

What's in a Reef?
A reflection on what we don't see
By Katherine L. Barrett

When the word “reef” happens to cross your mind, you probably envision scenes from *Finding Nemo* or *Finding Dory*; vast, immense corals and anemones, starfish, clams, mussels, and the list goes on and on. For me, a reef is a large, complex home to a variety of fish and smaller critters, including macroinvertebrates (organisms such as worms, mollusks, and insects, that lack a backbone). Most reefs, such as coral reefs, are naturally formed from the calcium carbonate skeletons of sponges. If you imagine the landscape of coral reefs, you probably see colorful clown fish and sea urchins on the Great Barrier Reef that flanks Australia's northeastern coast.

Reefs seem pretty distant to those of us in the Great Lakes region or anywhere inland, eh? If you have any attraction to reefs or are curious about what unseen worlds hide beneath the water's surface, I am going to tell the story of a small man-made reef in southwestern Lake Ontario.

For those of you who hail from upstate New York, you know Buffalo, Rochester, Lockport, Brockport, the cities and villages that are within a 15 minute drive to Lake Ontario. Tucked in between Buffalo and Rochester on Route 18 is the quaint, tiny town of Olcott, which is a fun place to go for fishing on Eighteen Mile Creek. Olcott is also home to the Hedley Boat Company, owned and operated by Mr. Rod Hedley. The story of the Olcott Reef starts here, in the yellowed papers and cluttered file cabinets and pictures of ships that surround Rod Hedley's office.

Hedley is not your typical fisherman. He is not in it just for the recreation. He is in it to make sure the local sport fish, such as lake trout (*Salvelinus namaycush*), are abundant for future generations of fishermen, outdoor enthusiasts, and researchers. Back in 1980, Hedley had an idea for the small fishing community: Build an artificial reef, or attractor reef, as he calls it, for the local fishery. And so the Olcott Reef Project began.

Hedley had a vision, but as he told me when I met with him back in June 2014, “Nothing is ever easy.” The vision began in 1980, when Hedley proposed the idea for a reef at a Niagara County Fisheries Board Meeting, but the idea was tossed around for months before any definitive steps were taken. Hedley sought out Lakeshore Contractors out of Michigan, who had been doing some mole drillings in the lake near the Somerset power plant. The drillings consisted of rocks up to 3 feet thick, which to Rod Hedley was perfect reef material. The drillings worked out: between 400 and 500 cubic yards of rock material was transported to the reef site in the spring of 1981 and 1982. Today the Olcott Reef consists of 359 tons of limestone, with cinder blocks in the middle of the reef.

Beginning in 1983, graduate students went SCUBA diving on the reef to investigate the fish and macroinvertebrate communities. Subsequent studies in 1991-1992 (early post-zebra mussel invasion), 1995, 1999-2000 (late post-zebra mussel and quagga mussel invasion, early post- Euryhaline Amphipod invasion), and 2014 (post-zebra and quagga mussel, Euryhaline Amphipod, and round goby invasion) found that the fish and macroinvertebrate community changed from the time the cinder blocks and limestone first hit the lake floor to 2014.

I won't delve into the gritty details of these studies (although the 2014 study holds a special place in my heart because I collected the 2014 samples with my adviser, Dr. James M. Haynes), for you might ask, what's in a reef? A reef is so much more than the fish that live and forage there; it is a continual play, with different acts that star different characters. When I collected my thesis samples from the reef and surrounding natural cobble habitat in 2014, I saw what appeared to be thousands of invasive round gobies.

The reef, when I landed on it with all of my SCUBA gear, was akin to a carpet of dense algae. I remember swimming on this reef, watching the algae move with the current and gobies darting between the rocks and cinder blocks. I collected benthic samples with a dome suction sampler (imagine an underwater shock vac) and discovered a whole new world of macroinvertebrates that calls the reef home. There is a world down below, in a place you probably didn't even know was there. There are crayfish, aquatic insects such as caddisfly and chironomid larvae, flatworms, side-swimmer shrimp, and worms. But why do these organisms matter?

They matter because they exist. From their existence and the role they play in the reef, they form the cornerstone of the nearshore benthic food web. They filter nutrients and recycle organic waste that larger fish do not eat. And, they have fascinating life histories, especially insects, which spend most of their lives underwater and then come to the water's surface to become winged adults; but as adults they only live for as little as 24 hours to as long as several months. And as adults, the mayflies and caddisflies and chironomids mate and leave eggs which sink and hatch to become nymphs and larvae, and the cycle starts again. In another sense, the adults that emerge from the reef carry with them benthic nutrients, and those nutrients go into the birds and fish that eat them. Cormorants, lake trout, sea gulls- they all take a piece of the underwater world with them. And then some of us enjoy fishing for lake trout, watching the seagulls and cormorants sweep across the lake. As I write this I am gently reminded by Mr. Rod Hedley's wise words: "Just because you can't see something from the surface doesn't mean it isn't there or that it isn't important."

I truly think that the Olcott Reef is a story about how we all should take a moment, no matter how brief, to simply think about the things we don't always see. The Olcott Reef is a lasting legacy of a man's dream to make the Olcott sport fishery long-lasting. It is also a legacy of long-term research, as evidenced by the many technical reports and peer-reviewed journal articles that have been published within the last 30 years. It is a saga of invasive species, from zebra mussels to round gobies, which have dramatically changed the community. I have touched, seen, and investigated the reef. I remember when I first touched the cobbles and knelt upon the top of the reef; I felt as though I was a visitor to a world that you have to beckon in order to discover it or learn from it. I have seen up close the crayfish, the caddisfly larvae, the chironomid larvae, the quagga mussels, and round gobies. I have counted the teeth and antennal segments of chironomid larvae; in a sense I have gotten to know them on a very intimate level, as much as you can for tiny insects.

So, next time you find yourself traveling along Lake Ontario, or any lake or river or stream, remember the little things that live beneath the surface. And if you find yourself in Olcott, look for the Hedley Boat and Marina Co; there is a friendly gentleman whose face lights up whenever his baby, the Olcott Reef, is mentioned. I write this story because the Olcott Reef has touched my life; it has been 2 years since I have sampled the reef, but the experience of seeing an underwater community of fish and invertebrates will stay with me forever.