



Department of Defense Legacy Resource Management Program

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PROJECT NAME/TITLE

**Recovery Tool for Enhanced Black Abalone
Recruitment on the California Channel Islands
and Coastal Habitat**

AUTHOR / ACTIVITY

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Recovery Tool for Enhanced Black Abalone Recruitment on the California Channel Islands and Coastal Habitat

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Background:

- The Department of Defense (DoD) is responsible for the management of Federal lands, home to flora and fauna some of which have been listed as endangered or threatened as part of the Endangered Species Act (ESA).
- The Black Abalone (*Haliotis cracherodii*) was listed as endangered under the ESA in 2009 (74 FR 1937).
- Black Abalone currently inhabit the rocky intertidal areas of DoD land in southern California (San Nicolas and other Channel Islands).
- San Nicolas Island is an important Navy training and operating range. Without proper management of Black Abalone, these ranges could potentially be at-risk for restricted training activities or even closure.
- In order to avoid potential negative impacts on training and operations, a proactive program in abalone restoration efforts must be started to increase the number of possible disease-resistant Black Abalone within impacted areas.



Figure 1. Tank setup for Black Abalone inside the SSC Pacific Abalone Farm

Objective:

- Develop competent larvae, settle the larvae for metamorphosis into juvenile abalone
- Culture of the juvenile abalone for eventual outplanting into designated habitat to increase recruitment of this species.

Summary of Approach:

SSC PACIFIC is growing Black Abalone under various controlled environmental conditions to determine the optimal:

- 1) Seawater temperature for sustained growth (body mass, gonad index)
- 2) Macroalgal diet required to attain an appropriate gonad index for spawning in the laboratory.
- 3) Method to induce spawning



Figure 2. Gonads of Black Abalone A) Possible female B) Possible male

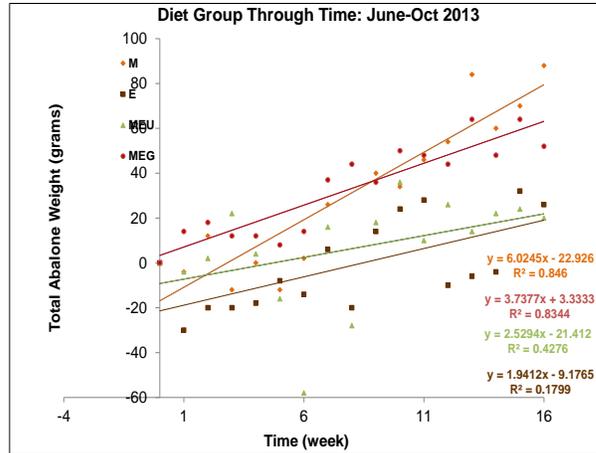


Figure 3. Total weight of 3 black abalone under diet group, from June 2013 to October 2013. *Macrocostis pyrifera* (M), *Egria menziesii* (E), *Ulva lactuca* (U), and *Gracilaria robusta* (G)

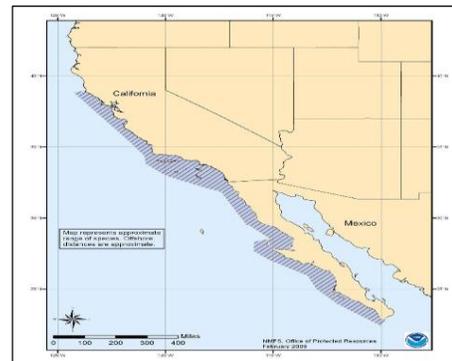


Figure 4. Range of *Haliotis cracherodii* from Mendocino, California to Cabo San Lucas, Mexico

Accomplishments:

1. An ESA permit to culture Black Abalone was secured from the National Marine Fisheries Service to conduct research on conditioning the black abalone
2. SSC Pacific transferred Black Abalone to its farm and established a culturing system
3. Data has been collected for 10 months on growth requirements
4. Induced spawning conducted for October 2013

Future Directions:

- Obtain more individuals
- Place two groups on separate macroalgal diets to compare monospecific vs. mixed:
 - (1) *M. pyrifera*
 - (2) *M. pyrifera* and *G. robusta*
- Use of UV filtered seawater and temperature fluctuation to induce spawning

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