August 20, 2017

Dear Fifth-Grade Teacher:

On behalf of the Delaware Sea Grant College Program and the University of Delaware’s College of Earth, Ocean, and Environment, I am pleased to extend an invitation to your fifth-grade classes to participate in the Coast Day 2017 essay contest. Coast Day offers students and teachers a unique opportunity to learn more about the ocean and coastal environments as they take part in hands-on research demonstrations, tour ships and laboratories, see and touch marine life, and enjoy numerous other activities, from marine science lectures to seafood cooking demonstrations. This year’s theme is “Discoveries on Land, in the Air, and at Sea,” and the festival will be held Sunday, October 1, from 11 a.m. to 5 p.m., at the UD Hugh R. Sharp Campus in Lewes, Delaware.

Our Coast Day essay contest follows the day’s theme this year, with students being asked to plan a robotic mission to discover new things about Delaware’s land, water, or air. The enclosed materials are designed to help guide classroom discussion of the topic. Our intent is to create awareness about coastal issues in Delaware and to help teachers meet state standards through teaching about coastal ecosystems and the roles they play in our lives. Student essays must be postmarked or hand-delivered by close-of-business Friday, September 15, 2017.

Awards will be presented to the students and their teachers in a special ceremony at Coast Day, and the winners will be recognized in photos and press releases issued to the media.

While this essay topic does require some thought, the judges also will be looking for accurate descriptions that show students have researched the topic. A copy of a judge’s scoring sheet is included in this packet, so you can see how different areas are weighted. If you have any questions, please contact me at 302-645-4308, or by e-mail at petrone@udel.edu. Visit www.decoastday.org for more information.

Sincerely,

Christopher Petrone
Marine Education Specialist

Enclosure
Discoveries can happen at any time, by any person—scientist, business person, engineer, mathematician, teacher, or student. Many of our medicines and items we use every day were discovered either by accident, or after lots of testing and redesigning. Discoveries can be big, like finding a new species of deep-sea shark and uncovering a shipwreck, or small, like finding a cool rock or seashell on the beach, and trying a new delicious seafood recipe. Regardless of their size, discoveries open our minds to new ideas, concepts, cultures, and most of all, more questions!

Whether you realize it or not, you discover something new every day—a faster route to school, a new fact about the ocean, or a new favorite place or game to play outside. With this in mind, we want to learn how YOU would plan a robotic mission to discover more about Delaware.

University of Delaware scientists use all sorts of robotics as a tool to discover more about our world. Many of these technologies will be highlighted at Coast Day on October 1, and they include: aerial drones; autonomous surface vessels; autonomous underwater vehicles; and remotely operated vehicles.

We want to know your ideas for “Discovering the land, air, and water around Delaware” using any of these robots.

1. **Start by identifying a site somewhere in Delaware. It could be a farm, state park, your favorite bayshore or ocean beach, river, pond, or even Delaware Bay or the coastal Atlantic Ocean, then**

2. **Identify a research question. What would you like to explore at this site and why? Then,**

