

Restoring Seaweed Beds by Changing Sea Urchin Foraging Behavior

**Dominic F.C. Belleza^{a*}, Takeshi Urae^a, Shinichiro Tanimae^a, Hiroto Tateishi^a,
Makoto Kabeyama^a, Shigetaka Matsumuro^a, and Gregory N. Nishihara^b**

^aGraduate School of Fisheries and Environmental Sciences, Nagasaki University, 1-14 Bunkyo-machi, Nagasaki City,
Nagasaki, Japan

^bInstitute for East China Sea Research, Organization for Marine Science and Technology, Nagasaki University, 1551-7,
Taira-machi, Nagasaki City, Nagasaki, Japan

ABSTRACT

Alarm cues from dead conspecific urchins are known to evoke a fear response in the purple urchin, *Heliocidaris crassispina*. The disruption of their normal foraging patterns through behavioral change is an important step in the conservation of seaweed beds throughout Japan. Although guidelines have been put in place to counteract the declining seaweed ecosystems because of overgrazing, the management practices often involve installing net barriers and periodic urchin culling which are not only expensive and labor-intensive to implement but also unsustainable in the long-term as urchin populations rapidly recover due to the overfishing of natural predators. This study examined the possibility of using urchin alarm cues to prevent overgrazing of seaweed ecosystems and how this can be introduced as a new tool for seaweed ecosystem restoration. In laboratory experiments, we exposed purple urchins to fresh extracts taken from different conspecific urchin body tissues and results show that all extracts potentially have a repellent effect. Field trials using fresh extracts embedded in agar show urchins limiting their movement and are less likely to forage outside their burrows. The method presented would involve less personnel and equipment and would be a cheaper alternative for coastal communities aiming to help restore seaweed forest ecosystems.

Keyword: Seaweed ecosystem/ Purple urchins/ Overgrazing/ Fear response

*Corresponding Author: Dominic F.C. Belleza, Tel: +81-095-850-4588; Fax: +81-095-840-1881
E-mail address: dfcbelleza@gmail.com