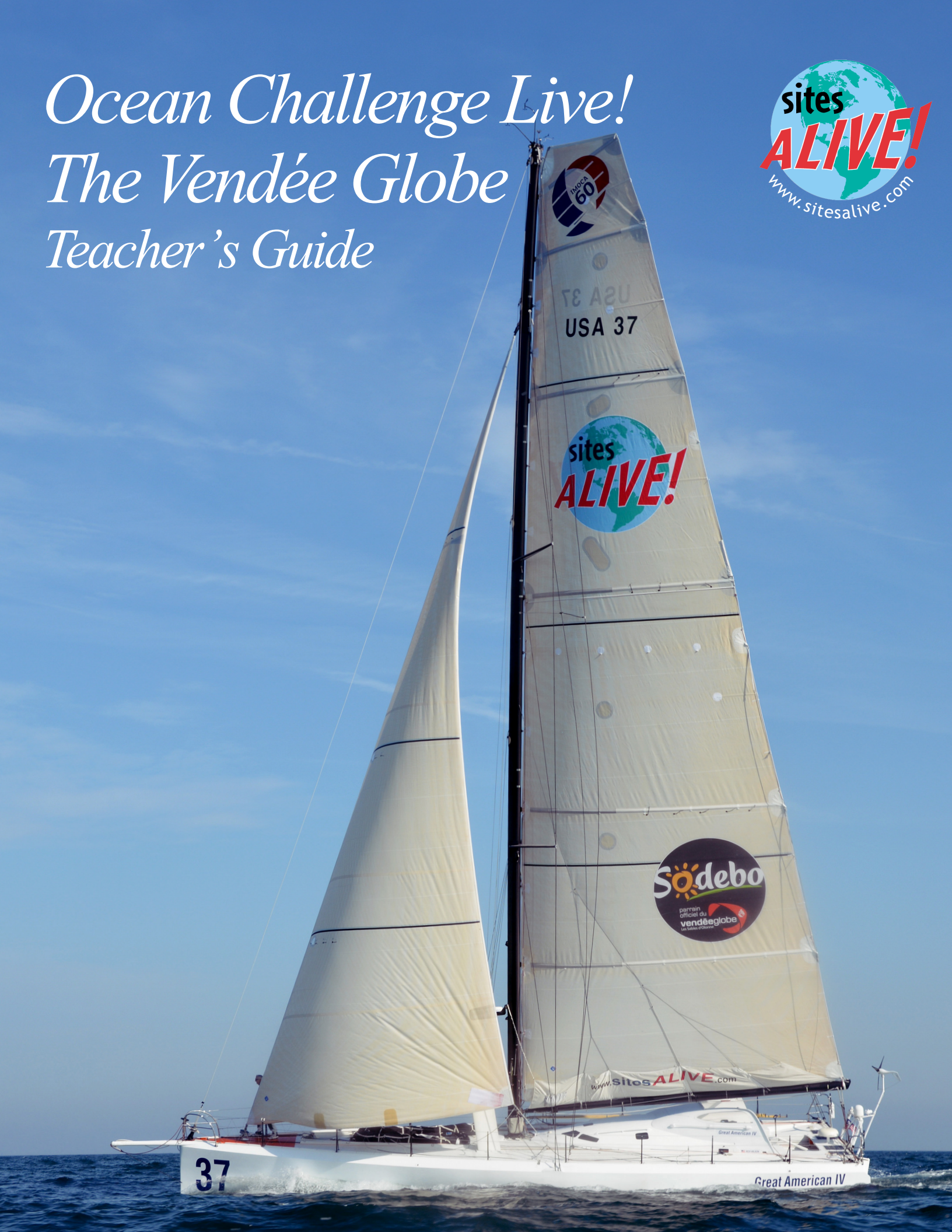
Ocean Challenge Live!
The Vendée Globe
Teacher's Guide



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Since 1993, sitesALIVE! has produced programs that link adventures and expeditions in the real world, live and interatively, to classrooms for science, geography, mathematics and history.

Founded by Rich Wilson, a former mathematics schoolteacher in the Boston Public Schools, sitesALIVE has produced 75 live, interactive, semester-long programs. These archives can be seen at http://www.sitesalive.com under the Menu item "75 Past Expeditions".

sitesALIVE programs have come from partnerships with accredited field school instutions worldwide, such as Class Afloat, The School for Field Studies, The Island School, and Ocean Classroom Foundation. Additionally, 5 of the 75 programs have been Rich's own voyages, such as this version of Ocean Challenge Live!, where Rich will skipper the Open 60 *Great American IV* in the Vendée Globe 2016 - the solo, non-stop, around-the-world race.

Cover photo: Bernard Gergaud

Introduction

Purpose of *Ocean Challenge Live!*

On November 6th, 2016, RichWilson will embark on a solo, non-stop race around the world aboard the 60' long yacht *Great American IV*. Rich will race 26 others in the Vendée Globe, widely recognized as the ultimate challenge in sailing. The fleet will start in France, sail south past the equator into the South Atlantic, east around Africa's Cape of Good Hope, across the Indian and Pacific Oceans, then around treacherous Cape Horn at the southern tip of South America, and return to France.

Rich hopes to accomplish this journey of ~28,000 miles in about 100 days. His participation in this race will bring the excitement of the voyage to classrooms and schools around the world via the Internet at **http://www.sitesalive.com**.

A Brief History of Circumnavigations

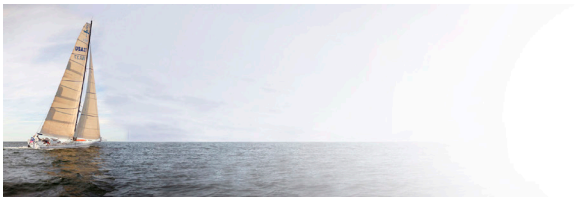
A ship captained by Ferdinand Magellan of Portugal was the first to sail around the world, embarking from Spain in 1519 and returning to Spain in 1522. Magellan and his crew sought to discover a southwest passage around the Americas to the Orient. Magellan was killed in the Phillippines in 1521, but his voyage proved the Earth was round and was a major landmark in the great era of European exploration.

The first person to sail solo around the world was the American Joshua Slocum, who accomplished this feat aboard *Spray*, a 37' long sloop, between 1895 and 1898. Slocum recounted his adventures in the classic book Sailing Alone Around the World. In 1942, during World War II, the Argentinian Vito Dumas was the first to sail solo past the three great capes of the Southern Hemisphere: the Cape of Good Hope, Cape Leeuwin, and Cape Horn, marking the southern tips of Africa, Australia, and South America.

Credit for the idea of long-distance single-handed yacht racing is given to Blondie Hasler and Sir Francis Chichester. In 1960, Hasler, Chichester, and three others participated in first-ever solo race across an ocean. They set forth from Plymouth, England and sailed 3,000 miles across the often-stormy North Atlantic Ocean against prevailing winds and ocean currents. At that time, many believed that the course was impossible.

In 1968, Chichester, sailing aboard *Gipsy Moth IV*, became the first person to single-handedly circumnavigate the Earth from west to east. Chichester made just one stop, and completed the round-trip voyage in 226 days of sailing time. Later that same year, the first round-the-world single-handed yacht race—the Sunday Times Golden Globe Race—was held. Sir Robin Knox-Johnston was the only one of nine competitors to complete the race becoming the first to sail an unassisted, non-stop, solo circumnavigation.

The BOC Challenge, the first solo round-the-world race since the disasterous Golden Globe race, was started in 1982. This race is held every four years in four legs with stopovers between. The success of the BOC Challenge led to the Vendée Globe.



Introduction (continued)

The Vendée Globe

The Vendée Globe is a solo, round-the-world race that must be sailed non-stop and without assistance. Dubbed "the Everest of yacht racing," it is widely acknowledged as the single most challenging race in sailing. It is also the only such race in existence.

Frenchman Philippe Jeantot founded the Vendée Globe in 1989, and the race has been held once every four years since 1992. The race starts and finishes in Les Sables d'Olonne, France, and is open to 60' long monohull yachts. Monohulls (boats with one hull) use a heavy underwater keel to remain upright.

The race starts in November so that the racers can pass through the dangerous waters of the Southern Ocean in summer. In addition to being the ultimate test of a sailor's endurance, the race poses many challenges, including severe wind and wave conditions, the possibility of hitting floating ice, and the often long distances from emergency help.

The results of the previous races are shown in the table below.

Year	Winner	Time
1989-1990	Titouan Lamazou	109 days, 8 hours, 49 minutes
1992-1993	Alain Gautier	110 days 2 hours 23 minutes
1996-1997	Christophe Auguin	105 days 20 hours 31'
2000-2001	Michel Desjoyeaux	93 days, 3 hours, 57 minutes
2004-2005	Vincent Riou	87 days, 10 hours, 48 minutes
2008-2009	Michel Desjoyeaux	84 days, 3 hours, 9 minutes
2012-2013	Francois Gabart	78 days, 2 hours, 16 minutes

Gabart's finish in the 2012 race set the world record time for completing a single-handed circumnavigation of the globe in a 60' monohull. The eighth running of the Vendée Globe will begin November 6, 2016. Each previous race has had much drama. Two sailors have been lost at sea since the race was first held, and several others have been rescued dramatically, in some cases by their competitors.Who knows what adventures await Rich and his fellow racers on this trip?

Rich likes to say that the reason he does these long voyages is because "there is so much to learn and that is what makes it so interesting." And with this sitesALIVE! program, you can learn right along with Rich. Welcome aboard!

Program Components

The descriptions below highlight various components of ***Ocean Challenge Live!*** and how these can be used to enhance students' experiences as they follow the voyage.

Internet Connection

Updates of the 2016/2017 voyage are available in Ocean Challenge Live! on the sitesALIVE! website at **http://www.sitesalive.com** . These updates include:

• **DAILY**: Captain's Logs & Audio, Ship Positions,Weather Reports (updated daily)

• **3 TIMES WEEKLY**: Questions & Answers by Skipper & Experts; Photos, Videos

• **SATURDAY**: Skipper & Expert Essays (on the topic of the weekly Lesson Plan)

By combining the live website content with the Lessons and Team Projects in this Guide, teachers can make this adventure a truly live and interactive educational experience based in a real-world context.

Lesson Plans

Fifteen weekly lesson plans (plus one extra plan) have been designed by teachers to develop students' academic and life skills. Your students will use the same important skills required of Rich and the land-based *Great American IV* support team: planning and teamwork. The complete course of study can be organized around the activities built into each lesson plan, or teachers can use activities as they see fit.

Team Projects

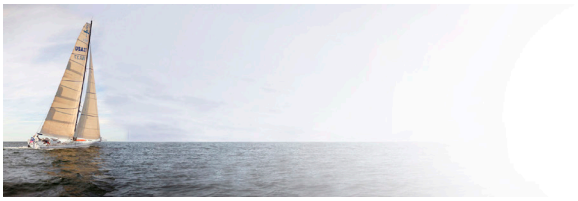
Also included are eleven Team Projects for students to complete. A detailed Project Guide is provided for each Team Project to help students complete the required tasks and assignments. Student should be split up into teams to conduct these projects throughout the voyage. Each student team will present a detailed report on their work once to the class. Each team should present a brief update weekly to the class.

Home Connection

These activities involve families and friends in the Ocean Challenge Live! experience. Through these activities, parents can work and learn with their children.

Current Events Connection

These activities develop students' reading and research skills. The weekly activities are coordinated with the lessons so that students can make a connection between the newspaper, magazines, online, and their own classwork.



Team Project Summaries

The Team Projects focus on various aspects of Ocean Challenge Live! Each team project is linked to a weekly lesson. Assign students to work in groups.

Organize a "team of the week" approach, scheduling one group to report its findings to the class most weeks. There are a total of eleven team projects (none for Weeks 2, 6, 7, 11, and 12). The scheduling of presentations is flexible to the teacher's needs.

Use the project summaries below and the corresponding Team Project Guides (pages 42-54) as you organize students and assign tasks. Schedule at least one collaboration session weekly so groups can update their work.

History Team Project (Week 1)

Learn about and report on the history of ocean exploration and trade.

- Collect information from history books, encyclopedias, newspapers and the internet to demonstrate the ways in which shipping has changed over the past three centuries.
- Compare the challenges faced by past explorers with those faced by Rich today.

Navigation Team Project (Week 3)

Learn about and report on navigation methods, ocean currents, and global wind patterns.

- Plot the weekly position of *Great American IV* . Calculate the ship's distance traveled and average speed, and predict its future positions.
- Research the various global wind zones (e.g., the doldrums) and ocean currents that *Great American IV* will pass through, that affect the speed and direction of the boat.
- Calculate the distance & direction to the nearest landmasses.

Geography & Environment Team Project (Week 4)

Research and report on the physical features and environmental concerns of the regions that *Great American IV* passes.

- Collect information from atlases and encyclopedias, about the regions and countries passed along the route. This research can be divided among the team members.
- .Include: fishing and shipping industries, climate change, health of marine ecosystems, land-based pollution, offshore oil drilling, etc.

Team Project Summaries

Energy & Mechanics Team Project (Week 5)

Learn about and report on GA4's electricity generation (solar, wind, hydro, diesel) and needs (lights, computers, radios, autopilots, desalinator, etc.). Report on the mechanics (sails, ropes, and pulleys), flotation, structure, and materials of *Great American IV*.

- Collect information on basic elements of sailboats. Learn about monohulls. Compare the advantages and disadvantages of monohulls & multihulls (catamarans; trimarans).
- Determine strategies for Rich to conserve energy on board.