3. **Explain how you would use any of the four robots featured below, or a combination of robots, to investigate your research question.**
<table>
<thead>
<tr>
<th>Robot</th>
<th>Image</th>
<th>How it is driven and limitations</th>
<th>Where can it be used?</th>
<th>What can it measure?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerial drone, also known as a quadcopter or unmanned aerial vehicle (UAV)</td>
<td><img src="image" alt="Photo credit: University of Delaware/Evan Krape" /></td>
<td>Remote control using a small monitor and line-of-site</td>
<td>Over land or water</td>
<td>Photographs Video Light intensity Land use/ground cover</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Not limited by a tether/cable</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Limited by battery life and weather conditions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Autonomous surface vessel or unmanned surface vehicle</td>
<td><img src="image" alt="Photo credit: Coral Reef Research Foundation" /></td>
<td>These vessels can be programmed to run a mission, on their own, or driven with a remote control</td>
<td>Shallow water such as creeks (greater than 1-foot deep), rivers, ponds, Delaware Bay, and the Atlantic Ocean</td>
<td>Photographs Video Light intensity Water clarity Water temperature Salinity Dissolved oxygen Chlorophyll-a (plant plankton) Nitrate Phosphate Sound Sidescan sonar Bathymetry</td>
</tr>
<tr>
<td>Robot</td>
<td>Image</td>
<td>How is it driven</td>
<td>Where can it be used</td>
<td>What can it measure</td>
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<td>--------------------------------------------</td>
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<tr>
<td>Autonomous underwater vehicle (AUV)</td>
<td><img src="https://example.com/image1.jpg" alt="Image" /></td>
<td>AUVs are pre-programmed with a mission to run and then deployed. They cannot be controlled once underwater; but can be re-programmed via satellite communications when they are at the surface. Not limited by a tether/cable Limited by battery life.</td>
<td>Deep water, such as Delaware Bay and the Atlantic Ocean</td>
<td>Photographs Video Light intensity Water clarity Water temperature Salinity Dissolved oxygen Chlorophyll-a (plant plankton) Nitrate Phosphate Sound Sidescan sonar</td>
</tr>
<tr>
<td>Remotely operated vehicle (ROV)</td>
<td><img src="https://example.com/image2.jpg" alt="Image" /></td>
<td>Tethered by a cable that runs from the boat or dock down to the robot. ROVs can deliver live video and data to scientists at the water's surface. They are driven by remote control using a small monitor and are highly maneuverable.</td>
<td>Shallow or deep water Depth is limited by the length of the tether/cable.</td>
<td>Photographs Video Light intensity Water clarity Water temperature Salinity Dissolved oxygen Chlorophyll-a (plant plankton) Can be outfitted with a claw to collect specimens</td>
</tr>
</tbody>
</table>
*Note: Please include student’s name, teacher’s name, school name, and word count on each entry.

**Word Count:** Up to 400 words. Please include the word count at the bottom of the essay.

**Deadline:** Postmarked or hand-delivered by Friday, September 15, 2017

**Mail entries to:** Coast Day Essay Contest
Delaware Sea Grant – Marine Advisory Service
700 Pilottown Rd
Lewes, DE 19958

**Prizes will be awarded to the winning essayists:**
- First prize: $100 bookstore gift card
- Second prize: $75 bookstore gift card
- Third prize: $50 bookstore gift card
- Essay writers receiving honorable mention and teachers of winning students will also be recognized!

**Questions?** Contact Christopher Petrone at 302-645-4308 or petrone@UDel.edu

**Teacher’s Aids:**

The books and websites below are a great starting point for both teachers and students.

This contest can also be used to meet Delaware state Science and English/Language Arts standards. A few examples of standards related to this essay theme are highlighted below.

**Sample Vocabulary**
artificial/natural reef, conservation, cooperation, discover/discovery, documenting, ecosystem, environment, explore/exploration, fishery/fisheries, habitat, identify, investigate, legislation, mapping, monitoring, nutrients, phytoplankton, regulation, restoration, runoff, shipwreck, sustainable, underwater archaeology, water quality, watershed, zooplankton

**Web Resources**

UDel Team Habitat Mapping Facebook page (a Facebook account is not necessary to view this site)
https://www.facebook.com/teamhabitatmapping/

Navigating Nor’easters: UD students examine beach changes with drone, kayak
http://delawarepublic.org/post/navigating-noreasters-ud-students-examine-beach-changes-drone-kayak

Aerial drone data

Exploring what lies beneath
http://www.udel.edu/udaily/2016/august/autonomous-systems-bootcamp/
Shipwreck mystery solved
http://www1.udel.edu/udaily/2013/aug/trembanis-shipwreck-080812.html

Missing aircraft identified
http://www.udel.edu/udaily/2017/may/missing-aircraft-documented-off-papua-new-guinea/

Robotic reasoning

Arctic excursion
http://www1.udel.edu/udaily/2016/feb/winter-arctic-light-022916.html

Coastal storms fellow
http://www.udel.edu/udaily/2016/october/coastal-storms-fellow/

Robots may bring reef relief
http://www.udel.edu/udaily/2017/may/studying-deep-sea-reefs/

Underwater robot
http://www1.udel.edu/udaily/2013/feb/rov-marine-research-022213.html

