

Seawall Units Herzliya Marina

Location	Product used	Duration
Herzliya Marina Israel	Seawall Units	November 2014- On going

In Short

Ports and marinas are an essential part of our coastlines, yet too often these replace rich natural habitats with non-productive concrete based infrastructure. Concrete seawalls are communally used in coastal construction and provide low quality habitat and often promote the dominance of nuisance and invasive species. For the purpose of elevating ecosystem function at Herzliya Marina, ECOConcrete® has designed a high texture seawall unit with a bio-enhanced concrete mix that provides suitable environmental conditions for the development

of a diverse assemblage of marine flora and fauna while complying with all the standard seawall requirements for structural performance. Monitoring was performed up to 22 months post-deployment, at which point the ECOConcrete® seawall units were covered with a variety of invertebrates, including sponges, oysters, bivalves, bryozoans, and coralline algae, while the control concrete seawall presented the low-diversity assemblage, commonly associated with ports and marinas.



Project Description

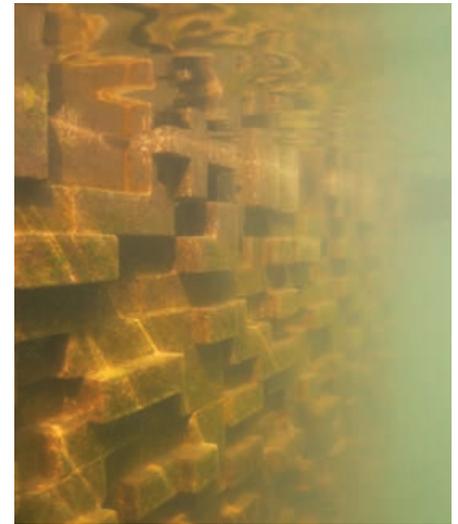
Coastal and marine infrastructure (CMI), often imposes much stress on fauna and flora of natural habitats. Concrete based CMI, provide poor substrates in terms of biological recruitment due to the combined effects of the concrete's chemistry, featureless surface texture and high inclination compared to natural habitats. Considering the recent growth of world populations and rural development around coastlines, the effect of CMI on the natural environment is catastrophic.

Herzliya Marina, opened to the public in 1995, is the largest and one of the most innovative Marinas in the eastern Mediterranean Sea. The marina provides substantial public boating options for tens of thousands of visitors annually from all over the world. As one of the first marinas in Israel to receive the world renowned eco-label "Blue Flag", Herzliya Marina put a considerable

emphasis on sustainability and elevating ecosystem functionality. For this reason, ECONcrete[®] has developed a high texture seawall unit composed of bio-enhanced concrete that provides suitable biological and environmental conditions for the development of a rich and diverse assemblage of marine flora and fauna.

ECONcrete[®]'s Approach

ECONcrete[®] supplies a range of modular, esthetic seawall elements, which functionally integrate into coastal infrastructure. The units can be used to retrofit an existing wall or to provide a fully structural and load bearing wall for new construction. ECONcrete seawalls increase the ability of species to utilize the structure, and can be tailored for specific species of conservational value, without effecting their structural and functional properties. ECONcrete[®]'s Seawall defers from standard concrete walls on three



levels; concrete chemistry, surface complexity and macro-design. These three elements combined, mimic natural marine environments and decrease the negative effects of concrete based coastal development. The mix is specially designed for the requirements of marine flora and fauna and the surface complexity mimics the one found in natural habitats. In addition, higher level surface elements offer refuge to larger marine life similar to natural habitats.

Project conclusion

A direct comparison was made between the ECONcrete[®] Seawall units and the standard Portland cement comprising the existing seawall infrastructure. Immediately after installation, a baseline survey of the existing conditions on the marina seawall was conducted using a 30x30 cm stainless steel frame (quadrat) to identify the species present. After which, the quadrat area was scraped clean to serve as control for the ECONcrete seawall unit. 22 months post-deployment, the ECONcrete[®]



18 month post deployment

seawall units were covered with a variety of invertebrates: sponges, oysters, bivalves, bryozoans, sessile tube worms, as well as colonial tunicates and coralline algae. In contrast, the control original marina seawall presented a low-diversity assemblage, which was even lower than the baseline, meaning that in less than two years, the ECOConcrete® seawall panels were able to recruit a more diverse and abundant assemblage in comparison to the control and the baseline. The majority of the dominant organisms on the ECOConcrete® units were structurally beneficial species that cement their calcitic skeletons onto the structure;

thus, contributing to the structural stability and operational life span of the seawall units through the process of biogenic build-up providing bioprotection. In addition, a major part of these species are filter feeders which potentially contribute to the local water quality.

By integrating environmentally sensitive technologies into the design and construction of CMI, ECOConcrete® is able to harness natural processes for ecological enhancement and reduce a structure's ecological footprint. The improved design of the Seawall Units has several implications on the marine environment; such as lowering the

ratio between invasive and native species, water purification by filter feeding organisms (e.g. oysters) and more. Apart from its clear ecological significance, biological enhancement also provides structural and socio-economic benefits. Biogenic growth of organisms like oysters, corals or barnacles provides bioprotection; acting to strengthen the structure and add to its stability and longevity. This form of bioprotection can reduce the magnitude and frequency of structural maintenance, which translates into improved ecological stability (reduced anthropogenic intervention), as well as a higher ROI (reduced maintenance costs).



ECONcrete[®] Company Profile

ECONcrete[®] offers a suite of environmentally sensitive concrete solutions designed to encourage biological productivity on urban and coastal marine infrastructure, such as coastal and riverine erosion control structures, urban waterfront developments, marina's and ports. ECONcrete[®] provides; bio-enhanced concrete admixtures suited for different aquatic environments; custom forms & form liners for creating complex textures and science based design features; as well as a unique line of precast ECONcrete[®] elements. All of ECONcrete[®] products serve to elevate the functionality of local ecosystems, while providing the structural performance required of urban, coastal, and marine infrastructure.

To date, ECONcrete[®]'s innovative technologies have been implemented towards the design and fabrication

of precast seawalls, armoring units, tide pools, marine mattresses, terrestrial bio-active wall tiles, and on-site casting. ECONcrete[®]'s extensive and continuous R&D efforts, coupled with expert environmental and technical consulting allows for the creation of unique solutions for the development of all types of urban, coastal and marine infrastructure projects.

ECONcrete[®] personnel have the capability and expertise to tailor products and designs based not only on the project's specific needs, but also for optimal ecological performance in different marine environments. As such, ECONcrete[®] provides complete project services, from initial planning and site assessment, through detailed design and product fabrication and supply, as well as installation procedures and post installation monitoring.

ECONcrete[®] Services

PR services

- Assistance with and development of project ecological collaterals
- Community outreach and education
- Publications (scientific/popular)

Project Specific Product Development

- Product Customization following structural and biological requirements
- Schematic design and full product specifications

Consulting and Design

- Preliminary environmental assessment
- Conceptual design for ecological enhancement
- Support in working with regulators and permit facilitation

Supply of Materials and Products

- Precast units
- Form and form liners
- Admixtures

Installation supervision

- Guidance and installation coordination with contractors
- Quality assurance of fabricated units, and site placing

Post Installation Monitoring

- Biological monitoring of flora and fauna
- Scientific project reports