Information Team Project (Week 8)

Collect and distribute pertinent voyage data to the other teams. Maintain a timeline.

- Listen to the daily audio updates to get information about the trip and a sense of Rich's mood. (All teams on a rotating basis could share this responsibility.)
- Maintain a timeline display for the duration of the voyage. This should include items collected from the other project teams.
- Create and post information on a chart and bulletin board display under the titles: "Focus of the Weekly Update"; "Significant Events from the Daily Audio Updates".

Marine Life Team Project (Week 9)

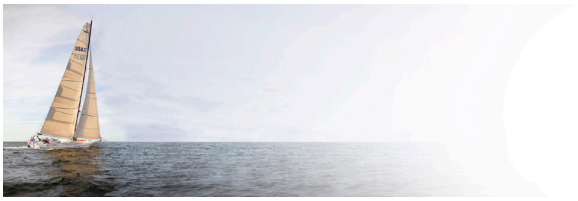
Research and report on the marine life found along *Great American IV* 's route.

- Research the vertebrates (fish, reptiles, marine mammals, birds) and invertebrates along the route. Learn about food chains, food webs, and migratory routes.
- Collect information on fishing, whaling, oil exploration, and shipping based near the ship's route, and the impact these industries may have had on local marine life.
- Record wildlife sightings and encounters reported by Rich.

Weather Team Project (Week 10)

Research and report on the weather systems and climatic patterns that affect the voyage.

- Use the sitesALIVE! website to collect information and report on air temperature, sea temperature, wind direction and velocity, and rainfall.
- Document the storms that *Great American IV* experiences.
- Research the climate zones en route and learn how their patterns affect daily weather.



Team Project Summaries

Teamwork Team Project (Week 13)

Learn about, and report on, the biographies of Rich, the shore crew, and the other participants in the race. Describe their backgrounds, strengths, and weaknesses.

- Collect information about the progress and problems of the *Great American IV* from the sitesALIVE! website. Sense the feelings that Rich's voice may communicate.
- Find out about how various industries employ a team approach to produce products.
- Create a guide for successful teamwork projects.

Communications Team Project (Week 14)

Research and report on the radio and satellite transmission systems on board *Great American IV*. Compose weekly updates for Rich about local and national news events.

- Research how radio and satellite communications work and each's advantages. Compare the frequencies the ship uses to those used for television and FM radio.
- "Digest" the news into reports to be sent to Rich. Topics can include national and international events, politics, sports, plus local news affecting your own community.

Book & Movie Team Project (Week 15)

Write the voyage story in book form; create scenes and dialogue for a movie or play.

- Use information from the sitesALIVE! website and information from other student teams to write this story.
- Students with a special interest in art may work as illustrators on this team..

Nutrition & Health Team Project (Extra Week)

Learn about and report on the food, water, medical, and sleep needs of Rich while at sea. Remember: no refrigeration is on board; water is desalinated; Rich has severe asthma.

- Research the average adult male's needs for nutrition, then determine the needs of an individual doing strenuous work for up to 18 hours a day. Do climatic changes affect these nutritional needs? If so, in what way?
- Contact a health professional, pharmacist, or asthma organization to obtain information about the causes, treatment, and health risks of people with severe asthma.
- Research essential sleep requirements; recommend a sleep schedule for Rich to follow.

Lesson Plan Outline

Week 1– Following Your Dreams
Theme: Career and Life Goals
Skills: Researching, planning, relating cause and effect, analyzing maps

Week 2 – Marine Transportation
Theme: Transportation
Skills: Predicting, designing and redesigning, mapping, calculating

Week 3 – Equator Crossing
Theme: Observing Traditions
Skills: Brainstorming, classification, research

Week 4 – Environment: Water and Air
Theme: Environmental Resources and Impacts
Skills: Fractions, decimal percents, model making, writing, graphing

Week 5 – Invisible Places
Theme: An Understanding of "Place"
Skills: Mapping, research, letter writing, using empathy, using a compass

Week 6 – Antarctica
Theme: International Cooperation
Skills: Research, relating cause and effect, analyzing maps

Week 7 – Climate Change
Theme: Change Over Time
Skills: Conducting a controlled experiment, graphing, predicting, researching

Week 8 – Midpoint
Theme: Turning Points
Skills: Using perspective, predicting, drawing (maps), research

Week 9 – Wildlife
Theme: Adaptation & Interconnectedness
Skills: Graphing, identifying cause and effect, calculating, research

Week 10 – Decision-Making
Theme: Making Decisions
Skills: Making decisions, reading maps, collecting data

Week 11 – Forces of Nature
Theme: Natural Forces
Skills: Collaborating, mapping, research

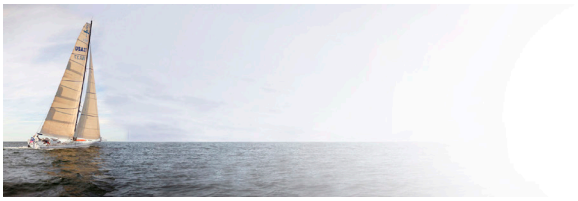
Week 12– Fisheries Depletion
Theme: Sustainability
Skills: Calculating, predicting, researching, graphing

Week 13 – Teamwork & Perseverance
Theme: The Team's Commitment
Skills: Making decisions, collaborating, showing respect, researching

Week 14 – What I'll Miss
Theme: Perspective
Skills: Graphing, map reading, averaging, narrative writing

Week 15 – Defining Success
Theme: Defining Success
Skills: Drama, creative expression, setting goals, planning, making decisions

Extra – Getting Ready
Theme: Vision and Motivation
Skills: Designing a model, calculating speed, mapping, using a log



Team of Experts

Experts write Essays on the topics of our Lesson Plans and answer student Questions on our website. This allows students to hear from highly accomplished people in a wide variety of career paths. Online, a student can ask a question to a specific Expert

Dr Maria Zuber
Vice President for Research at MIT

Rich du Moulin
Owner, Intrepid Shipping

Ms Dava Sobel
Author, Longitude, Galileo's Daughter

Dr Kara Lavender Law
Marine Pollution
SEA.edu

Capt Yann Cariou
L'Hermione

Dr Dan Finamore
Maritime Art
PEM.org

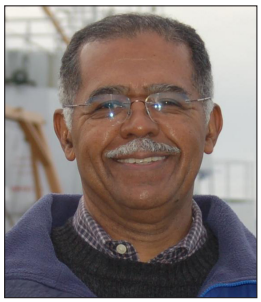
Dr Jan Witting
Oceans & Climate
SEA.edu

Ms Marti Shea
Rich's Trainer
Select Fitness

Ms Sy Montgomery
Author, The Soul of an Octopus, Birdology

Dr Brien Barnewolt
Rich's Emergency Doctor
Tufts Medical Center

Capt Murray Lister
Rescued Rich Wilson off Cape Horn 1990



Dr Ambrose Jearld
Fisheries Biologist
Nat'l Marine Fisheries

Dr Chris Fanta
Rich's Asthma Doctor
Partners Asthma Center

Scott Hamilton
Medical Expedition Leader, Nepal

Ms Lorraine Leo
Technology Teacher
Jackson School, MA

Lesson Plans

Week 1 – Following Your Dreams

Theme:
Careers & Life Goals

Interdisciplinary Connections:
Geography, History, Math

Skills:
Researching, planning, relating cause and effect, analyzing maps

Key Words:
Transatlantic, circumnavigation, persistence, motivation, polar easterlies, prevailing westerlies, trade winds, Gulf Stream, great circle, horse latitudes, doldrums

Materials

Classroom Activity Computer with Internet access, biographies, magazines focusing on the news, popular culture, sports, or business, set of encyclopedias;
Geography/STEAM Connection: maps of the Atlantic Ocean and the world (provided), global wind belts, and ocean currents; globe.

Introducing the Lesson

Blondie Hasler, a decorated veteran and experienced sailor, had a dream. He believed that he could sail solo across the Atlantic Ocean, from England to America. He thought that a trans-Atlantic race would be an exciting sports event, and would stimulate the development of new gear that would make sailing safer and easier. Most sailors thought that no one could endure the long solo voyage across the North Atlantic, with its constant threat of storms and icebergs, against prevailing winds and currents, and getting little sleep each day. Yet due to Hasler's persistence, his dream became a reality. Hasler and four others completed the first solo trans-Atlantic race in 1960.

Others have had similar dreams. In the early 1500s, Magellan sought to discover a southwest passage around the Americas to the Orient. Recently, people dreamed of sailing around the world solo, non-stop. Sir Robin Knox-Johnston was the first to achieve that in 1969. In 1989, Philippe Jeantot founded the Vendee Globe. Successful people are often driven by lofty dreams. In this lesson, students will research the dreams of a well-known person and draw lessons for themselves.

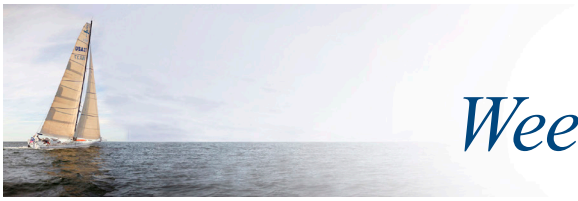
Classroom Activity

Write several topics on the board, such as Music, Literature, Art, Sports, Science, Travel, Technology, Politics, Entertainment, and Adventure. Have each student choose a topic; group students by their choices. Have each group think of 5 people that they admire in their field. Have each student research one person, and then develop a short biography of this person, focusing on what he or she accomplished and how they got there. Have students answer these questions:

1. Where and when was your person born? What was their family background? Did s/he have a dream or goal that s/he were determined to pursue? How did s/he go about this?

2. What dream or goal would you like to pursue? List some concrete steps that you could take to make this dream come true.

3. Have the class discuss themes and characteristics shared by these chosen individuals.



Week 1 – Following Your Dreams

Geography/STEAM Connection

1. Give to each student a copy of the Atlantic Ocean map included on page 53. Have students locate Plymouth, England (where the first transatlantic race started) and Boston, Massachusetts, USA (where Rich is from) on the map. Ask students to draw a line showing the shortest distance between these two points.
2. Show students maps of global winds and ocean currents. The global winds map should show the following wind belts: polar easterlies, prevailing westerlies, and trade winds. The ocean currents map should show the Gulf Stream and Labrador Current. Point out that, because of these winds and currents, a straight line might not be the fastest course between the start and finish of the race.
   - A Rhumb Line route is a straight line drawn on a typical Mercator projection map. Note that a Mercator map does not account for the curvature of the Earth, and so is not the shortest route between Plymouth and Boston.
   - A Great Circle route is the shortest distance between two points on a sphere. Use a globe to demonstrate the difference between the Great Circle and Rhumb line routes.
3. Have students consider the advantages and disadvantages of each route in debating which course would be the best to follow in a trans-Atlantic race.

Home Connection

Have students research the history of long sailing voyages. How did earlier ships take advantage of global wind belts and currents to sail between Europe and the Americas, and between the Americas and the Orient? What are the horse latitudes and the doldrums, and why did ships try to avoid them? How does the route Rich plans to take compare with those of earlier round-the-world voyages, such as that of Magellan?

Team Project Connection

History Team

Current Events Connection

Locate a newspaper article that describes a person (or group) that is pursuing his or her dream. Write a summary of the article. What strategy is the person using to reach their goal? Do you think he or she will succeed? Explain why or why not.

Week 2 – Marine Transportation

Theme:
Transportation

Interdisciplinary Connections:
Physical science, engineering, geography, mathematics

Skills:
Predicting, designing and redesigning,mapping, calculating

Key Words:
Tanker, floating and sinking, fluid, density, displacement, buoyant force, latitude, longitude, nautical mile, statute mile, knot (speed)

Materials

Classroom Activity tank of water; a variety of objects to demonstrate floating and sinking; tin foil; pennies; pails of water;
Geography/STEAM Connection: world map with latitude/longitude lines..

Introducing the Lesson

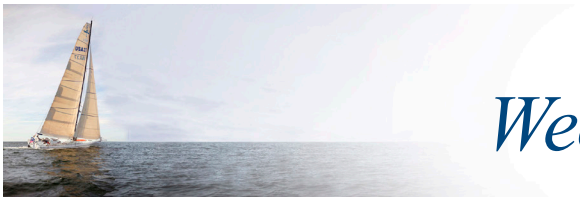
Many everyday objects that students enjoy, including games, electronics, toys, clothing, and furniture are imported from other countries. Also, much of the food that we rely on was produced abroad. How do these products reach our homes? Often they are brought to major ports, such as Long Beach and New York, by huge cargo ships. The largest of these ships are more than 1,000 feet long and weigh several hundred thousand tons!

The Greek scientist and engineer Archimedes was the first to describe a principle of fluid mechanisms in which the buoyant force on an object in a fluid is equal to the weight of the fluid the object displaces. It is this principle which allows designers and engineers to build these cargo-carrying ships, and to build boats like Rich's *Great American IV*.

Classroom Activity

In this activity, students will learn about floating and sinking.

1. Ask students to explain their ideas about floating and sinking. Many students may have the misconception that all light objects float and all heavy objects sink. Challenge students to explain how a heavy object such as ocean tanker can float. (An object will float in a fluid if the object is less dense than the fluid.)
2. Use a tank of water and objects made of different substances, such as corks, pennies, paper clips, or rubber stoppers, to demonstrate floating and sinking. For each object, have students predict whether it will float or sink, and then test their predictions.
3. Provide each group of students with several square sheets of tin foil, a pile of pennies, and a pail of water. Challenge them to construct a "cargo ship" out of the tin foil that can support the most pennies without sinking. Have them experiment with different shapes to see which works best. Have them draw each shape and record its results.
4. Ask students what materials they think are used in Rich's boat *Great American IV*. Then share with students that much of the boat is made of carbon fibers, including the hull, rudders, keel, and mast. Have students identify the benefits of building things with carbon fiber. Identify another object built of carbon fiber.



