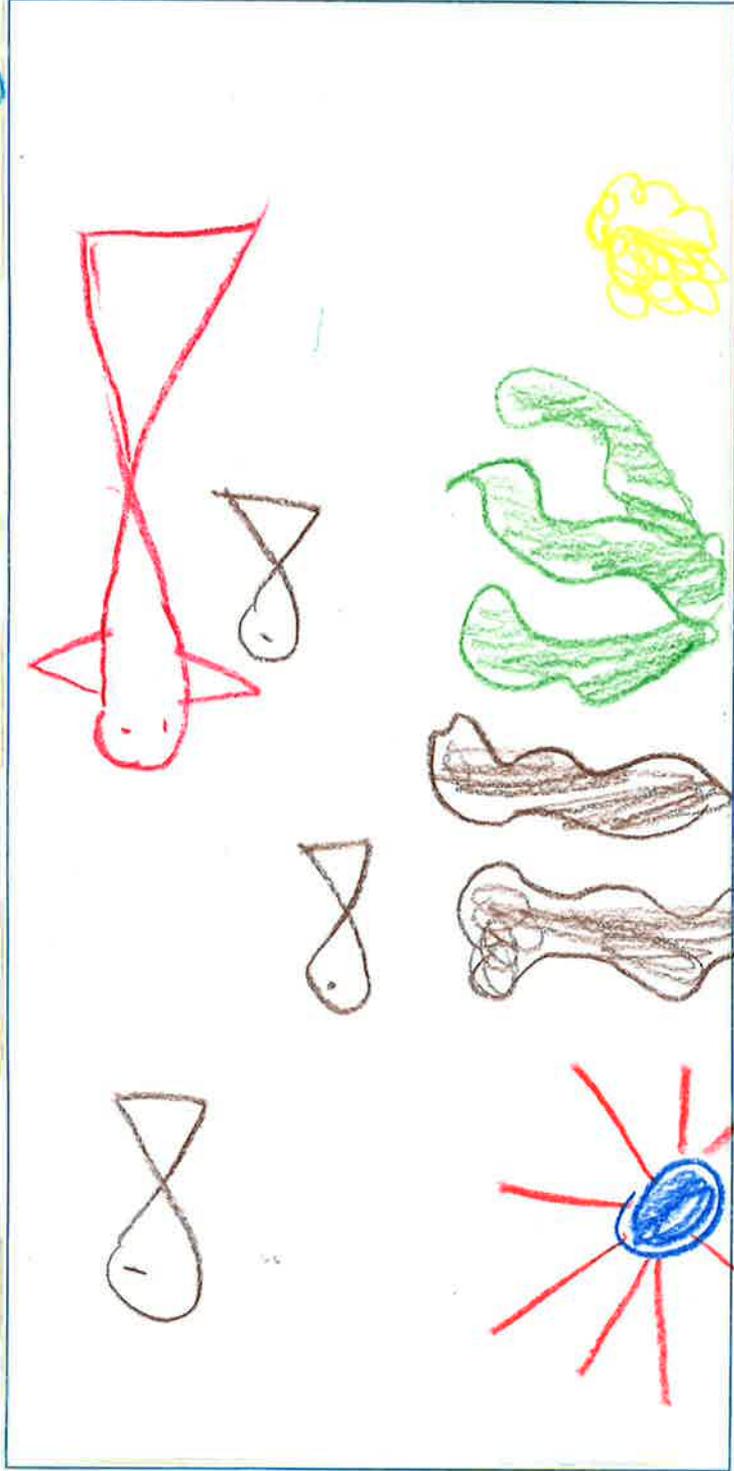
Rose

First Name Only: \_\_\_\_\_

Age: 7

Grade Level: \_\_\_\_\_

2004





# BALTIMORE CANYON

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Yasha C. Gage

First Name Only:

Age:

Grade Level:



7



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# BALTIMORE CANYON

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*Dorinda*

First Name Only: \_\_\_\_\_

Age: \_\_\_\_\_

Grade Level: \_\_\_\_\_

*7* *2*





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First Name Only: Sara

Age: 10

Grade Level: 5





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First Name Only:

Shira

Age:

16

Grade Level:

5





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First Name Only: \_\_\_\_\_

Age: \_\_\_\_\_

Grade Level: \_\_\_\_\_

so the animals dont get sick.



