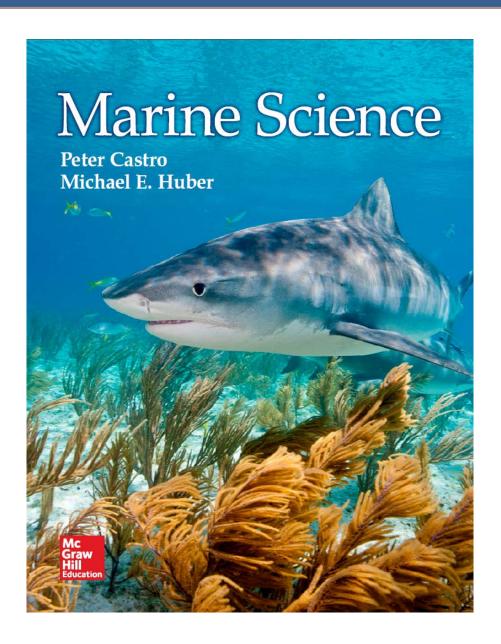
Ocean Literacy Standards CORRELATION GUIDE

Marine Science



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Ocean Literacy Standards Correlation *Marine Science*, (1e) by Peter Castro & Michael E. Huber

tanda	ırd	Pages
	e Earth has one big ocean with many features.	
	·	
a.	The ocean is the dominant physical feature on our planet Earth—covering approximately 70% of the planet's surface. There is one ocean with many ocean basins, such as the North Pacific, South Pacific, North Atlantic, South Atlantic, Indian and Arctic.	30, 47, 48
b.	An ocean basin's size, shape and features (such as islands, trenches, mid-ocean ridges, rift valleys) vary due to the movement of Earth's lithospheric plates. Earth's highest peaks, deepest valleys and flattest vast plains are all in the ocean.	33–44, 47–55 Dive In! 48, 578 Habitat Spotlight 53
c.	Throughout the ocean there is one interconnected circulation system powered by wind, tides, the force of the Earth's rotation (Coriolis effect), and water density differences. The shape of ocean basins and adjacent land masses influence the path of circulation.	93-99, 107-110, 111-112, 114-115, 116-120, 121-125, 422
d.	Sea level is the average height of the ocean relative to the land, taking into account the differences caused by tides. Sea level changes as plate tectonics cause the volume of ocean basins and the height of the land to change. It changes as ice caps on land melt or grow. It also changes as sea water expands and contracts when ocean water warms and cools.	45-46, 133-134, 397, 419
e.	Most of Earth's water (97%) is in the ocean and contains a constant proportion of dissolved salts (i.e. average salinity of 35). Seawater has unique properties: its freezing point is slightly lower than fresh water, its density is slightly higher, its electrical conductivity is much higher, and it is slightly basic. The salt in the water comes from eroding land, volcanic emissions, reactions at the seafloor, and atmospheric deposition.	58, 64-65, 67-72
f.	The ocean is an integral part of the water cycle and is connected to all of the earth's water reservoirs via evaporation and precipitation processes.	69, 106, 108, 125, 128–129
g.	The ocean is connected to major lakes, watersheds and waterways because all major watersheds on Earth drain to the ocean. Rivers and streams transport nutrients, salts, sediments and pollutants from watersheds to coastal estuaries (where rivers meet the sea) and to the ocean.	64, 69, 410, 419, 423, 451–452, 624–627, 631, 632, 636
h.	Although the ocean is large, it is finite and resources are limited.	331–335, 594–595, 597–598, 642 Humans and the Ocean 596

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2.	2. The ocean and life in the ocean shape the features of the Earth.			
	a.	Many of the sedimentary rocks now exposed on land	186, 189, 190, 191, 381	
	α.	were formed in the ocean. Ocean life laid down the	Habitat Spotlight 36	
		vast volume of siliceous and carbonate rocks.	Thistian Spottight 50	
	b.	Sea level changes over time have expanded and	45-46, 397, 419-420	
	υ.	contracted continental shelves, created and	10 10,001,110 120	
		destroyed inland seas, and shaped the surface of		
		land.		
	c.	Erosion—the wearing away of rock and soil—occurs	44,410-411,452	
		in coastal areas as wind, waves, and currents in rivers	, ,	
		and the ocean move sediments.		
	d.	Most beach sand is carried to the coast by rivers and	Can be incorporated into the	
		redistributed by waves and coastal currents. Erosion	following:	
		builds and destroys beaches. Winter storm waves	87-88, 410-411, 420, 452	
		carry sediments away from the beach and small	Habitat Spotlight 644	
		summer waves carry sediments back onto the		
		beaches.		
	e.	Tectonic activity, sea level changes, and waves	47-52, 134, 390-391, 397, 410-411,	
		influence the physical structure and landforms of the	419-420	
		coast.		
3.	The	e ocean is a major influence on weather and climate.		
		The easen controls weather and climate hy	72 72 104 106 107 110 120 121	
	a.	The ocean controls weather and climate by	72-73, 104, 106-107, 119-120, 121-	
		dominating the Earth's energy, water and carbon	123, 132	
	b.	systems. The ocean absorbs much of the solar radiation	106, 108, 121–123, 128–130, 135	
	υ.	reaching Earth. The ocean releases heat by	Nature of Science 27	
		evaporation and this heat loss drives atmospheric	1 variate of Science 21	
		circulation when heat released as water vapor		
		condenses as rain. Condensation of water evaporated		
		from warm seas provides the energy for hurricanes,		
		cyclones and typhoons.		
	c.	The El Niño Southern Oscillation causes the most	120, 123-127, 477, 489	
		important changes in global weather patterns	, , , ,	
		because it changes the way heat is released to the		
		atmosphere in the Pacific.		
	d.	Most rain that falls on land originally evaporated	Can be incorporated into the	
		from the tropical ocean.	following:	
			108, 110, 128, 135	
	e.	The ocean dominates the Earth's carbon cycle. Half	72-73, 74-75, 132, 146, 376-379, 381	
		the primary productivity on Earth takes place in the	Marine Science in Action 24	
		sunlit layers of the ocean and the ocean absorbs		
		roughly half of all carbon dioxide added to the		
		atmosphere.		
	f.	The ocean has had, and will continue to have, a	5, 45-46, 72-73, 74-75, 106-107,	
		significant influence on climate change by absorbing,	121-127, 131-136, 381, 622	
		storing, and moving heat, carbon and water.		
	g.	Changes in the ocean's circulation have produced	120, 123–127	
		large, abrupt changes in climate during the last		
l		50,000 years.		