Week 2 – Marine Transportation

Geography/STEAM Connection

1. Have students research the top 10 container shipping ports in the world. Create a chart of how much cargo is shipped through each, port per year.
2. Add this information to a world map. Have students represent this information by creating a proportional symbol map key, where the size of the symbols representing each container port represents the volume of cargo shipped through that port.

Home Connection

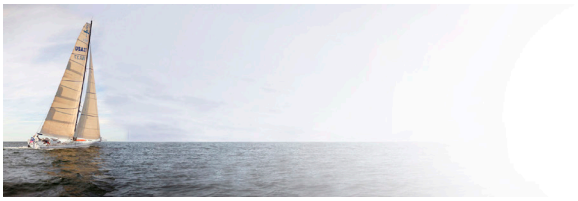
Find a container of food or a piece of clothing at home that was produced in another country. Find this country on a map, and explain to your family how it likely was transported from that location to your town.

Team Project Connection

None

Current Events Connection

Locate an article that focuses on transportation. Explain the type of transportation involved (ship, rail, automobile, etc.) and what is being transported. How is this type of transportation well suited for this purpose? What alternatives, if any, might be available? How do you think fuel prices affects this type of transportation?



Week 3 – Equator Crossing

Theme:
Observing Traditions

Interdisciplinary Connections:
Geography, History, Math

Skills:
Brainstorming, classification, research

Key Words:
Equator, superstition, tradition, ceremony, cartographer

Materials

Classroom Activity Props for role-playing
Geography/STEAM Connection: library resources containing pictures of old maps

Introducing the Lesson

A tradition is a custom or belief that is transmitted from generation to generation, for example, holidays and the customs that we observe with them. A superstition is a belief that seems irrational (e.g., don't walk under a ladder, knock on wood for good luck, etc.). Nevertheless, superstitions, and their actions and ceremonies, are still present today.

Historically, sailors have been superstitious (don't leave port on a Friday; don't change the name of a vessel; don't bring bananas). For a sailor who is crossing the equator for the first time, an important superstition and ceremony exists.

The purpose of the ceremony is to be blessed by King Neptune, mythical ruler of the oceans, and thus allowed to cross the equator and enter King Neptune's new domain. During the ceremony, sailors who have been previously 'initiated' will dress as King Neptune, with a crown and scepter, and will smear old food, or dirty bilgewater, onto the first-time initiate, to humble him. Then he is interrogated to assess worthiness to Cross the Line (Equator). Discuss the concept of superstition, and this ceremony, with students.

Classroom Activity

1. As an open discussion, have students list on the chalkboard the superstitions that they may know of or follow.
2. Once all superstitions are listed, have students categorize them. In what area are most superstitions focused (e.g., sports, hobbies, family, etc.)? Why do students have these superstitions? Do they serve a purpose? What do students think would happen if they did not do as the superstitions require?
3. Once students learn about he equator-crossing ceremony, have them gather materials from home to dress up and conduct their own ceremony, playing the roles of captain and crew of a ship. Do they think that King Neptune would bless them?

Week 3 – Equator Crossing

Geography/STEAM Connection

1. Explain that a cartographer designs and makes maps. Historically, cartographers illustrated the world as it was understood at the time. Some were practical navigational maps; others showed the unknown with pictures of sea monsters and other hazards.
2. Have students look through history textbooks and in library resources to find pictures of old maps (local, regional, and world). Have the students answer these questions:

    • How did the cartographers' perceptions of their world differ from what you know to be true today?

    • What can you learn about people by the way in which they draw their maps?

Home Connection

Families are a place where ceremonies, traditions and superstitions often play an important role. Have students discuss with their families what traditions they follow and why. Are the traditions based in religion? Are they based on "what they have always done?" What is the purpose of the ceremonies, traditions, and superstitions that students' families observe? How would it feel, if they did not observe these traditions?

Team Project Connection

Navigation Team

Current Events Connection

Find an article or picture in the newspaper or online that shows or discusses a ceremony (political, religious, or personal). Why is this ceremony important? Write a letter to the editor that describes one of your traditions and why it is important to you.

Week 4 – Environment: Water

Theme:
Environmental Resources & Impacts

Interdisciplinary Connections:
Science, Social Studies, Geography, Language Arts, Mathematics

Skills:
Converting fractions and decimal percents, calculating ratios and proportions, making a model, persuasive writing, graphing, reading maps

Key Words:
Environment, pollution, climate, desalinator, ratio, proportion, Likert scale, survey

Materials

Classroom Activity light source(s) (incandescent lamps), clean glass jars (1 quart or 1 liter), paper cups, saltwater solution, food-grade plastic wrap, rubber bands;
Geography/STEAM Connection: atlases or globe, meter stick, paper, markers

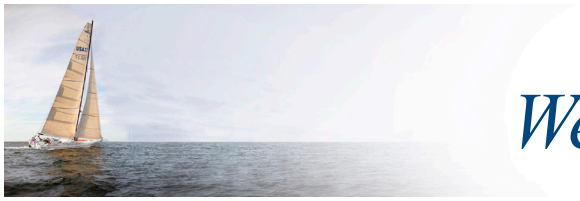
Introducing the Lesson

Ask students to estimate how much water they use during a day. Help them to come to a reasonable estimate by first defining when they use it (remind them of the hidden uses too: laundry, cooking, lawn care, etc.). Emphasize the importance of fresh water to all life. Explain how fresh water and sea water are resources that we often take for granted, and that we tend not to realize their importance until they are polluted.

Great American IV has a limited capacity to store water on ship because of limited space. In addition, if too much water is stored, it might add too much weight to the boat and slow it down. Nonetheless, Rich still must use a certain amount of water each day (for drinking, cooking, washing, etc.). So, how do he get enough fresh water? He makes fresh water from sea water by putting it through a process called desalination. Students can use the following process (distillation) to demonstrate one way in which salt can be removed from water. On *Great American IV,* Rich uses a reverse osmosis desalinator (a process that is different from distillation), but the end product is the same: fresh water.

Classroom Activity

1. Separate students into teams of 2–3 students each. Give each team a cup of salt water, a large glass jar, plastic wrap and rubber bands. (Alternatively, you could have the whole class work with one jar.)
2. Have each student taste a small drop of the salt solution and then describe the taste.
3. Next, have each team put their salt water into their jars, then place the plastic wrap tightly around the top of the jar and wrap a rubber band around it to seal it well. Make sure that the salt water does not splash onto the plastic.
4. Place a light source near the base of each jar to heat up the water. If no lamps are available, place the jars on a sunny windowsill. Leave the jars overnight, shutting off the light at the end of the day.
5. The next day, have each team carefully remove the rubber bands and plastic from their jar, then taste the water that has condensed on the plastic. Is it salty? If so, is it as salty as the water in the bottom of the jar? If not, why not?



Week 4 – Environment: Water

Geography/STEAM Connection

1. Ask students what they know about the ratio of land to water on Earth. Show them a globe and asking for estimates in either fractions or percents. Show them a meter stick and point out that centimeters are based on 100, as is percentile, so a meter stick can be used to show a percentage ratio of land to water on the Earth.

2. Have students make meter sticks out of paper, then use markers to color code and label the following facts on their paper meter sticks: approximately 71% of the Earth's surface is covered with water; just 4% of this 71% is fresh water.

3. Locate the oceans on the world map and order them by size from largest to smallest (Pacific, Atlantic, Indian, and Arctic). The percentage of water on Earth's surface covered by each ocean is: Pacific: 46%; Atlantic: 23%; Indian: 20.5%; Arctic: 4%.

4. Have students calculate how much of the world's surface is covered by each ocean and mark it on their meter stick (e.g., Pacific Ocean = 0.46 x 0.71 = 33% = 33 centimeters on the meter stick. This number represents the percentage of Earth's surface that is covered by the Pacific Ocean.).

Home Connection

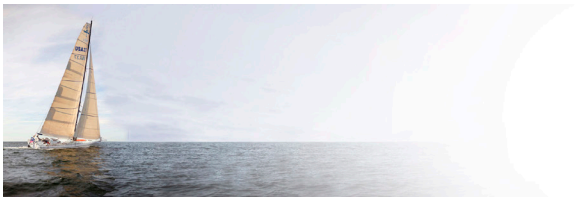
Help students develop an environmental survey to use with their families. As a class project, collectively develop statements about local environmental issues that can be responded to in a Likert scale, ranging from "strongly agree" to "strongly disagree." Have students collect, analyze (in the form of histograms, bar graphs or circle graphs), and report the survey data collected from their families. Have students include recommendations from parents about ways to improve and protect the environment.

Team Project Connection

Geography & Environment Team

Current Events Connection

Freshwater is essential for life on Earth, yet there are communities and ecosystems that do not have enough of it. Have students research an issue covered in the news that involves a lack of clean freshwater. Have students identify what the problem is and what some potential solutions are. Have them write an editorial to a local newspaper about it.



Week 5 – Invisible Places

Theme:
Understanding of "Place"

Interdisciplinary Connections:
Science, Social Studies, Geography, Language Arts, Mathematics, History

Skills:
Using maps, letter writing, using empathy, orienteering (using a compass), research

Key Words:
Environment, imagine, empathy, compass

Materials

Classroom Activity atlases, maps;
Geography/STEAM Connection: compass, aluminum pie pan, styrofoam sheet, water, bar magnet, sewing needle, tape, small Post-Its (labeled: North 0°, East 90°, South 180°, West 270°).

Introducing the Lesson

Ask students if they recall a time when they were away from home for a week or longer without friends or family (e.g., going away to camp or school). Invite them to share their thoughts with a partner and develop a list of some of the things they missed (or imagine they would miss if they were in such a situation). Then, as a class, develop a combined master list of things students would miss in such a situation.

Point out that Rich has been away from home and family for four weeks. What are some of the comforts of home that he probably misses? How might Rich have used his memories of friends and family to comfort his loneliness? Talk about the meaning of empathy (i.e., imagining what someone else is feeling, thinking, or experiencing). Suggest that students write empathetic and encouraging letters to Rich.

Classroom Activity

1. Remind students that Rich hasn't seen land for 4 weeks. Mark Rich's position on the Voyage Tracking Map and identify the major countries Rich has passed but not seen.
2. Divide students into small groups and assign each group one of the countries to research. Have students find out about the country's geography, economy, climate, commercial interests, society, and culture.
3. Have groups reports to the class about the land and people they studied. Guide students to write about what they have learned.

Week 5 – Invisible Places

Geography/STEAM Connection

1. Explain that early navigators used floating compasses to determine direction and to maintain the course of their ships. Elicit what mechanisms the earliest mariners used to navigate prior to the invention of the magnetic compass (i.e., they sailed close to shorelines and used telescopes if they went too far off shore).
2. The earliest compasses were invented by the Chinese in the 12th century. By the 15th century, European navigators used them too. Guide students to make a floating compass model similar to those used in early navigation, by these steps:

   • Pour water a centimeter deep in an aluminum pie pan.
   • Cut a styrofoam square 2 inches on each side.
   • Magnetize a sewing needle by stroking the needle point several times against the north pole of a bar magnet. Each stroke must be in one direction only.
   • Tape the magnetized needle diagonally onto the piece of foam; float it gently in the center of the pan.
   • On the pan, label the direction that the needle points "North 0°." Label the corresponding major compass points (East 90°, South 180°,West 270°) around the edge of the pan. You may also add NE, NW, SW, and SE. Use a standard compass to check for accuracy. If it does not correspond, see if nearby metallic objects are interfering.

Home Connection

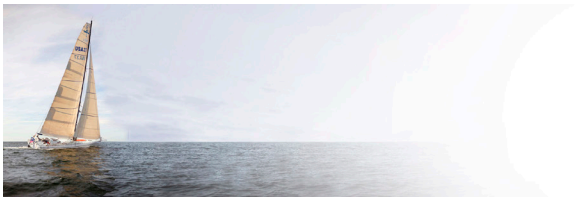
Have students talk with their parents about what information they would want to tell other peoples to create an understanding of what makes the students' country "home."

Team Project Connection

Energy & Mechanics Team

Current Events Connection

Use the Communications Team Project Guide as a class project. Have students search newspapers or online to find news of interest to Rich at sea. Write a news digest for him. Have students work in teams on different areas of interest.



Week 6 – Antarctica

Theme:
International cooperation

Interdisciplinary Connections:
Science, Geography, Politics, History

Skills:
Research, relating cause and effect, analyzing maps

Key Words:
Continent, glacier, desert, consumer, producer, predator, food chain, food web, expedition, treaty, consensus, diplomacy

Materials

Classroom Activity access to Internet or library for research; map of Antarctica
Geography/STEAM Connection: access to Internet or library for research; map of Antarctica

Introducing the Lesson

The Vendée Globe races around Antarctica, offering a chance for students to learn about Earth's least-known continent. With an area of ~14 million km^2 (~1.5 times the size of the U.S.), it is the coldest, windiest, driest, and highest (on average) continent. With little precipitation, it is considered the world's largest desert. Average temperatures vary from -31°F to -5°F (-35°C to -15°C) in summer to -94°F to -40°F (-70°C to -40°C) in winter. ~98 percent of Antarctica's surface is covered by ice. The ice averages ~1.6 km thick.