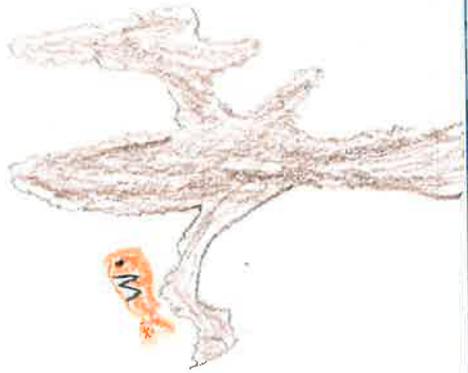
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*Cole*

First Name Only: \_\_\_\_\_ Age: \_\_\_\_\_ Grade Level: \_\_\_\_\_

*We ♥ Fish*



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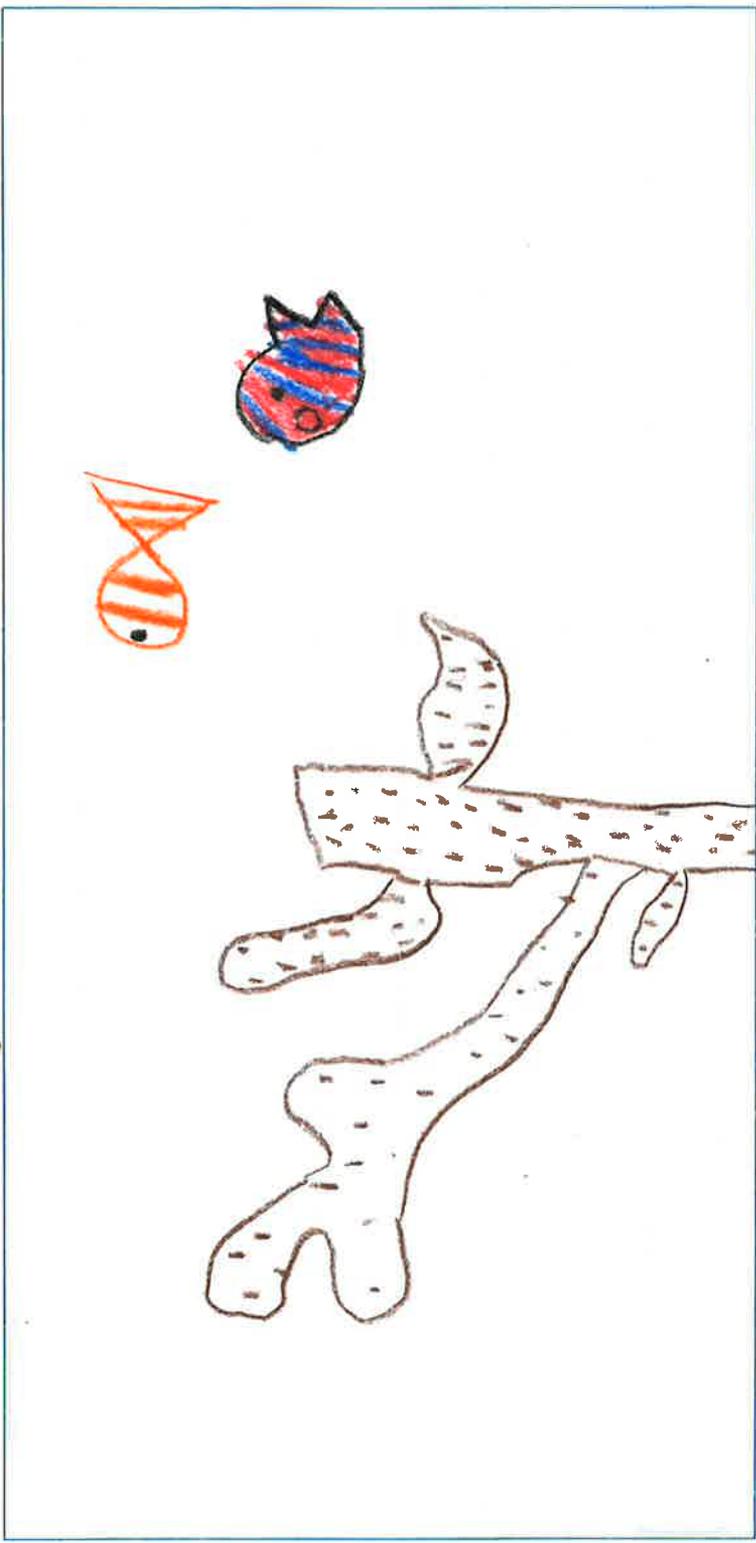
Tessa Jones

