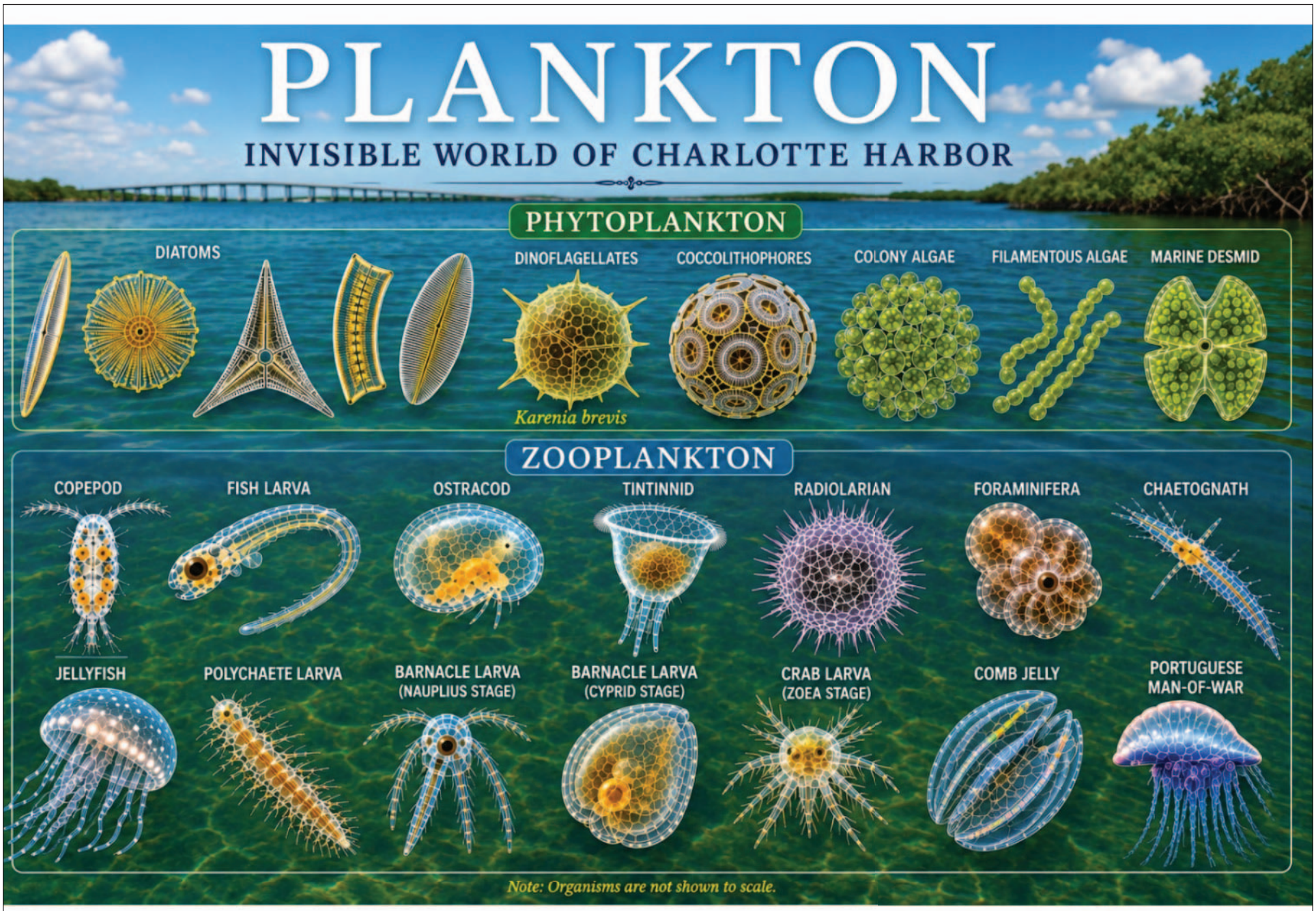

DIGITAL ILLUSTRATION BY RICHARD WHITMAN USING OPENAI GRAPHICS GENERATION.

The plankton consist of the tiny plant-like phytoplankton which make food from sunlight and carbon dioxide and microscopic zooplankton that eat phytoplankton. Not to scale.

The Invisible World of Plankton

RICHARD WHITMAN, PH.D.
Columnist

It has become a routine. Whenever I visit Charlotte Harbor, whether from a bridge, shoreline, dock, or waterfront walkway — I begin by reading the water. I note the tide stage, water color, waves, surface patterns, and boat traffic.

If time allows, I linger, watching for signs of life: schools of baitfish breaking the surface, mullet leaping, dolphins rolling, manatees surfacing, or ospreys and pelicans diving for a meal. If the water is especially clear, I'll peer into the shallows, searching the bottom for crabs, seagrasses, and fish. I always look for fish.

But as they say, there's more than meets the eye.

We naturally focus on the surface because that's all we can see. Yet the greatest abundance of life often lies beyond our vision.

To appreciate it, let's shrink our perspective to a single drop of harbor water. To the naked eye it appears almost empty, perhaps a few grains of sand or bits of suspended debris. Now imagine viewing that same drop under a microscope at 100 or even 1,000 times magnification. Suddenly an astonishing world comes alive.