There is no permanent human population on Antarctica. 28 countries operate permanent or seasonal research stations on the continent. The population of these stations varies, from ~1,000 in winter to ~4,000 in summer.

Seven countries (Argentina, Australia, Chile, France, Great Britain, New Zealand, and Norway) have staked claims to parts of Antarctica. These claims are not widely accepted. Practically, Antarctica is managed jointly under the 1961 Antarctic Treaty. Under the Treaty, decisions are made by consensus (not by vote), and are then implemented by individual member nations. The treaty states that Antarctica is to be used only for peaceful purposes and that freedom of scientific research is permitted throughout the continent.

Classroom Activity

Antarctic life is complex. Phytoplankton and algae are tiny plants that are the major producers of the Antarctic region. Krill are shrimp-like animals that serve as a major food source for ocean animal life. About 100 species of fish and 35 species of squid swim in Antarctic waters. Penguins feed on fish and krill, and are preyed upon by seals and orca. Seabirds and whales also inhabit the region, including the giant blue whale, Earth's largest animal. Life on land is sparse, with a few species of hardy mosses, lichen, fungi, and insects, and animals such as penguins and seals that gather food from the sea.

1. Elicit students' knowledge about Antarctica. On a chalkboard, create 3 columns for geography, climate, and living organisms. Have students volunteer what they know about each. Support students by confirming which are facts and which are misconceptions, or, as a group, verify the information using encyclopedias or online resources.
2. Have groups of students construct a set of class cards for organisms that live in and around Antarctica. Have students sketch their organisms and record basic information, including what it consumes and any predators it may have. Then help students to construct a food web, connecting different organisms/cards with arrows or string.

Week 6 – Antarctica

Geography/STEAM Connection

1. Have students find a map of Antarctica on the Internet and print it out. Locate the South Pole and major research stations, seas, and ice shelves on the map. Explain that ice shelves are regions of floating ice, and equal ~11 percent of the continent's area.
2. Have students work in teams to research and prepare brief presentations about the major historical expeditions to Antarctica, including those of James Ross, Robert Scott, Ernest Shackelton, Roald Amundsen, and Richard Byrd. Have them answer: What was the purpose of the expedition? What route did it follow? What discoveries were made? Have students trace their expedition's route on a class map or the blackboard.
3. Have a class discussion about the ozone hole over Antarctica. How did this "hole" form, and what are its effects? How has its size changed over time? What agreement have nations reached to try to ameliorate this problem?

Home Connection

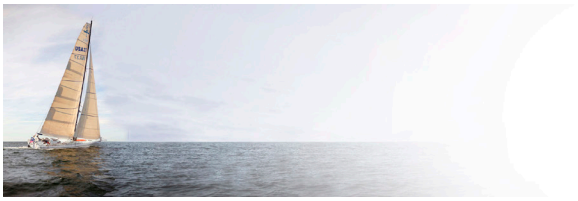
People in families may have different goals and interests, just as different nations do. Have students describe some ways in which family disputes can be resolved. Ask them to give examples from their own experience. How are these similar to, and different from, the ways in which nations resolve disputes?

Team Project Connection

None

Current Events Connection

Find an article that focuses on international cooperation or negotiations (on trade, climate, natural resources, space, or endangered species). Write a paragraph describing the issue. Who are the parties? What are the major points of contention? What are the benefits of cooperation? Was an agreement reached, or is one likely to be reached?



Week 7 – Climate Change

Theme:
Change over time

Interdisciplinary Connections:
Physical Science, Earth Science, Meteorology, Mathematics

Skills:
Conducting a controlled experiment, graphing, predicting, researching

Key Words:
climate, global warming, carbon dioxide, greenhouse gases, greenhouse effect, fossil fuels, combustion, infrared radiation, carbon cycle, carbon footprint

Materials

Classroom Activity 2 plastic bottles, heat lamp, 2 thermometers, soil, spray bottle, ruler, plastic wrap, rubber band, scoop, clock, graph paper
Geography/STEAM Connection: graph of atmospheric CO2 levels over the last 150 years, access to Internet or other up-to-date information resources.

Introducing the Lesson

Climate is the range of weather that occurs over large regions over long periods of time. The most dramatic example of climate change is global warming, an increase in the average temperature of the Earth over time. The major cause of global warming is thought to be increased emissions of carbon dioxide (CO_2) and other greenhouse gases such as methane, primarily from the combustion of fossil fuels such as oil, natural gas, and coal.

The effects of global warming are predicted to be significant. One is that higher temperatures will melt much of the ice on Earth's surface. The Arctic icecap, per satellite photos, has shrunk when compared with the past. As that ice melts, ocean levels will rise, which can flood coastal areas. Another predicted effect is increased intensity of storms.

A greenhouse is a good analogy for CO_2 in the atmosphere. The CO_2 in the air is fairly transparent to incoming sunlight, much of which is in the visible and ultraviolet wavelengths of the electromagnetic spectrum. Much of this incoming light is absorbed by Earth's surface, thus warming the surface, and is then radiated back toward the atmosphere as infrared radiation (a different wavelength than the original incoming sunlight radiation). The CO_2 in the atmosphere is less transparent to this infrared radiation, thus allows less to escape, traps it near Earth's surface, and thus warms the atmosphere. This "greenhouse effect" has kept Earth warm enough to support life, yet increased CO_2 emissions, mainly from burning fossil fuels, now threaten to warm the atmosphere more.

Classroom Activity

Students will conduct a controlled experiment to simulate the greenhouse effect:

1. Before class, cut the top off of 2 clear plastic bottles where the neck begins to narrow.
2. Have students place a scoop of soil in each bottle, tape a thermometer at a fixed height to the side of each bottle, and dampen the soil with water from the spray bottles.
3. Cover one bottle with plastic wrap and secure it with a rubber band. Leave the other uncovered. Put a heat lamp equidistant between the two bottles.
4. Have students record the initial temperatures in each bottle, and then the temperature at 30-second intervals for 15 minutes. Then have students graph the results for each bottle. Students should find that the temperature of the covered bottle increased faster and remained consistently higher than that of the control bottle.

Week 7 – Climate Change

Geography/STEAM Connection

1. Examine a graph of CO_2 levels in the atmosphere for the last 150 years. If that trend continues, predict the level of CO_2 in the year 2050. What actions could people take to alter your prediction?
2. Use internet or library resources to identify other possible effects of global warming. How might your area be affected?
3. Although Rich may not notice as he sails around the world, the oceans, by absorbing much of this extra heat in the atmosphere, are warming up. This affects ecosystems, evaporation, and ocean circulation patterns. Discuss possible effects.
3. Make a collective list of the impacts of climate change. Have students prepare an art project to tell the story of climate change on Earth.

Home Connection

Use an online calculator to determine your family's "carbon footprint".

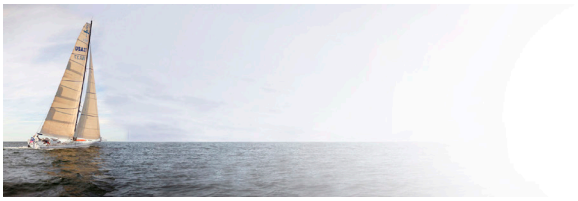
Our houses or apartments are places where we can help with climate change by reducing energy use, creating green spaces to absorb CO_2, using efficient heating and insulation. Design and implement a plan with your family to reduce your carbon footprint.

Team Project Connection

None

Current Events Connection

Locate a newspaper or online article that discusses some aspect of climate change. What causes or effects of climate change are identified in the article? What evidence is cited? What actions, if any, are being proposed or might be considered to reduce these effects??



Week 8 – Midpoint

Theme:
Turning Points

Interdisciplinary Connections:
Geography, Art, Technology, Language Arts

Skills:
Using perspective, predicting, drawing (maps), research

Key Words:
Midpoint, perspective, desalinator, dehydrated food, communication systems

Materials

Classroom Activity Ocean Challenge Live! Captain's Log and Journals;
Geography/STEAM Connection: Voyage Route Tracking Map, paper, markers

Introducing the Lesson

Point out to students that at the midpoint in a journey or challenging experience, people can plan ahead with two different perspectives. They can look back and think of things they would have done differently, or they can look ahead and think of ways they will act differently based on what they have learned during the first part of their journey.

Classroom Activity

1. Organize students into teams. Have each team use the Ocean Challenge Live! Captain's Log and Journals to assess the status of the voyage thus far.
2. Have students identify specific voyage achievements as well as challenges, and predict how long it will take *Great American IV* to complete the race. Make sure that teams explain the reasoning behind their predictions.
3. Ask each team to list and evaluate the decisions Rich as made, determining which decisions were "wrong" or "right", depending on the result. What determines whether the decision was good or not?
4. Form discussion groups to talk about what students might do differently at this point of the school year based on experiences they have had so far. Collectively share the information in a full-class discussion.

Week 8 – Midpoint

Geography/STEAM Connection

1. Ask students to turn the Voyage Route Tracking Map upside down (i.e., north at the bottom) and view it that way. Ask students if they notice anything different about the route or have different predictions when they see the map from that perspective.
2. Point out that there is no reason why we always put north at the top of maps. Ask students how people would use a compass if, instead of having north as the top of maps, they used south, east, or west as the top.
3. To encourage students to think anew about maps and geography, have them put away the Voyage Route Tracking Map, then draw their own map of the route that the boat will follow for the rest of the voyage. Have students exchange their maps with their peers, then determine as a group which student's map has the most accurate detail.

Home Connection

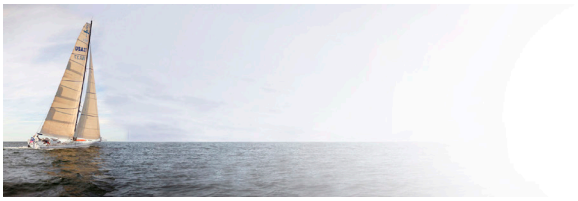
Have students interview their parents, grandparents or other family members to find out about turning points in their family history. What did they learn from these turning points that helped them to make future decisions? Did they change directions or not?

Team Project Connection

Information Team

Current Events Connection

Have students search the newspaper or online for examples of individuals or organizations at a turning point. This could be a sports team, a business with a new product, or a politician beginning his or her term in government. Ask the students to imagine themselves from the individual or organization's perspective in that situation. What would the people at the turning point have to think about from their earlier experience? What goals might they set or change? How might they evaluate their success?



Week 9 – Wildlife

Theme:
Adaptation & Interconnectedness

Interdisciplinary Connections:
Science, Geography, Mathematics

Skills:
Brainstorming, graphing, identifying cause and effect, calculating, researching

Key Words:
Surface zone, algae, food web, habitat, neritic zone, continental shelf, adaptation, predator, prey, camouflage, animal population

Materials

Classroom Activity a various colored paper clips, toothpicks, or other small objects, solid colored paper, paper clip containers, graph paper, colored markers, stopwatch;
Geography/STEAM Connection: *Ocean Challenge Live!* Captain's Log (from website)

Introducing the Lesson

Have students list various animals that Rich has reported from sea. The most commonly seen marine species are those that either float on the surface, like sea turtles, or jump out of the water, like flying fish or dolphins, that live in the "surface zone" of the ocean. This zone extends to the depth that sunlight reaches, usually less than 200 meters. Most ocean life is found in this zone because algae, the basis of the ocean food web, needs sunlight.

Have students work in groups to research land and marine habitats along the ship's route (e.g., the Amazon rainforest; the African plains; the Andes range; beaches; and ocean habitats such as the surface ocean zone). Use the following questions as a guide:

- What are the physical characteristics, and major animal species, of the habitat?
- Describe the local food web, and which species are predators and which are prey.
- Find pictures of animals in the habitat; describe their adaptations. How do these adaptations help the animals to survive? How might these adaptations have originated?
- One form of adaptation is camouflage. How does camouflage aid survival?

Classroom Activity

1. Organize students into groups. Have each group scatter a set of approximately 50 colored paper clips or similar objects on a solid colored sheet of paper. Each paper clip represents prey, with the students playing as predators. The sheet color should be similar to one of the paper clip colors, so that they blend in with the sheet.
2. Once all clips are in place, have groups switch positions so that each group has a different sheet. Have one student in each group be the "catcher" and another be the "counter." Tell the "catchers" that they can "catch" only one paper clip at a time and may not pick up the sheet. Once a clip is caught, it is handed to the "counter" to be tabulated later. Give each group one minute to collect half of the clips on the sheet.
3. Have each group sort their collected clips by color and make a bar graph of the results.
4. Have students answer the following questions, using their bar graphs for reference.
   a. Who was the predator and who was the prey?
   b. Which color paper clips were found most easily, and with most difficulty?
   c. How does the activity demonstrate animal camouflage?
   d. If the color of the background sheet was changed, might this affect the result?
   e. What does this activity reveal about how adaptations appear in animal populations?

Week 9 – Wildlife

Geography/STEAM Connection

1. Explain to students that, on the ocean, distances are measured in nautical miles, while on land, distances are measured in statute miles. The value of a nautical mile is based on the length of one minute of arc on Earth and is also equal to 1.15 statute miles. A knot is a unit measure for speed, equal to one nautical mile per hour.
2. Go to the *Ocean Challenge Live!* Captain's Log. Find out how many nautical miles *Great American IV* has traveled since it left France. What is the average number of nautical miles per day the ship has traveled? What has been the average ship's speed?
3. How does the the boat's speed relate to other data in the Captain's Log?

