Chii’xuu TII inas’dll – Nurturing Seafood to Grow
Transforming urchin barrens to kelp forests: restoring abalone and rockfish habitat in Gwaii Haanas

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Objectives
- Restore degraded kelp forest habitat along 3 km of shoreline
- Improve habitat for northern abalone and other kelp forest species
- Work collaboratively with others to achieve shared conservation goals

Introduction
Kelp forests benefit coastal communities and ecosystems by increasing coastal productivity and supporting ecologically sustainable use. Today, kelp forests in Gwaii Haanas are greatly diminished due to voracious grazing by hyperabundant sea urchins. Degraded kelp forests negatively impact culturally and economically important species including endangered northern abalone by reducing habitat that provides food and protective cover. We aim to restore kelp forests along ~3 km of coastal habitat in an Abalone Stewardship Area within Gwaii Haanas.

Study area

Implementation

<table>
<thead>
<tr>
<th>Year</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Summer 2018</td>
<td>Pre-treatment monitoring &amp; research</td>
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<tr>
<td>Early fall 2018</td>
<td>Restoration work: 75% reduction in urchin abundance</td>
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<tr>
<td>Summer 2019-2020</td>
<td>Ongoing urchin control (with possible extension)</td>
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Expected Results

Pre-treatment
- Kelp forest depth & area
- Kelp stipe density
- Habitat conditions for abalone
- Collaborative research, restoration & education

Short term
- Biodiversity & primary productivity
- Habitat for abalone & other kelp forest species
- Shoreline protection from coastal erosion
- Larval retention & recruitment for kelp forest species
- Nutrient input into coastal ecosystems
- Carbon fixation through kelp growth
- Collaborations to maintain conservation gains

Long term
- Kelp forest depth & area
- Kelp stipe density
- Habitat conditions for abalone
- Collaborative research, restoration & education

Research Focus
How can kelp forest restoration benefit abalone and local biodiversity?
Abalone benefit from increased kelp forest habitat through increased habitat protection and food provision. We intend to investigate the underlying mechanisms which remain largely unknown:
- What are current abalone and urchin growth rates and demographics?
- How will these characteristics respond to expected habitat changes with significant reductions in urchin density?
- How will abalone and urchin diets change following urchin reduction?
- Will abalone behaviour change from being more out in the open to more cryptic in previous following sea urchin reduction?
- How will local biodiversity and species composition change with expected kelp forest recovery?

What are the ecological effects of crushing urchins in the barrens?
To help evaluate potential effects of similar urchin restoration projects in future, we will investigate the short and potentially long-term effects of in situ urchin crushing on local ecological processes:
- What volume of dead urchin biomass enters the water column and where does it move?
- How do the crushed urchin biomass get processed in the ecosystem?
- How long does it take for the short-term ecological effects of this pulse input of dead biomass to return to ‘normal’ levels?
- Does the expected short-term increase in predatory fish and invertebrates have an obvious negative effect on abalone at the site?

Public Outreach & Support
Public awareness is vital to build support for Gwaii Haanas’ marine conservation and restoration work:
- Media outreach to inform the public about kelp forest restoration work
- Public presentations by project team members about our project
- Facilitating opportunities for visitors to Gwaii Haanas to experience and understand kelp forests and the connections between marine ecology and Haida culture.