The Harbor Takes a Breath

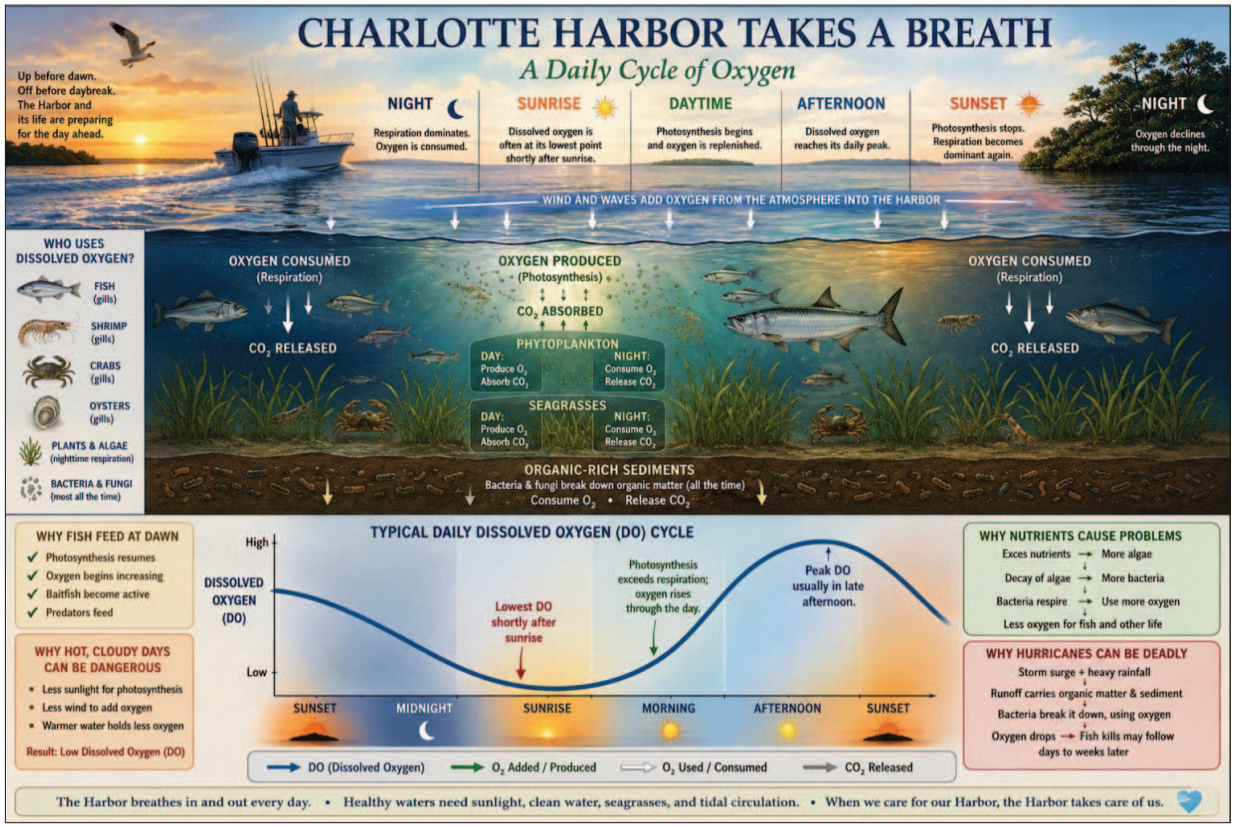

ILLUSTRATION BY RICHARD WHITMAN WITH AI-ASSISTED GRAPHICS.

Charlotte Harbor Takes a Breath.

RICHARD WHITMAN

Thursday morning. Up before dawn. Off before daybreak. Songbirds herald the coming day. To the east, the sky unfolds in a succession of Monet-like colors. Ahead, the bow parts the water, leaving twin V-shaped ripples as you follow familiar channels toward open water. Soon the rising sun will warm the morning air, driving the sea breeze inland. Your focus stays on the compass leading to the spot you chose last night.

Below the surface, the Harbor's sea life is waiting for the morning sun as well. The new day will permit the Harbor's next breath.