Home Connection

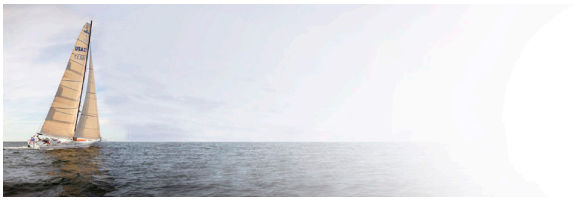
In an earlier voyage on *Great American II*, Rich Wilson was awed by the connectedness of the ocean's action. "Every salty wave from San Francisco to Boston was connected to the next, and to every harbor, beach and river we passed." To demonstrate interconnectedness, have students talk with their families about how events, actions, and decisions that occur in the family can have an effect on other family members. How can students' own decisions affect their families? Invite students to share their family discussion.

Team Project Connection

Marine Life Team

Current Events Connection

Issues affecting animals that live in the ocean are often in the news. Have students find articles that identify problems relating to life in the ocean. Have each group present one problem to the class, then have the class brainstorm possible solutions to the problem.



Week 10 – Decision-Making

Theme:
Making Decisions

Interdisciplinary Connections:
Science, Geography, Mathematics, History

Skills:
Making decisions, reading maps, collecting data

Key Words:
Route, decision, alternative, prevailing winds, aneroid barometer, barometeric pressure, millibars

Materials

Classroom Activity Captain's Log and Ship Position, world atlas, Voyage route Tracking Map (provided), paper, writing utensils, world history books;
Geography/STEAM Connection: Aneroid barometer (optional)

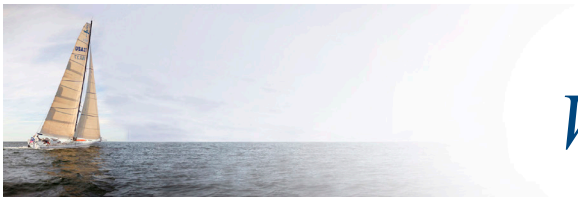
Introducing the Lesson

Point out that daily—in fact hourly—Rich Wilson aboard the *Great American IV* must make decisions about which is the best route to take based on wind, weather, sea conditions, and destination. Ask students if they have ever taken a route that was longer than another route but safer or different in some way. Ask them to explain why they chose to take the longer route. Display the following decision-making steps on a chalkboard. Refer to them as students explain their decisions to change routes:

1. What was the problem or decision to be made?
2. What information (facts that created the problem) did students have?
3. What were the alternative solutions and consequences for each?
4. Which seemed to be the best choice and why?

Classroom Activity

1. As a class, look at the map that you are using to track *Great American IV* 's progress. Ask students to analyze the Ocean Challenge Live! Ship Position and Captain's Log pages to find instances in which Rich changed his route or course.
2. Have students make a two-column chart on paper. In one column, ask them to list reasons why Rich might choose a certain route. In the other column, have them list reasons why Rich might avoid a certain route. For example, the crew might choose a route that has consistent prevailing winds and avoid a route that has a lot of storms. Students should base their lists on information on the Ocean Challenge Live! website.
3. Encourage students to study other nautical voyagers, such as Captain Bligh, sailing the Bounty to Tahiti in the late 1780's. Other famous voyagers include Charles Darwin, Christopher Columbus, Henry the Navigator and Ferdinand Magellan.



Week 10 – Decision-Making

Geography/STEAM Connection

1. Elicit from students why air pressure changes. (Answer: It is caused by changes in air density and elevation.) Explain that detecting and measuring changes in air pressure is useful in predicting weather changes (which in turn can determine whether a ship's captain changes the course of his ship). Areas of high pressure generally bring clear skies and fair weather. Areas of low pressure bring clouds and precipitation.
2. Show students a barometer (optional) and explain that it is an instrument used to measure air pressure, often called barometric pressure. Point out that as temperature rises or elevation increases, the air becomes less dense. Thus, the pressure decreases. As the temperature drops or elevation decreases, the air becomes more dense and the air pressure increases. An aneroid barometer is a tool that measures air pressure. The millibar is a unit of pressure that is related to the actual weight of air pressing on a square centimeter. Inches of mercury (in Hg) is another common unit of measure for air pressure.
3. As the pressure increases or decreases at sea level, Skipper Rich Wilson uses his barometer to predict changes in weather. Invite the Weather Team to present the air pressure data over the past week to determine if the barometric pressure reading was a good predictor of weather conditions and changes.
4. Have students collect barometric pressure readings for the next two weeks and use the data to predict weather changes..

Home Connection

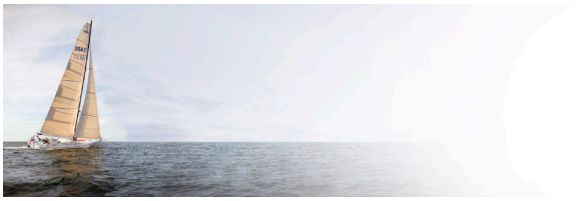
With their parents' help, have students study a map that they have used on a vacation or to visit a friend or relative. Plan different routes to take them to the same place. Discuss and record the advantages and disadvantages of each route. Ask parents why they chose a certain route. Invite students to share their family discussion and map with the class.

Team Project Connection

Weather Team (Invite this team to share barometric pressure data for the activity above.)

Current Events Connection

Have students find examples of decision-making in the news, and then use the decision-making method offered in Introducing the Lesson. Ask students to identify the factors that affected the choice that person made. Was the outcome what that person anticipated?



Week 11 – Forces of Nature

Theme:
Natural Forces

Interdisciplinary Connections:
Science, Geography, History

Skills:
Collaborating, Mapping, Research

Key Words:
Ocean wave, wind, current, typhoon, tsunami, volcano, earthquake, global wind, Coriolis effect, hurricane, tornado, latitude, longitude, Ring of Fire, tectonic plate

Materials

Classroom Activity world map of ocean currents, Voyage Route Tracking Map;
Geography/STEAM Connection: World Map; location list of earthquakes & volcanoes

Introducing the Lesson

On his small boat, Rich Wilson is at the mercy of the forces of nature. The boat is buffeted by waves and strong winds. Some forces, such as winds and ocean currents, are fairly predictable. Other forces, such as major storms, are not as predictable. On the voyage, the boat will pass locations where extreme displays of natural forces have appeared in the past. These include major volcanic eruptions, Tambora (1815) and Krakatoa (1883) (the two deadliest volcanic eruptions in history) in Indonesia, and Cape Horn, known for its terrible storms. Earthquakes are also common in Southeast Asia.

Have student groups (3-4 each) research one of these questions and report to the class:

1. What are global winds? How will these help or hinder the voyage?
2. What causes currents? What affect do they have on climate?
3. What is the Coriolis effect? How does it affect global wind patterns and currents?
4. How do tsunamis develop, and how large can they be? How common are they?
5. What are the three major types of volcanoes? How are they different?
6. What causes earthquakes? Can they be predicted? Where do they occur?
7. How and where do hurricanes (called typhoons in the Pacific) develop? Is the boat likely to face such storms? What happens to hurricanes once they reach land?
8. What are tornadoes? Can they occur over the ocean?

Classroom Activity

1. Have students study a map of ocean surface currents., and look for patterns in the direction of these currents. They should see that major currents rotate clockwise in the Northern Hemisphere and counterclockwise in the Southern Hemisphere. They should also notice that currents tend to flow along the coasts of continents.

2. Have students compare the ocean current map to the Voyage Route Tracking Map. In which areas did the ocean currents move in the same direction as the boat traveled? In which areas did the boat sail against prevailing currents? How do you think the direction of currents affects the speed at which a boat moves? Does the *Great American IV*s route make sense in light of the currents?

Week 11 – Forces of Nature

Geography/STEAM Connection

1. Obtain a list of 20 major earthquakes or volcanoes, together with their locations (latitude and longitude). Have students plot them on a world map.
2. Do they see any patterns in the plotted earthquakes and volcanoes?
3. As a class, discuss the geographic patterns of earthquakes and volcanoes. Most earthquakes and volcanoes cluster together, especially around the rim of the Pacific Ocean, called the "Ring of Fire." This is because the Earth's crust and upper mantle are divided into a series of tectonic plates, which slowly slide horizontally along the surface. Most major earthquakes and volcanoes are near where such plates meet.

Home Connection

Discuss safety during natural disasters. As a class, think of proper actions to take before, during, and after natural disasters that may occur in your area. Have students talk with family members about how they could make their home safer for a natural disaster.

Team Project Connection

None

Current Events Connection

Have students study the news to find articles on events in the last year caused by forces of nature, i.e., hurricanes, blizzards, tornadoes, floods, earthquakes, and volcanic eruptions. Locate and mark these events on a world map. How have people in those areas been affected? What can be done to help?

Week 12 – Fisheries Depletion

Theme:
Natural Forces

Interdisciplinary Connections:
Science, Geography, History

Skills:
Collaborating, Mapping, Research

Key Words:
Ocean wave, wind, current, typhoon, tsunami, volcano, earthquake, global wind, Coriolis effect, hurricane, tornado, latitude, longitude, Ring of Fire, tectonic plate

Materials

Classroom Activity 40 pennies/paper clips/group, graph paper;
Geography/STEAM Connection: Access to Internet or library for research; graph paper

Introducing the Lesson

Commercial fishing employs millions of people worldwide, and seafood provides an important source of nutrition around the globe. Sophisticated technology has made it possible to use satellites to find schools of fish, to use lines and nets that are miles long, and to stay on the open ocean for months at a time. As a result, total worldwide seafood catch has risen at about 8 percent per year over the past 40 years.

This substantial increase in fishing has caused the populations of many species of fish to decline precipitously. Moreover, the overfishing of certain species, such as sharks, has damaged entire marine ecosystems as natural marine food webs have been disrupted. Unlike non-renewable resources such as oil and coal, fisheries are a renewable resource.

ClassroomActivity

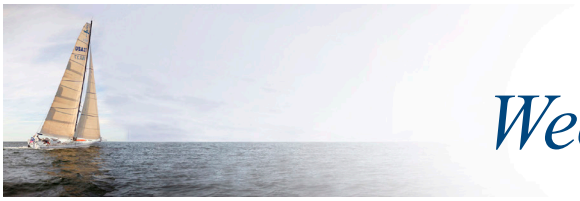
1. Students will be playing the role of fisheries scientists in studying different fisheries. Introduce the following terms and elicit prior student knowledge about them. Have students research and present on them:

   Bycatch - fish or any other organisms accidentally caught in fishing gear.
   Sustainable fishing - collection of fishing practices that maintain fish populations.
   Aquaculture - the cultivation of aquatic animals or plants for food.
   Sustainable yield - the ecological yield (or catch) that can be extracted from a certain population of fish or shellfish without reducing the base of the population itself.

2. Have student groups research different types of fish and shellfish on the Seafood Watch website from Monterey Bay Aquarium. Have groups present on their research:

   - What are the issues with consuming this type of fish or shellfish?
   - What are the most common fishing methods used to catch this species?
   - Are these methods helpful or harmful to the health of ecosystem?

Blue Crabs	**Swordfish**	**Shrimp**	**Tuna**
Cod	**Salmon**	**Mako sharks**	



Week 12 – Fisheries Depletion

Geography/STEAM Connection

Assign a major marine species to each student group. Have students use the Internet to gather current information on the species' population status and how it has changed over time. Have them construct graphs showing population versus time. Also have them describe current issues and possible solutions to creating a sustainable population.

Home Connection

Have students enroll their family in creating a family meal that will include seafood from the Monterrey Bay Seafood Watch's "Best Choice" or "Good Alternatives" list. Have students talk about the benefits and the risks of eating seafood at home, and then help shop for and prepare the meal.

Team Project Connection

None

Current Events Connection

Locate a news article that focuses on a particular natural resource (either a living resource such as fish or a non-living one such as energy.)
- Is this resource renewable or nonrenewable?
- Are supplies currently abundant, or is the resource becoming increasingly scarce?
- What is being done, or could be done, to make use of the resource more sustainable?

Week 13 – Teamwork & Perseverance

Theme:
The Team's Commitment

Interdisciplinary Connections:
Science, Geography, History, Language Arts

Skills:
Making decisions, collaborating, showing respect, research

Key Words:
Cooperation, challenge, commitment, perseverance, decision, tolerance, motivatione

Materials

Classroom Activity Online resources: GA4 and sitesALIVE Shore Teams.
Geography/STEAM Connection: Materials for creating a map

Introducing the Lesson

Ask students to recall a situation in which they, with another person or group, kept working toward a goal, even though it was a difficult goal to achieve. This might have been a team sporting competition, a school or community project, or a family challenge. Ask why the four elements—cooperation, tolerance, commitment, and perseverance—are important to the success of a project or challenge. Point out that personal motivation and a commitment to achieving the goal is the reason Rich Wilson persists in his efforts.

Discuss problems that might occur because Rich is sailing alone and does not have anyone immediately available to help him. After being at sea for several weeks, what do you think could happen to Rich's level of commitment? What are some constructive ways he could handle loneliness and his feelings about his commitment to the race? Suppose Rich's extended team (shore-based communications and technical teams, family, and friends) did not share the cooperation, tolerance, commitment, and perseverance that Rich maintains. How might this put Rich at risk?