Delaware State Parks
http://www.destateparks.com/

Delaware National Estuary Research Reserve

Delaware Sea Grant – 10 Things You Can Do to Help Our Ocean
http://www.deseagrant.org/products/10-things-you-can-do-help-our-ocean

U.S. Environmental Protection Agency – Exploring Estuaries
http://www.epa.gov/owow/estuaries/kids/

U.S. Environmental Protection Agency – Marine Ecosystems
http://www.epa.gov/bioiweb1/aquatic/marine.html

Climate Change in Delaware Impact Assessment summary report
http://www.dnrec.delaware.gov/energy/Pages/The-Delaware-Climate-Impact-Assessment.aspx

Useful Publications — Books

Ecology (DK Eyewitness Books), Brian Lane, (ISBN: 0756613876)

Everything Kids' Environment Book: Learn how you can help the environment — by getting involved at school, at home, or at play, Sheri Amsel, (ISBN: 159869670X)

Ocean (DK Eyewitness Books), Miranda MacQuitty (ISBN: 0756637767)

Pond & River (DK Eyewitness Books), Steve Parker, (ISBN: 0756610850)


Delaware/Next Generation Science Standards & Common Core Content Standards

5-LS2 Ecosystems: Interactions, Energy, and Dynamics

LS2.A: Interdependent Relationships in Ecosystems
LS2.B: Cycles of Matter and Energy Transfer in Ecosystems

5-ESS2 Earth’s Systems

ESS2.A: Earth Materials and Systems
ESS2.B: The Roles of Water in Earth’s Surface Processes

5-ESS3 Earth and Human Activity

ESS3.C: Human Impacts on Earth Systems

3-5-ETS1 Engineering Design

ETS1.B: Developing Possible Solutions
ETS1.C: Optimizing the Design Solution

Common Core English Language Arts Standards – Writing – Grade 5

Text Types and Purposes

• CC.5.W.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
• CC.5.W.3. Write narratives to develop real or imagined experiences or events using effective technique, descriptive details, and clear event sequences.

Production and Distribution of Writing

• CC.5.W.4. Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience.
• CC.5.W.5. With guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.
Research to Build and Present Knowledge

- CC.5.W.7. Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.
- CC.5.W.8. Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources.

Common Core English Language Arts Standards – Language – Grade 5

Conventions of Standard English

- CC.5.L.1. Demonstrate command of the conventions of Standard English grammar and usage when writing or speaking.
- CC.5.L.2. Demonstrate command of the conventions of Standard English capitalization, punctuation, and spelling when writing.

Knowledge of Language


Vocabulary Acquisition and Use

- CC.5.L.6. Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases, including those that signal contrast, addition, and other logical relationships (e.g., however, although, nevertheless, similarly, moreover, in addition).
Coast Day 2017
5th Grade Delaware Student Essay Contest

Name:

School:

Teacher:

5 = Excellent 4 = Above average 3 = Average
2 = Below average 1 = Poor 0 = Did not attempt/show

Content (25 points)

_____ Essay shows overall understanding of subject matter and clearly and accurately addresses the topic. (5)
_____ Main idea is clear, focused, and well supported. (5)
_____ Student has met and followed requirements and criteria of the writing prompt. (5)
_____ Student has included information from suggested/relevant resources and sample vocabulary. (5)
_____ Essay includes only factual, accurate information—scientific, historic, etc. (5)

_____ Total

Organization (15 points)

_____ Essay has a strong beginning that draws the reader into the text. (5)
_____ Paragraphs are focused, idea-centered, and transition smoothly, connecting ideas and creating a sense of flow. (5)
_____ Essay has a logical order and leads the reader through the text, including a clear beginning, middle, and end. (5)

_____ Total

Grammar and Spelling (10 points)

_____ Essay demonstrates correct use of sentence structure and punctuation. (5)
_____ Student uses correct spelling and capitalization. (5)

_____ Total

Originality & Creativity (15 points)

_____ Student creates a meaningful connection to the reader. (5)
_____ Student takes fresh approach to subject, addressing topic in a creative way. (5)
_____ Student uses interesting organization or storytelling techniques to examine topic in an original manner. (5)

_____ Total

_____ Final Score (65 points possible)