First Name Only: \_\_\_\_\_

Age: \_\_\_\_\_

Grade Level: \_\_\_\_\_

4





# BALTIMORE CANYON

## OUR NATION'S FIRST URBAN NATIONAL MARINE SANCTUARY

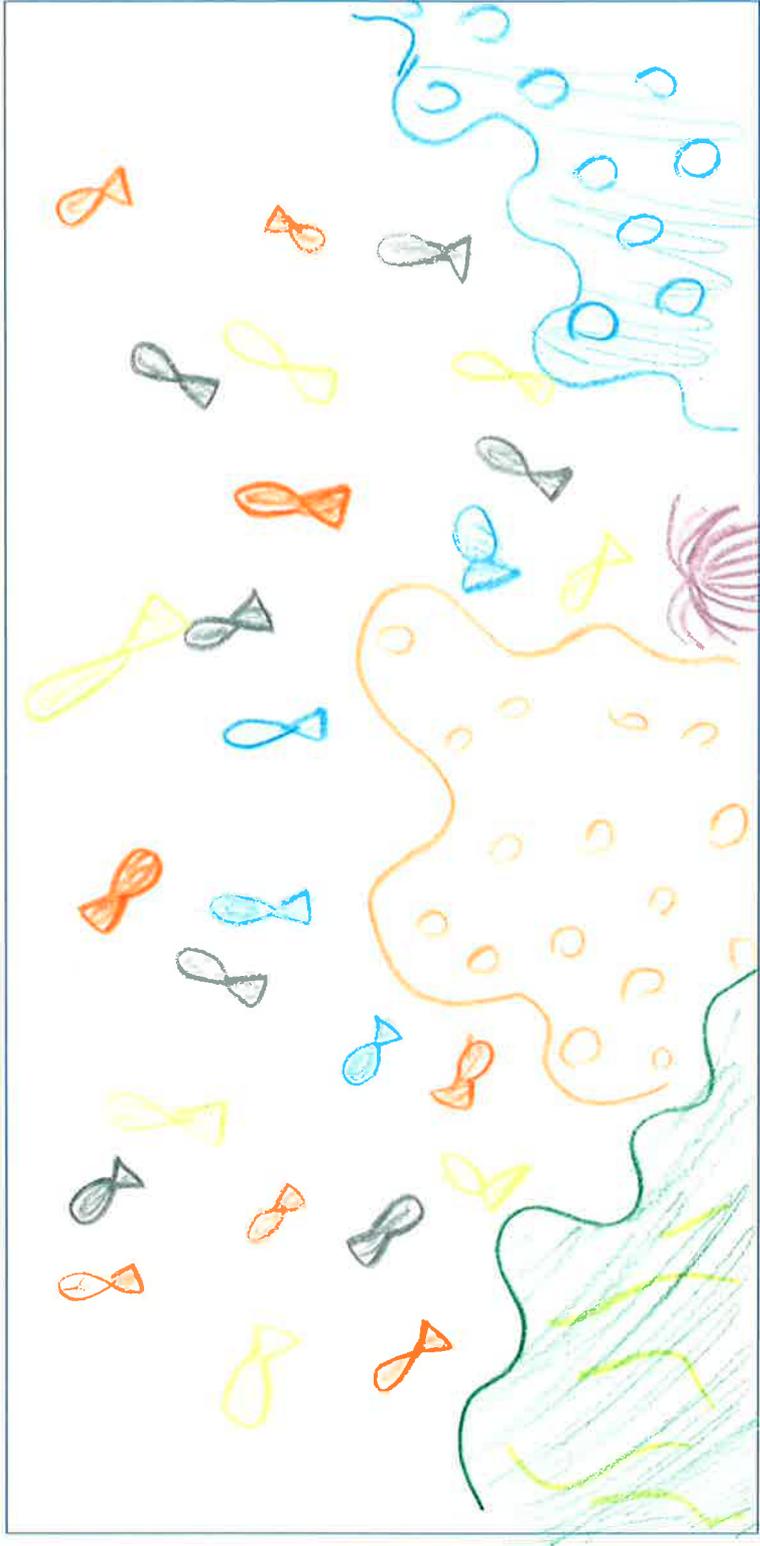
Protection of the Baltimore Canyon as a National Marine Sanctuary will create chances for all of us to better understand our underwater world, now and in the future. Complete this activity sheet with drawings or thoughts about what explorers might find within the Baltimore Canyon.