Classroom Activity

1. Have students review and share the information thaey have learned and gathered so far about the trip. What are some of the challenges that Rich has faced? How did he persist to meet these challenges?
2. Encourage students to identify some problem-solving events in the voyage, then evaluate Rich's decisions about them. As a class, create a list of the lessons Rich may have learned from his decisions.
3. Study the Team of Experts on the Ocean Challenge Live! website. Four of these are especially important to Rich at sea: his Emergency Doctor, his Asthma Doctor, his Trainer, and his Rescuer from the Cape Horn capsize in 1990. How might these especially encourage Rich along his challenging route around the world?

Week 13 – Teamwork & Perseverance

Geography/STEAM Connection

1. Have students work in groups to develop a plan to conduct a journey by foot, bicycle, or sailing vessel. Tell students that the trip they design will be one that they will take together. The journey should be both challenging and interesting. It could be as grand as a bicycle trip cross-country, or as local as a walking trip across their city or town.
2. Have students create a map of the route and calculate how long it will take and the speed at which they will travel. Have them plan stops they will take along the way, and what they will do at those stops.
3. Ask students to imagine how cooperation, tolerance, and perseverance will be needed on their journey. Have them write 2-3 sentences on each of these traits and then present their planned journey to the class.

Home Connection

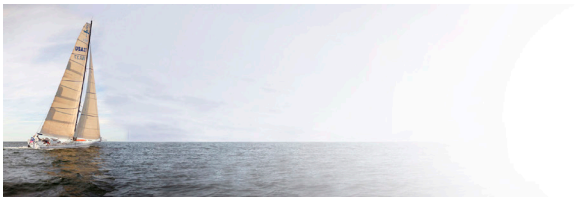
Have students interview their parents, grandparents, or other adults to learn about the daily challenges they face. These could be health, economy, work or family-related. How do they overcome these challenges? Are cooperation, tolerance, commitment, and perseverance a part of their solutions to problems?

Team Project Connection

Teamwork Team

Current Events Connection

Have students research the news to find an example of a person or a group of people who are taking on a big challenge. Have students prepare a summary of the challenge and how commitment, perseverance, tolerance, and cooperation play a role.



Week 14 – What I'll Miss

Theme:
Perspective

Interdisciplinary Connections:
Math, Geography, Language Arts

Skills:
Narrative writing, map reading, averaging, graphing

Key Words:
Expedition, treaty, consensus, diplomacy, narrative writing

Materials

Classroom Activity Ship's Log;
Geography/STEAM Connection: World Atlas; Voyage Route Tracking Map

Introducing the Lesson

Organize students into their project teams. Have each team list the most important events of the voyage, then prioritize the list and determine which are the top two most significant events. Have each team report to the class on why they chose those particular events as most significant. Finally, have the class vote on the two most significant events, then display the results on a bar graph (based on number of votes per event).

Classroom Activity

1. As a class, discuss how perspectives change after people experience an exciting or high-risk event. In what ways might Rich have a different perspective now that he has almost finished his trip and reached his goal?
2. Have students review the Captain's Log to determine what lessons Rich may have learned during the trip.
3. Have students remember special events in their own lives, and explain to the class the aspects of those events that they miss the most. For example, in the past, Rich has mentioned that the air at sea is very clean, and that that is good for his asthma, and when he returns to land, he will be exposed to allergens for his athma, including dust and trees, and urban pollution.

Week 14 – What I'll Miss

Geography/STEAM Connection

1. Use the Ocean Challenge Live! Captain's Log to determine the distance sailed so far and the distance remaining. Have students predict the elapsed time for Rich to complete his voyage.
2. Have students calculate the average speed of *Great American IV* in the past week. Study the remaining distance to France, and predict the day and hour that *Great American IV* will arrive. Create a contest to see whose prediction is the most accurate one?

Home Connection

Survey family members about the most significant events of the voyage. Do parents agree with students' choices of significant events. Collect and compare parent data with class data. Do parents' perspectives differ from students' perspectives. If so, why?

Team Project Connection

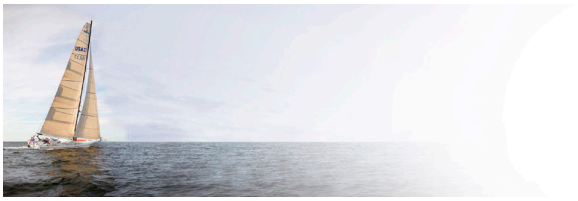
Communications Team

Current Events Connection

Explain that a narrative is a way of telling the story of an event from beginning to end.A good narrative:

- captures the reader's attention in the introduction
- follows a logical sequence of events
- evokes an emotional response from the reader
- provides the reader with new information or a unique perspective on old information
- employs an appropriate tone or voice for the subject

Have students find narratives in the news (e.g., in the features or op-ed sections), then ask them what they noticed about the kinds of information the reporter included. Have students write a narrative of some of the events that have occurred so far during *Great American IV* 's journey. They may divide the narrative into parts and write the complete event as a team. Have students write in one of the writing styles they have encountered.



Week 15 – Defining Success

Theme:
Defining Success

Interdisciplinary Connections:
Geography, art, math, language arts, humanities

Skills:
Mapping, drama, creative expression, setting goals, planning, making decisions, writing

Key Words:
Success, skills, achievement, resilient, procrastinate, self-esteem

Materials

Classroom Activity Voyage Route Tracking Map;
Geography/STEAM Connection: Ocean Challenge Live! website; Ship's Log

Introducing the Lesson

Have students review their notes about the journey. Remind them that at the start, there was no guarantee that Rich Wilson would achieve his goal. Have students define what success means to them? Did Rich Wilson win the race? If so, was his success limited only to winning? If not, could his voyage still be considered successful? As they review, have students document and describe any instances that they would qualify as successful. What lessons were learned from mishaps or failures? Ask students what factors they think were most important in enabling Rich to succeed and arrive at his destination.

Classroom Activity

1. Have students identify people that they believer are successful. These people might include classmates, teachers, family members, sports figures, politicians, etc.
2. Ask students: What are actions or qualities a person needs to do and have to be successful? Answers might include: being responsible, setting challenging but realistic goals, devising a plan, managing time, being committed, and remaining resilient.
3. Have students discuss pitfalls that could hamper achieving success, such as procrastination, fear of failure, and poor planning. Write the term "resilient" on the chalkboard. Elicit a definition and examples of resiliency. Stress that being resilient means being able to recover from an event that could be disappointing or catastrophic.
4. As a class, discuss how these items can help a person define and achieve success:

   a. make a checklist; check off the smaller steps as they are achieved
   b. reward oneself when a goal has been achieved
   c. ask for help when it is needed
   d. find someone with a similar goal; exchange encouragement, ideas & lessons learned
   e. once the goal is accomplished, reflect on the processes that were most important.

4. Discuss the actions/qualities that Rich Wilson demonstrated in setting and achieving his goal. How do students think that Rich used the five suggestions above?

Week 15 – Defining Success

Geography/STEAM Connection

1. Have students annotate the Voyage Route Tracking Map.
2. Have students write "headlines" at places en route where significant events occurred.
3. Have students calculate the hourly rate of speed of Rich's boat in the last week and make a prediction of the day and hour when *Great American IV* will finish.

Home Connection

Have students make a scrapbook of the materials they produced during the voyage. It may be based on events or chronology. Include photos, quotes, and captions downloaded from Ocean Challenge Live! website. Encourage students to focus on a theme such as teamwork, success, marine life, decision-making, record-breaking, etc.

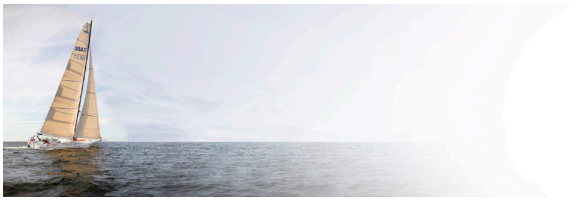
Team Project Connection

The Book & Movie team can act out the final scene of their film. Have the other Team Projects present their own brief summary of the voyage from their particular perspective.

Current Events Connection

Have students prepare a "Special Edition" newspaper to celebrate the completion of *Great American IV*'s journey and their own work. The Special Edition should include:

- **Front Page:** Headline and main feature story. Students could add in related "side-bar" articles, including quotes from the daily audio updates or interviews with members of the class who have become "experts" about specific aspects of the journey.
- **Features:** Articles about different aspects of the journey. Each Team could submit an article relating to their team project.
- **Perspectives:** Editorials and an editorial cartoon about the meaning and/or purpose of Ocean Challenge Live!
- **Challenge:** Math problems, science connections, or trivia questions based on materials generated during the voyage. For example, a crossword puzzle could be developed focusing on nautical terms used in Ocean Challenge Live!



Extra Week – Getting Ready

Theme:
Vision and Motivation

Interdisciplinary Connections:
Science, Math, Geography, History, Architecture

Skills:
Designing a model, calculating speed, mapping, using a log, research

Key Words:
Vision, motivation, clipper ship, visualize

Materials

Classroom Activity glue, large toothpicks or thin dowels, scissors, flat styrofoam plates, styrofoam bowls, wallpaper water trough, electric fan, stopwatch;
Geography/STEAM Connection: Maps; see Mapping Appendix

Introducing the Lesson

Ask students to recall a difficult trip that they, friends, or family members have made. Point out that it is easy to dream of taking on a difficult trip or challenge, but to actually meet that challenge is much harder. Ask the students to put themselves in the shoes of Rich on *Great American IV*. What might motivate him to take on such a high-risk adventure? Have students suggest some rewards (tangible, social, personal) that Rich might visualize. Have students predict situations Rich might encounter and fears he might have to overcome. What types and quantities of supplies would he need to bring to last around 100 days on board without ever coming to shore? Have students work with a partner first, then share with the class a list of things they would want to pack on their ship.

Classroom Activity

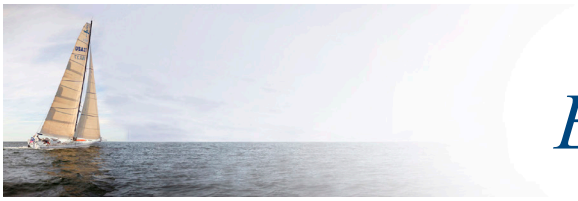
1. Have students research the topic of sailboats. Some questions to research might be:

- When were sailboats first used?
- What principles of physics make sailboats sail?
- What structural designs are considered when designing a sailboat?
- What are difference(s) in the design of a racing yacht and a cruising yacht?
- What special considerations must be made when designing for solo sailing?

2. Have students study the design of *Great American IV* from its picture on the website and from schematics in the back of this Guide. Group students in teams to design and build a model of *Great American IV* from toothpicks, wood dowels, and styrofoam plates. Determine the specifications for students' models (including overall length, width, and height) beforehand so that during the race, the ships compete evenly.

3. Have a race! Set up the wallpaper water trough as the "race course," and the electric fan as the "wind." As student teams race their models, keep the fan speed and angle, and starting and finishing points constant. Use the stopwatch to calculate speed.

4. Have a class discussion about the differences of the faster and slower boats.



Extra Week – Getting Ready

Geography/STEAM Connection

1. Review the concepts of latitude and longitude. Explain that on a globe or map, lines of latitude are imaginary lines around the Earth that are parallel to the equator, and measured in degrees North or South of the equator. Lines of longitude are imaginary lines running north and south around the Earth that intersect at the poles and are measured east or west of the Prime Meridian. A ship knows its position per this grid of lines.
2. Using the concepts of latitude and longitude and the mathematical skills that accompany them, have students track *Great American IV*'s location throughout the voyage. Consult the Captain's Log on a daily basis and plot the boat's position on the Voyage Route Tracking Map according to its latitude and longitude coordinates.

Home Connection

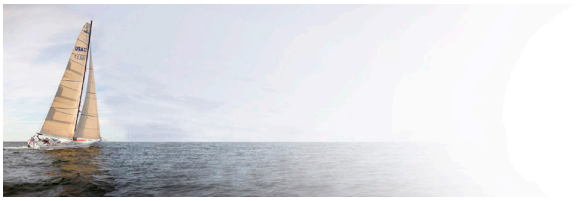
With the help of a parent or other family member, have students plan a three-week-long journey to a remote area where there are no modern conveniences (plumbing facilities, refrigeration, grocery/supply stores, housing/hotels, etc.). Have students select the season in which they plan to visit the area, then make a list of items (food, gear, and personal supplies) that they will need. Have students share their list of "essentials." How do these compare to what Rich Wilson is taking with him aboard *Great American IV*?

Team Project Connection

Nutrition and Health Team

Current Events Connection

Have students compare and contrast the terms "motivation" and "vision." Can a person have a vision and no motivation or vice versa? Ask students to read the Purpose of Ocean Challenge Live! in the Teacher's Guide Introduction. Next, have students review the "help wanted" section of a newspaper, then write an employment advertisement for an individual who would be qualified to undertake the Ocean Challenge Live! project. Compare the students' advertisement with Rich's qualifications in his biography online.



History Team Project Guide

Your challenge is to research the histories of the countries along the route that *Great American IV* sails. For your sources, use world history textbooks, encyclopedias, the sitesALIVE! website, CD-ROMs, etc.

1. Start by researching and summarizing the voyages of some famous sailors who have challenged the ocean. Include information on the following:

a. Hernando de Soto
b. Hernán Cortés
c. Vasco Nuñez de Balboa
d. Juan Ponce de León
e. Christopher Columbus
f. Captain James Cook

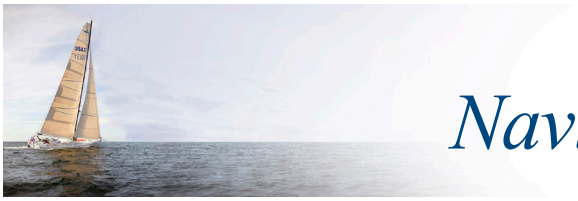
2. Find out about the history of commerce and trade routes in the regions through which *Great American IV* will pass.