Like its inhabitants, Charlotte Harbor has its own daily rhythm of breathing. During respiration, oxygen powers life's processes while carbon dioxide is released as a waste product. Fish, crabs, shrimp, plants, fungi, and many bacteria all respire, although some specialized bacteria thrive without oxygen.

Aside from reptiles, mammals, and a few air-breathing fishes such as tarpon, most estuarine animals do not breathe air. Instead, they obtain dissolved oxygen from the water, principally through their gills. While oxygen makes up about 21 percent of the atmosphere, natural surface waters generally contain only about 5 to 10 parts per million of dissolved oxygen—thousands of times less oxygen than the air we breathe. That narrow range is critical. Too little dissolved oxygen stresses sport fish and other aquatic life, while extreme oxygen supersaturation can occasionally cause gas bubble disease. Unlike terrestrial animals, aquatic life survives on a relatively scarce supply of oxygen.

Fishermen often follow dissolved oxygen content without actually realizing it.

At sundown, Charlotte Harbor begins its night-long exhalation as respiration becomes the dominant process. Phytoplankton, seaweeds, and seagrasses, which produced oxygen, made food from carbon dioxide via photosynthesis during daylight, and stopped making oxygen after sunset. Instead, they respire, consuming oxygen just as bacteria, fish, crabs, shrimp, and other organisms do around the clock. Throughout the night, dissolved oxygen declines while carbon dioxide accumulates.

If conditions are favorable, sunrise brings the Harbor's next breath. As daylight returns, photosynthesis resumes, gradually replenishing dissolved oxygen. In fact, dissolved oxygen often reaches its daily low shortly after sunrise before photosynthesis overtakes respiration. For many fish, it is breakfast time, and for anglers, the first feeding period of the day often offers the best chance for a memorable catch.

This is one of the most dynamic — and important — ecological cycles in Charlotte Harbor, quietly determining where fish feed, where they rest, and ultimately where anglers find success.

Of course, photosynthesis and respiration are only part of the story. Dissolved oxygen rises and falls with sunlight, tides, temperature, salinity, wind, rainfall, and the abundance of aquatic plants, algae, and microorganisms. Wind-driven waves are especially important because they transfer atmospheric oxygen into the Harbor. If all goes well, dissolved oxygen reaches its daily peak in the late afternoon.

Weather and tides are among the next most important factors affecting dissolved oxygen. Warm water cannot hold as much oxygen as cool water. When summer heat is coupled with calm, cloudy conditions, trouble can develop. The atmospheric oxygen pump slows, sunlight needed for photosynthesis is reduced, and warm water holds even less oxygen. Higher salinity and lower barometric pressure further reduce dissolved oxygen. Aquatic animals become stressed, and fish kills may occur, particularly in nutrient-rich waters like Charlotte Harbor.

Nutrients create problems in several ways. They fuel excessive algal growth that shades the water and reduces oxygen production by seagrasses. When those algae die, bacteria decompose them, consuming even more oxygen. Organic-rich bottom sediments also act as oxygen sinks, continually drawing dissolved oxygen from the water. Under the right conditions, harmful algal blooms such as red tide may also develop.

After major storms, especially hurricanes, conditions can deteriorate rapidly. Storm surge first pushes Gulf saltwater into the Harbor, only to be followed by enormous volumes of freshwater runoff loaded with organic debris, dark tea-colored dissolved organic matter, and sediment. As bacteria break down this material, they can strip nearly all the oxygen from the water, leading to massive fish kills days or even weeks after the storm.

Such was the case following Tropical Storm Debby and Hurricanes Ian, Helene and Milton. Ultimately, the severity of these events is often amplified by urbanization, wetland loss, inadequate stormwater infrastructure, poor farming and yard practices, canalization, and the loss of natural shoreline buffers.

By the time many of us have finished our morning coffee, while the dew still lingers and the cool sea breeze reminds us why we live in Southwest Florida, the Harbor will be taking in its day-long breath. As you subconsciously take your next breath, remember that the Harbor and its inhabitants need to breathe too.

Listen carefully. The Harbor speaks to us continuously — not in words, but through its actions; not in language, but through its gifts; not in anger, but in its distress. It tells us when it is healthy and when it is not. Its message is simple: Take care of me, and I'll take care of you.

Each of us has a part to play in keeping Charlotte Harbor healthy.