Delicate glass-like diatoms drift beside armored dinoflagellates, tiny crustaceans paddle through the water, translucent fish larvae search for food, and microscopic predators stalk their prey. This is the world of plankton—the invisible community upon which the entire aquatic ecosystem depends.

The word plankton comes from the Greek planktos, meaning "drifter." Plankton spend their lives suspended in the water column, carried largely by currents controlling where they go. They include microscopic plants and algae called phytoplankton, and mostly microscopic animals known as zooplankton.

Unlike fish that swim wherever they choose or bottom animals that crawl, burrow, or attach themselves to rocks and shells, plankton live in a constantly moving world.

But don't let the word drifter fool you. Many zooplankton are surprisingly active. Every evening countless tiny animals rise hundreds of body lengths toward the surface under the cover of darkness to feed, then descend before sunrise to avoid predators. Some hunt prey, while others rely on camouflage, transparency, spines, or rapid escape to survive. Phytoplankton face a different challenge. Because they depend on sunlight, they have evolved remarkable adaptations that slow their sinking and keep them suspended within the sunlit waters where photosynthesis can occur.

Like every ecosystem, the plankton community has producers and consumers.

PHYTOPLANKTON: THE PRODUCERS

Charlotte Harbor has no towering redwoods, no sweeping grasslands, and no endless fields of grain. Our sea gardens are largely invisible yet, one gallon of water can contain billions of organisms and hundreds of different species!

The harbor's productivity begins with phytoplankton — microscopic algae that capture sunlight and convert carbon dioxide and nutrients into living tissue. Together with mangroves and seagrasses, they form the foundation of the estuary's food web.

Their importance varies throughout the harbor. In the upper estuary, where the Peace and Myakka Rivers deliver dark, tannin-stained water, sunlight often fails to reach the bottom, making it difficult for seagrasses to grow. There, phytoplankton become especially important as the primary producers. In the clearer lower harbor, sunlight penetrates much deeper, supporting extensive seagrass meadows alongside phytoplankton. Far offshore, where rooted plants disappear altogether, microscopic phytoplankton are responsible for nearly all food production.

Charlotte Harbor is one of Florida's most productive estuaries, but productivity alone is not always a sign of health. Like a garden, success depends on what is growing.

A diverse community of phytoplankton supports fish, shellfish, oysters, and countless other organisms. When one undesirable species dominates, however, the results can be harmful. Blooms of the red tide organism Karenia brevis or certain cyanobacteria (blue-green bacteria) can produce toxins that damage marine life, threaten human health, and diminish our enjoyment of the harbor.

CLIMATE ENGINEERS

Phytoplankton are far more than animal food. Despite their microscopic size, they produce more than half of the oxygen entering Earth's atmosphere each year. They also remove enormous amounts of carbon dioxide from the atmosphere, helping moderate Earth's climate. When they die, many sink to the bottom, carrying carbon into marine sediments where it can remain stored for centuries.

Every breath we take and every fish we catch owes something to these invisible plants drifting Earth's waters.

ZOOPLANKTON: THE CONSUMERS

As phytoplankton transform sunlight into food, they become food themselves. The most abundant grazers are tiny crustaceans called copepods. If phytoplankton are the grass of the sea, copepods are its rabbits.

Although only a few millimeters long, copepods are among the most abundant animals on Earth. Most feed on microscopic algae, while others prey on even smaller plankton. Nearly every juvenile fish in Charlotte Harbor—from tarpon and snook to mullet and redfish—depends on copepods during its earliest days of life.

Many familiar harbor animals begin life as plankton. Oysters, clams, barnacles, shrimp, blue crabs, sea stars, worms, octopus, and most marine fish spend their earliest days drifting with the currents before settling to the bottom or swimming on their own.

Even giants such as tarpon and goliath grouper once floated through Charlotte Harbor as tiny transparent larvae.

Not all zooplankton are microscopic. Comb jellies, moon jellies, and the Portuguese man-of-war also spend their lives drifting with winds and currents. Some are harmless, while others deliver painful stings. Size doesn't determine whether an organism is plankton—its inability to overcome the currents does.

Zooplankton fill every role imaginable. Some filter microscopic algae from the water. Others scrape

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surfaces, scavenge organic debris, or actively hunt prey. Tiny arrow worms, for example, are fierce predators despite being only a few millimeters long.

Together, these countless drifting animals transfer energy from microscopic plants to the fish, birds, dolphins, and ultimately the people who enjoy Charlotte Harbor.

The next time you stop to admire Charlotte Harbor, remember that beneath the surface lies an invisible world of extraordinary beauty and importance. Every drop of water contains thousands of living organisms, each playing a role in keeping this estuary healthy and productive.

When that delicate balance is disturbed by excess nutrients, poor water management, or other human activities, harmful species can replace beneficial ones, affecting fishing, wildlife, recreation, and our quality of life. We have a shared interest in Charlotte Harbor. Its future depends on us just as surely as we depend on it.

I think the next time I visit the harbor; I'll thank it for all that it quietly does. That, too, may become part of my routine.

Dr. Richard Whitman has spent over 50 years studying natural and disturbed aquatic ecosystems from the Gulf Coast states to the Great Lakes. His studies are widely cited in the scientific literature. Currently his research is focused on beach and canal recreational water quality of upper Charlotte Harbor.

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