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4.	. The ocean makes Earth habitable.		
	a.	Most of the oxygen in the atmosphere originally	145, 179, 197
		came from the activities of photosynthetic organisms	Dive In! 176
		in the ocean.	Habitat Spotlight 36
	b.	The ocean is the cradle of life—the first life is thought	Can be incorporated into the
		to have started in the ocean. The earliest evidence of	following:
		life is found in the ocean.	5, 179, 181
_	Tr1.	1:	Dive In! 176
5.	The ocean supports a great diversity of life and ecosystems.		
	a.	Most life in the ocean exists as microbes, although ocean life ranges in size from the smallest virus to the largest animal that has lived on Earth, the blue whale.	158, 173–174, 176, 178–179, 181, 184–193, 196–201, 203, 209–213, 216–223, 225–226, 227–235, 236–243, 245–252, 253–258, 259–263, 266–270, 272–274, 303–309, 310–315, 316–323, 325–327, 329–331 Dive In! 159 Habitat Spotlight 36 Nature of Science 360
	b.	Microbial organisms are the most important primary producers in the ocean. They not only are the most abundant life form in the ocean but also have growth rates that range from hours to days.	181–182, 185, 187, 189, 429, 442–443, 520–521, 542–547, 549 Habitat Spotlight 36
	c.	Most major groups of organisms (phyla) have many representatives living in the ocean.	158, 173–174, 176–179, 181, 184– 193, 198–201, 203, 209–213, 216– 223, 225–226, 227–235, 236–243, 245–252, 253–258, 259–263, 266– 270, 272–274, 303–309, 310–315, 316–323, 325–327, 329–331, 352
	d.	Ocean biology provides many unique examples of important relationships among organisms (such as symbiosis, predator—prey dynamics and energy transfer).	187, 191–192, 197, 228, 230, 234, 361–365, 367, 372–379, 461–462, 481–487, 502–505, 513–514, 539– 542, 572, 578 Dive In! 494 Marine Science in Action 328, 366 Nature of Science 180
	e.	There are examples of life cycles in the ocean that are not often seen on land.	157, 185, 186, 204–205, 207, 210, 219, 221, 222, 223, 232, 233, 243, 250–252, 258, 283–284, 291–292, 294–299, 307, 308, 314–315, 348–351, 472–473, 568–570, 574 Dive In! 155, 228, 552
	f.	The ocean is three—dimensional, offering a lot of living space from the surface through the water column to the seafloor. As a result, most of the living space on Earth is in the ocean.	116–120, 368–369, 371, 517–518, 552–553, 565–566

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	g.	Everyone is responsible for caring for the ocean. The ocean sustains life on Earth and humans must live in ways that sustain the ocean. Individual and collective actions are needed to effectively manage ocean resources for all.	136, 271, 308, 332, 333–334, 447, 599–603, 642–645 Dive In! 586, 639 Habitat Spotlight 445, 469 Humans and the Ocean 609, 646 Nature of Science 360
7.	The	e ocean is largely unexplored.	
	a.	The ocean is the last and largest unexplored place on Earth—less than 5% of it has been explored. This is the great frontier for the next generation's explorers and researchers, where they will find great opportunities for inquiry and investigation.	15–17, 574, 576 Marine Science in Action 370 Nature of Science 175
	b.	Understanding the ocean is more than a matter of curiosity. Exploration, inquiry and study are required to better understand ocean systems and processes. Our very survival may hinge upon it.	5-6, 75, 77, 123-127, 645 Habitat Spotlight 634
	c.	Over the last 40 years, use of ocean resources has increased significantly, therefore the future sustainability of ocean resources depends on our understanding of those resources and their potential.	270, 271, 586–589, 592–593, 599– 603, 612–614, 638, 639, 641, 645
	d.	New technologies, sensors and tools are expanding our ability to explore the ocean. Oceanographers are relying more and more on satellites, drifters, buoys, subsea observatories and unmanned submersibles.	15–17, 71, 378–379, 518–519, 552, 571 Dive In! 539 Habitat Spotlight 36 Humans and the Ocean 577 Marine Science in Action 370 Nature of Science 12–13, 66
	e.	Use of computer models is now an essential part of oceanography. They help us understand the complexity of the ocean and its interaction with Earth's climate. These models process observations and help describe the interactions among systems.	89, 124–125 Nature of Science 27
	f.	Ocean exploration is truly interdisciplinary. It requires close collaboration among biologists, chemists, climatologists, computer programmers, engineers, geologists, meteorologists, and physicists, and new ways of thinking.	6 Dive In! 359, 518 Habitat Spotlight 634 Marine Science in Action 118, 370, 408, 548 Nature of Science 27, 160