Eleni

First Name Only: \_\_\_\_\_

Age: 10 \_\_\_\_\_

Grade Level: 5 \_\_\_\_\_



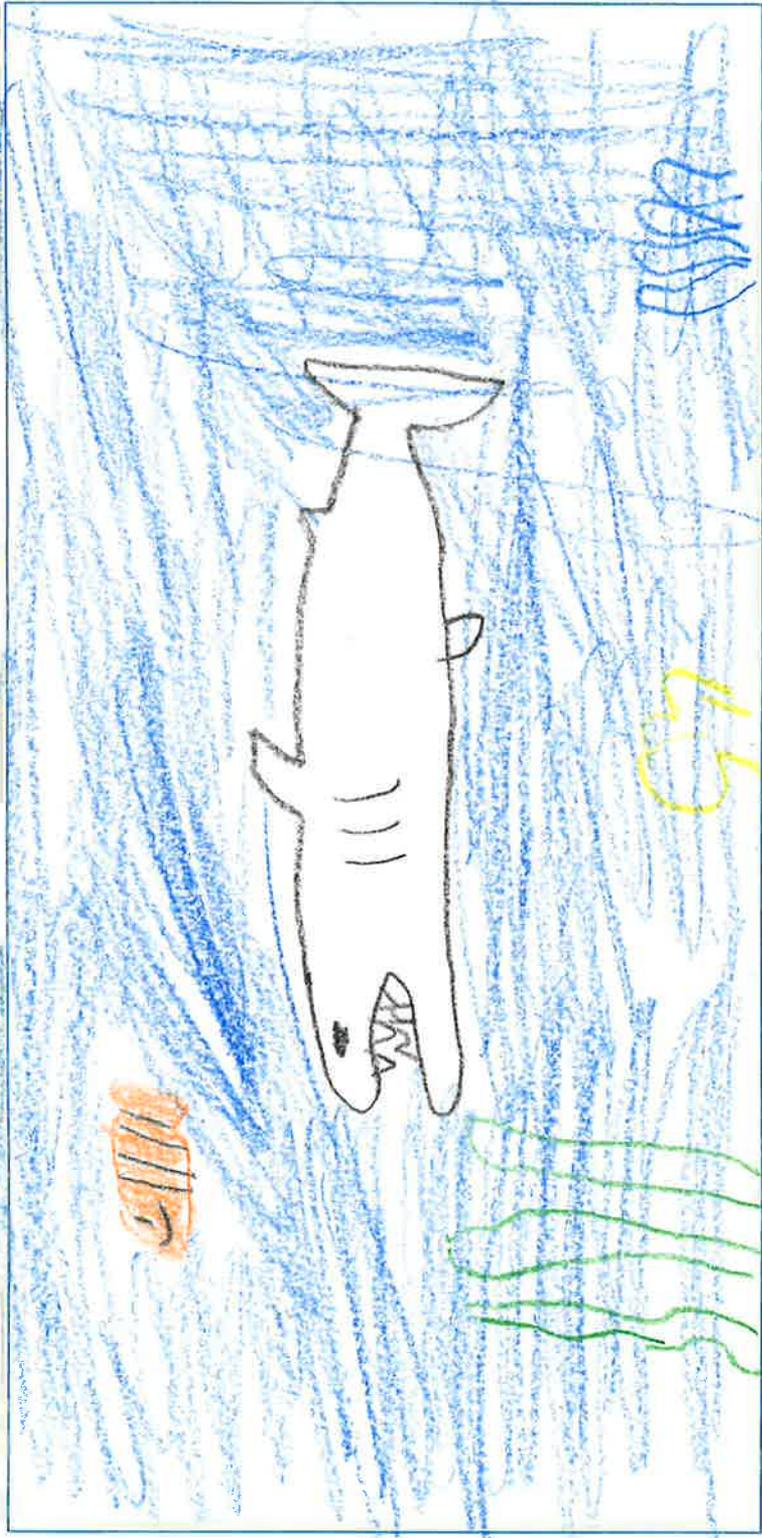
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First Name Only: Nicholas

Age: 10 Grade Level: 5





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TREVOR

10

5

Age: \_\_\_\_\_ Grade Level: \_\_\_\_\_

First Name Only: \_\_\_\_\_





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Trevor

First Name Only: \_\_\_\_\_

Age: \_\_\_\_\_

Grade Level: \_\_\_\_\_

10 5

Love the

eels