3. For each country along the way, make a "History Connections" digest. Include information about explorers and navigators who have met challenges in that country. Follow this outline in your reports:

a. Country:
b. Explorer/Navigator:
c. Challenges the person faced there:
d. How that person met the challenge:
e. Connections to Ocean Challenge Live!:
f. How does the explorer's challenge compare to that of Rich Wilson aboard the *Great American IV*?
g. What advice might this explorer have for Rich Wilson?

Added Challenge

How is traveling in space like traveling on *Great American IV* ?
What lessons might Skipper Wilson have for future travelers in outer space?

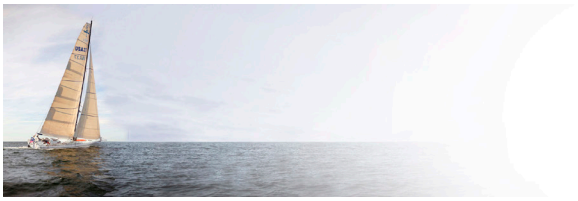


Navigation Team Project Guide

Your challenge is to create a Location Report. Use the chart below to weekly record the position of the boat and its distance to the nearest landmass. In addition, predict the boat's position one week from the current report and calculate the average weekly distance traveled.

Week	Latitude Longitude	Distance/Direction to Nearest Land	Average Weekly Distance	Predicted Position for Next Week
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

Added Challenge
Your predictions should improve each week as you learn more about the voyage.
What kinds of things help you to make better predictions about the location of the boat?

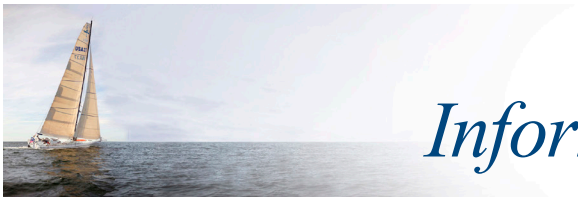


Geography & Environment Team Project Guide

Your challenge: To describe the countries and global regions that *Great American IV* is passing and the environmental issues facing these regions.

Week	Nearest Country or Region	Description of the Region	Environmental Issues of Region
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			

Added Challenge
Research one environmental issue to see if the problem exists elsewhere in the world.

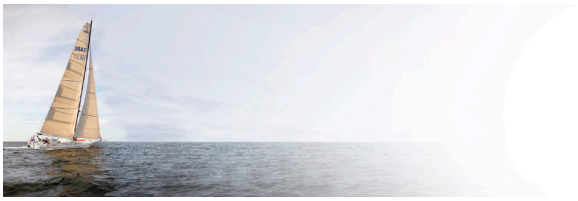


Information Team Project Guide

Your challenge: To update the following chart weekly. Set it up on a bulletin board.

Week	Focus of Weekly Report	Significant Events from Daily Audio Updates	Special Events
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			

Added Challenge
At the end of the voyage, decide which week was the most challenging.



Energy & Mechanics Team Project Guide

Your challenge: To research the basic physical setup of the boat and monitor the use of energy during the trip.

1. The Physics of a Monohull: What is a monohull and why is it built the way it is? You need a picture of such a boat (see the website), a list of its parts, and an understanding of sailing. You may also find information about monohulls and other sailing vessels from the essays, journals, and questions and answers on the website.

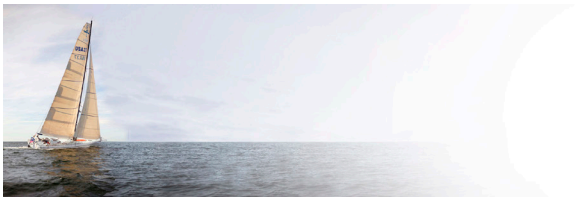
a. To find out further about sailboats, there are several options:
• Call a boat dealer or manufacturer if you have one in your area. How will you find such a business?
• Get a model of a sailboat from a hobby store and assemble it.
• Conduct an interview with someone who has sailed a boat.

b. To report your information, create a key for a picture of a monohull. For each labeled part, tell how it works and why it is important to the boat (Hint: you can use the boat diagrams on the sitesALIVE! website).

c. Find out and list the advantages and disadvantages of sailing monohulls (boats with one hull) and multihulls (boats with more than one hull, e.g., catamarans or trimarans).

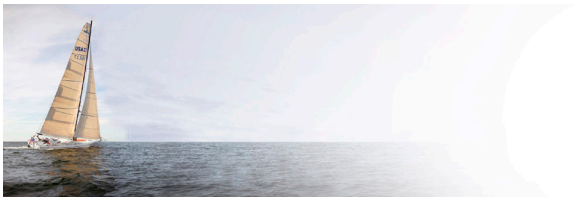
d. Make a list of tools that should be included in an onboard toolbox to keep the sailboat in good repair. Remember that there is a limit on space and weight on board.

2. Energy Advisors: It is your job to give Rich advice on his use of electricity.
a. Make a list of the equipment on the boat that requires electricity.
b. Make a general list of suggested ways that Rich can conserve electricity.
c. Make a list of ways the boat generates electricity (using the sun, wind, water, and boat's engine). Research and report on these four methods.
d. Keep a voyage energy log, using the table on the following page. Note any problems that cause the ship to use extra energy.



Week	Extra Energy Use Country/Region	How Serious is the Extra Use?	Your Advice About This Situation
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			

Added Challenge Set up an experiment in the classroom to determine how long different voltage batteries will power a light, and graph the results.

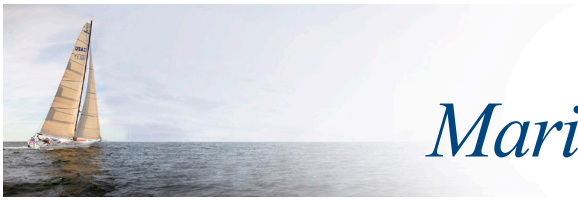


Weather Team Project Guide

Your challenge: You are the "official weather forecasting bureau. Complete this chart and determine how the weather has affected the ship's progress as the trip proceeds. You can base your predictons on climate information available in an atlas and on the Ocean Challenge Live! website. Each week, compare your predictions to actual weather conditions reported in the Ship's Log.

Week	Air & Sea Temperature	Wind Speed & Direction	Precipitation	Waves
1 Predict Actual				
2 Predict Actual				
3 Predict Actual				
4 Predict Actual				
5 Predict Actual				
6 Predict Actual				
7 Predict Actual				
8 Predict Actual				
9 Predict Actual				
10 Predict Actual				
11 Predict Actual				
12 Predict Actual				
13 Predict Actual				
14 Predict Actual				
15 Predict Actual				

Added Challenge Which week was the best for weather and why? Which was the worst? Research and report on: magnetic vs. true north; ocean currents; trade winds; barometric pressure; high and low pressure systems; icebergs; and hurricanes.



Marine Life Team Project Guide

Your challenge:
To research and report on the vast array of marine life found in the regions *Great American IV* will pass, and to record wildlife sightings during the voyage.
1. Research the variety of fish, marine mammals, birds, plankton, and other organisms that populate the ocean, and learn about food chains and migrations.
2. Find out about the industries based in the regions through which the *Great American IV* will travel and the impact these industries have on marine life. Be sure to include fishing, oil exploration, whaling, shipping, etc.
3. Record wildlife sightings reported by Rich Wilson and illustrate a food chain that links many of the animals spotted during the voyage.

Date	Wildlife Seen	What It Eats	What Eats It

Book & Movie Team Project Guide

Your challenge:
To write a story of the voyage. This story will then be used to create both a book and a movie or play. You may be assigned to write your story about one week, a few weeks, or the whole voyage.

Writing the Book
1. Start with this important step: outline the story of the *Great American IV*'s voyage.

2. Decide if you will use any special features, i.e., maps and charts.

3. Research how reporters tell stories. Read at least three newspaper articles about events. Discuss the following questions, then make a list of "Tips for Good Writers".

a. How does the writer keep the reader interested?

b. How does the writer work facts into the story?

c. How does the writer begin the story?

d. How does the writer end the story?

e. What else do you notice about the way the story is written?

2. Write a story of the voyage using your Tips for Good Writers as a guide. You can divide the writing into chapters, with each team member responsible for one chapter.

Book & Movie Team Project Guide

Your challenge:
Planning the Movie:
1. Music: What Music (if any) will you include in this scene?

2. Actors: Who should play the characters in this scene? (You can cast male or female actors for the roles.)

3. Dialogue: What should each character in this scene say?

Added Challenge: Make a video report of the voyage using the music and dramatic scenes you have planned.

Teamwork Team Project Guide

Your challenge:
To write a report on the teamwork involved in Ocean Challenge Live! You will need to gather clues from the biographies, essays, journals, and answered questions written by Rich Wilson on the sitesALIVE! website.

1. According to the biographies of RichWilson and the shore-based crew, what in their backgrounds has prepared them to work as a team?

2. Keep track of the teamwork challenges throughout the voyage by answering the following questions:

a. How does the crew decide how to share the work?

b. How do they make their decisions?

c. What do they do when one of them makes a mistake?

d. What else do you notice about their working as partners?

Added Challenge Based on what you learned from Skipper Wilson and his shore-based crew, make a guidebook on the subject of working as a team.

Nutrition & Health Team Project Guide
(Extra Week)

Your challenge:
Your challenge is to learn about and report on the food, water, medical, and sleep needs of Rich while he is aboard *Great American IV*.

1. Prepare for Your Job: Interview a coach, athlete, nurse, doctor, or nutritionist to find answers to the following questions:

a. How many daily calories does a person doing hard physical labor 12 hours per day need to consume?

b.What foods are high in energy?

c. How much water does an adult under a lot of physical strain need each day?

d. RichWilson has had severe asthma since childhood. What is asthma? What special medical needs or concerns does a person with asthma have?

e.What kinds of medical supplies should Rich take on his long, non-stop ocean voyage?

f. How many hours of sleep should Rich Wilson get during a 24-hour period? Since Rich will be alone on board, how long should he sleep in one stretch?

g.What other advice does the health expert have for Rich on such a trip?

2. Recommend Foods: Make a list of the kinds of foods that Rich should take along. Remember there is no refrigerator on the boat.

3. Food Consumption: Design a balanced and practical menu that will provide the necessary calories and nutrients for Rich during a 24-hour period.

4. Water Consumption: Rich gets fresh drinking water from the ocean salt water by using a machine called a desalinator. Figure out how much drinking water he will have to make each day.

5. Pack the Medicine Chest: Make a list of the supplies that Rich should be sure to pack to provide for their health and medical needs.

Added Challenge Find out how Rich's nutritional and calorie needs will change as they travel through different climates. Make a calorie chart of foods that Rich should eat.


120°
90°
60°
30°
0°
30°
Greenland
(DENMARK)
Svalbard
(NORWAY)
BAFFIN BAY
NORWEGIAN SEA
ICELAND
Faroe Islands
(DENMARK)
SWEDEN
FINLAND
NORWAY
HUDSON BAY
LABRADOR SEA
CANADA
UNITED KINGDOM
IRELAND
NETHERLANDS
BELGIUM
GERMANY
DENMARK
POLAND
BELARUS
FRANCE
SPAIN
PORTUGAL
ITALY
GREECE
UNITED STATES
NORTH
OCEAN
MOROCCO
ALGERIA
LIBYA
EGYPT
TUNISIA
MEDITERRANEAN SEA
Bermuda (U.K.)
MEXICO
GULF OF MEXICO
THE BAHAMAS
CUBA
HAITI
DOMINICAN REPUBLIC
JAMAICA
BELIZE
GUATEMALA
HONDURAS
EL SALVADOR
NICARAGUA
COSTA RICA
PANAMA
CARIBBEAN SEA
VENEZUELA
COLOMBIA
GUYANA
SURINAME
ECUADOR
Galapagos Islands (ECUADOR)
PERU
BOLIVIA
PARAGUAY
CHILE
ARGENTINA
URUGUAY
SOUTH PACIFIC OCEAN
Pitcairn Islands (U.K.)
MAURITANIA
MALI
NIGER
CHAD
SUDAN
SENEGAL
BURKINA
BENIN
NIGERIA
TOGO
GHANA
CAMEROON
EQUATORIAL GUINEA
GABON
CONGO REP.
CENTRAL AFRICAN REP.
ANGOLA
ZAMBIA
NAMIBIA
BOTSWANA
SOUTH AFRICA
USA 37
Great American III

Atlantic Plotting Map


150°
120°
90°
60°
30°
ARCTIC OCEAN
Greenland
(DENMARK)
BAFFIN BAY
BEAUFORT SEA
RUSSIA
Alaska (U.S.)
BERING SEA
ICELAND
HUDSON BAY
LABRADOR SEA
60°
CANADA
NORTH PACIFIC OCEAN
NORTH ATLANTIC OCEAN
UNITED STATES
IRELAND
PORTUGAL
SPAIN
Azores
(POR.)
Madeira Islands
(POR.)
MOROCCO
30°
Bermuda (U.K.)
Canary Islands
(SP.)
Western
Sahara
MAURITANIA
CAPE VERDE
SENEGAL
GAMBIA
GUINEA-BISSAU
GUINEA
SIERRA LEONE
LIBERIA
MEXICO
GULF OF MEXICO
THE BAHAMAS
CUBA
DOMINICAN
REPUBLIC
HAITI
JAMAICA
Puerto Rico (U.S.)
ANTIGUA AND BARBUDA
Guadeloupe (FR.)
DOMINICA
Martinique (FR.)
ST. LUCIA
BARBADOS
ST. KITTS AND NEVIS
ST. VINCENT AND
THE GRENADINES
GRENADA
TRINIDAD AND TOBAGO
BELIZE
GUATEMALA
HONDURAS
EL SALVADOR
NICARAGUA
CARIBBEAN
SEA
COSTA RICA
PANAMA
VENEZUELA
GUYANA
SURINAME
French
Guiana (FR.)
COLOMBIA
ECUADOR
Hawaii
(U.S.)
Kiritimati
(KIRIBATI)
0°
Galapagos
Islands
(ECUADOR)
KIRIBATI
BRAZIL
PERU
SAMOA
American Samoa
(U.S.)
BOLIVIA
FIJI
French Polynesia (FR.)
PARAGUAY
TONGA
30°
Pitcairn Islands (U.K.)
SOUTH ATLANTIC OCEAN
CHILE
URUGUAY
ARGENTINA
SOUTH PACIFIC OCEAN
Chatham Islands
(N.Z.)
Falkland
Islands
(U.K.)
South Georgia and the
South Sandwich Islands
(U.K.)
60°
0
3000 Km
Miller Projection
0
3000 Mi
SOUTHERN OCEAN
WEDDELL SEA
©2001 Maps.com
150°
120°
90°
60°
30°


0°
30°
60°
90°
120°
150°
180°
ARCTIC OCEAN
Franz Josef Land (RUSSIA)
Svalbard (NORWAY)
Novaya Zemlya
BARENTS SEA
KARA SEA
LAPTEV SEA
EAST SIBERIAN SEA
RUSSIA
SWEDEN
FINLAND
NORWAY
ESTONIA
LATVIA
LITHUANIA
BALTIC SEA
DENMARK
POLAND
BELARUS
GERMANY
UKRAINE
MOLDOVA
SLOVAKIA
HUNGARY
ROMANIA
AUSTRIA
SWITZERLAND
BLACK SEA
KAZAKHSTAN
MONGOLIA
SEA OF OKHOTSK
NORTH PACIFIC OCEAN
GEORGIA
ARMENIA
AZERBAIJAN
TURKEY
UZBEKISTAN
KYRGYZSTAN
TAJIKISTAN
TURKMENISTAN
CHINA
NORTH KOREA
SOUTH KOREA
SEA OF JAPAN
JAPAN
SYRIA
IRAQ
IRAN
AFGHANISTAN
PAKISTAN
MEDITERRANEAN SEA
CYPRUS
LEBANON
ISRAEL
JORDAN
KUWAIT
QATAR
BAHRAIN
SAUDI ARABIA
UNITED ARAB EMIRATES
OMAN
NEPAL
BHUTAN
BANGLADESH
INDIA
EAST CHINA SEA
TAIWAN
MYANMAR
LAOS
THAILAND
VIETNAM
CAMBODIA
SOUTH CHINA SEA
BAY OF BENGAL
Andaman Islands (INDIA)
PHILIPPINES
Guam (U.S.)
Northern Mariana Islands (U.S.)
MARSHALL ISLANDS
PALAU
FEDERATED STATES OF MICRONESIA
BRUNEI
MALAYSIA
SINGAPORE
SRI LANKA
MALDIVES
ARABIAN SEA
RED SEA
ERITREA
YEMEN
DJIBOUTI
ETHIOPIA
SOMALIA
LIBYA
EGYPT
ALGERIA
TUNISIA
MALTA
NIGER
CHAD
SUDAN
NIGERIA
BENIN
TOGO
CAMEROON
CENTRAL AFRICAN REP.
EQUATORIAL GUINEA
GABON
CONGO REP.
DEMOCRATIC REP. OF CONGO
UGANDA
KENYA
RWANDA
BURUNDI
TANZANIA
SEYCHELLES
COMOROS
MADAGASCAR
MAURITIUS
Réunion (FR.)
INDIAN OCEAN
ANGOLA
ZAMBIA
MALAWI
ZIMBABWE
NAMIBIA
BOTSWANA
MOZAMBIQUE
SWAZILAND
LESOTHO
SOUTH AFRICA
INDONESIA
PAPUA NEW GUINEA
NAURU
KIRIBATI
SOLOMON ISLANDS
TUVALU
VANUATU
FIJI
New Caledonia (FR.)
AUSTRALIA
SOUTH PACIFIC OCEAN
TASMAN SEA
NEW ZEALAND
Kerguelen Island
French Southern and Antarctic Lands (FR.)
SOUTHERN OCEAN
ANTARCTICA
60°
30°
0°

Ship Schematics
Great American IV

Nautical Glossary

aft (adj.) – towards the back or stern of a boat

aloft (adj.) – high above the deck of a ship in the rigging or on a mast

autopilot (n.) – an instrument designed to steer a boat and automatically maintain a predetermined course

barometer (n.) – an instrument for measuring atmospheric pressure and forecasting the weather

beam(n.) – the width of a ship at the widest part

bearing (n.) – a determination of position; one point's position with respect to another or to the compass

beat (v.) – to sail a boat to windward (into the wind) by tacking

berth (n.) – 1: a space for anchoring or tying up; 2: a job or position; 3: a built-in bed or bunk

bilge (n.) – the bottommost interior part of a ship; the inner, lower part of a ship's hull

block (n.) – a wooden, metal or plastic case containing pulleys, through which turns of line are threaded for the purpose of gaining mechanical advantage or changing the direction of motion

boom(n.) – a spar extending from a ship's mast to hold the bottom of a sail outstretched

bow (n.) – the front end of a boat

bulkhead (n.) – any of the upright partitions separating parts of a ship to protect against leakage

capsize (v.) – to overturn

car (n.) – a sliding fitting that attaches to a track, allowing for the adjustment of blocks or other devices attached to the car; also known as a slide

catamaran (n.) – a boat with two connected but distinct parallel hulls

chart (n.) – a map used in marine navigation

clew (n.) – the lower aft corner of a mainsail or jib, or either lower corner of a square sail

clipper (n.) – a sharp-bowed, narrow-beamed sailing ship built for great speed

cockpit (n.) – a sunken space in the deck of a boat, usually towards the stern and for use by the helmsman

"come about" (v.) – to change course so that the sail(s) shift from one side of the boat to the other; to tack

companionway (n.) – a hallway or ladder passage aboard a ship

compass (n.) – an instrument that shows direction, especially with the aid of a magnetic needle which swings freely and points to magnetic north

coordinate (n.) – any of a set of numbers in a reference system (e.g., on a map) that determine the location of a point (or ship)

course (n.) – the direction in which a ship is moving, based on the 360-degree compass; bearing

current (n.) – the horizontal motion of water, caused by tides, local winds and trade winds

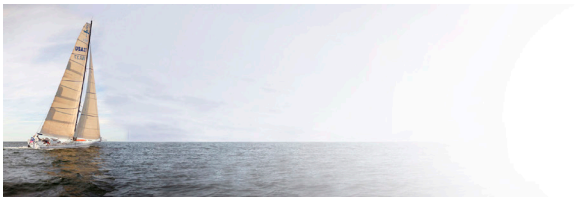
daggerboard (n.) – a dagger-shaped board that projects down into the water below a sailboat's hull; its purpose is to help keep the boat on course

deck (n.) – a part of a ship that serves both as a floor and as a full or partial covering for lower ship levels

desalinator (n.) – a machine that removes salt from sea water to make fresh water

doldrums (n.) – a part of the ocean near the equator abounding in calms, squalls, and light shifting winds

ensign (n.) – a flag or banner displayed on a ship



Nautical Glossary *(Continued)*

equator (n.) – an imaginary circle around the earth, equidistant from the North and South Poles, which divides the earth into the Northern and Southern Hemispheres

fathom(n.) – a nautical measure of depth or distance equal to 6 feet

fore (adj.) – towards the front or bow of a boat

furl (v.) – to fold or roll up tightly and secure a sail

gale (n.) – a nautical term defining weather conditions in which wind speed ranges between 34 to 40 knots

galley (n.) – the kitchen of a ship

halyard (n.) – a rope used for raising and lowering a flag or sail

hatch (n.) – a covered opening in a ship's deck through which entrance can be made to a lower deck

head (n.) – the bathroom (or sink, shower and toilet) aboard a boat

heading (n.) – the direction in which a moving ship is pointed, usually expressed in compass degrees

headsail (n.) – any sail set forward of the foremast

headwind (n.) – a wind blowing towards the bow of the boat

"heave to" (v.) – to stop the forward movement of a ship by bringing the vessel's bow into the wind

heel (v.) – to lean or tilt to one side, as a ship or boat in a high wind

helm(n.) – the steering apparatus of a ship, such as a wheel or tiller

hull (n.) – the body of a boat

immersion suit (n.) – a special bodysuit designed to protect a person from the cold and wet in emergencies "in irons" (adj.) – headed into the wind

INMARSAT (n.) – INternational MARitime SATellite; a satellite communication system used by ships at sea to communicate with other ships or with land-based locations

jib (n.) – a triangular sail secured to a stay forward of the mast

jibe (v.) – to pass the stern of a boat through the wind during a tack

keel (n.) – a ship's principal structural member, running lengthwise along the hull, to which the frames are attached

knot (n.) – rate of motion equal to 1 nautical mile or 6,076 feet per hour (about 1.15 miles per hour)

latitude (n.) – one of two coordinates (the other being longitude) used to locate a position at sea; marked in degrees north or south of the equator, from 0 degrees at the equator to 90 degrees north or south at the poles; one degree of latitude = 60 nautical miles; latitude is comparable to the x-axis on a graph

leech (n.) – the aft or trailing edge of a sail; the aft edge of a fore-and-aft sail

leeward (adj.) – in the direction towards which the wind is blowing

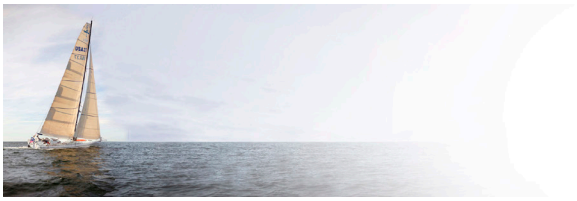
line (n.) – a rope used on a ship

log (n.) – a daily record of a ship's speed, progress, etc. and the events in its voyage; logbook

longitude (n.) – one of two coordinates (the other being latitude) used to locate a position at sea; marked in degrees east or west of the Prime Meridian (0 degrees longitude) located in Greenwich, England; longitude may range up to 180 degrees east or west; 180 degrees east and west, in fact, meet on the other side of the globe from Greenwich, at the International Date Line; longitude is comparable to the y-axis on a graph

mainsail (n.) – the largest sail on the ship

"make fast" (v.) – to firmly fasten or secure



Nautical Glossary (Continued)

mast (n.) – a tall vertical spar that rises from the keel or deck of a vessel to support the sails and rigging

monohull (n.) – a boat with one hull

nautical mile (n.) – a nautical unit of measurement equaling 1.15 statute (land) miles

port (n.) – the left side of a boat when facing forward

radar (n.) – a system or device which uses transmitted and reflected radio waves to detect objects, along with their direction, distance, height, and speed in relation to the device

reach (v.) – to sail with the point-of-sail between close-hauled and a run, with the wind coming from across the side of the boat

reef (n.) – the part of a sail which is rolled up to reduce the area exposed to the wind during a storm

reef (v.) – to shorten or reduce the size of a sail, usually done because of heavy winds

rigging (n.) – the ropes and chains used to support, position and control a vessel's masts, sails, yards, etc.

rudder (n.) – a broad, flat, movable piece of wood or metal, hinged vertically to the ship's stern; used for steering

run (v.) – to sail with the wind astern

set (v.) – to raise (e.g., a sail) into position

shackle (n.) – a U-shaped fitting closed with a pin across the open ends and used to secure sails to lines or fittings, lines to fittings, fittings to fittings, anchors to chain, etc.

sheet (n.) – a rope used to control a sail's angle to the wind w

shroud (n.) – part of the standing rigging that helps to support the mast by running from the top of the mast to the side of the boat; sailboats usually have one or more shrouds on each side of the mast

spar (n.) – a stout rounded wood or metal piece (mast, boom, gaff, or yard) used to support rigging

spinnaker (n.) – a large, triangular headsail (at the front of a boat), used when reaching or running

spreader (n.) – a strut leading off a vessel's mast to hold the rigging wires out and keep the mast straight

squall (n.) – a brief, violent storm

starboard (n.) – the right side of a ship when facing forward

stay (n.) – a heavy rope or cable, usually made of wire, used as a brace or support for a ship's mast

staysail (n.) – a triangular fore-and-aft rigged sail fastened on a stay

stern (n.) – the back end of a boat

strike (v.) – to lower or take down (e.g., a sail)

tack (v.) – to bring the wind to the other side of a ship by bringing the bow through the wind

trade wind (n.) – a wind that blows steadily towards the equator from the northeast in the tropics north of the equator and from the southeast in the tropics south of the equator

trim(v.) – to adjust (e.g., sails)

trimaran (n.) – a boat with three connected but distinct parallel hulls

watch (n.) – any of the periods of duty into which the day is divided on a ship, so that the work is shared among alternating shifts of the crew

windward (adj.) – in the direction from which the wind is coming

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