Seaweed Research Projects

Tim Haggitt, Seaweed expert and researcher

Tim Haggitt is an expert on seaweeds and is based at Leigh, Cape Rodney. He is currently researching the effects of harvesting stands of living native seaweed, *Ecklonia radiata*, in Waihau Bay, in the eastern Bay of Plenty.

Tim's objective is to gather sufficient information to develop a fisheries plan and management framework for the sustainable harvesting of seaweed. Presently there is very limited information on *Ecklonia radiata* and the effects of large-scale harvesting.

Before a species, especially one of such ecological importance, goes into the quota management system it was important to know the fundamentals such as:

- ⇒ How the species reproduces;
- ⇒ Where the species occurs;
- ⇒ When you can and should not harvest the species; and
- ⇒ How much of the species can you sustainably harvest?

Tim's current research is being conducted between Cape Runaway and Waihau Bay on the northern side of East Cape. Tim is working in conjunction with Te Whanau-A-Apanui and two local seaweed harvesters are assisting Tim with the project. It is a community-based project that has the approval of two local hapu. Research findings are presented annually to these hapu and reported to the Ministry of Fisheries.

Tim gave a brief overview of the reproductive cycle of seaweed. In winter, the time of highest reproductive output, adult kelp release spores that settle on the reefs, fertilise and then germinate in spring. Kelp matures and generally becomes reproductive in approximately two years.

A harvesting protocol has been developed to maintain biodiversity and a safe site for young kelp to grow. This is achieved by:

- ⇒ Leaving the plant's 'holdfast' (anchor system), attached to the reef;
- ⇒ Harvesting only the blades (leaves) and stems (stipe);
- ⇒ No harvesting during winter, the peak reproductive period for kelp; and
- ⇒ Only harvesting at depths greater than 10m.

During their research they are measuring a variety of species and factors including:

- ⇒ *Ecklonia radiata* abundance, biomass, coverage and size;
- ⇒ Other kelp abundance, biomass, coverage and size;
- ⇒ Gastropod numbers and other molluscs, including paua;
- ⇒ Sponges and effects of sediment after heavy rainfall;
- ⇒ Light levels and effects of algal blooms that reduce light levels;
- ⇒ Nutrient levels;
- ⇒ Water temperature;
- ⇒ Fish diversity; and
- ⇒ Lobster (crayfish) abundance.

In the Waihau Bay area there is an abundance of juvenile crayfish in the kelp beds that are being harvested so it was important to know the impacts of harvesting seaweed when devising a management plan.

Kelp has an estimated lifespan of five years. They are very sensitive to algal blooms. Tim provided graphic images of a once-healthy bed of four-year old kelp that had died back due to a spring/summer photo-plankton bloom.

From a harvesting perspective it was important to take these events into account. For example, if the die-off occurred in summer and a fisher was expecting to harvest that kelp bed in autumn then there would be nothing left to harvest.

Long-term studies, such as the five-year research project in Waihau Bay, were critical to understand:

- ⇒ How often and when die-offs occur; and
- ⇒ Why die-offs occur.

Hui Discussion

Tim confirmed that old age for *Ecklonia radiata* is around five years, so there is a level of natural mortality. As kelp ages it seems the plants are more vulnerable to stress and can be severely affected by events such as an algal bloom, which reduce natural light levels.

During their research various plots were harvested at different times. It was notable that the plots harvested in spring (September to late November) seem to have recovered, but the area harvested in Autumn (March to May) has not regenerated as well. These preliminary results fit with the biological patterns of reproduction and growth for *Ecklonia radiata*.

It was noted that overseas experience has seen commercial interests move from harvesting wild kelp stocks to farming on artificial structures. This approach allows more control over cultivation, means less environmental impacts and reduced risk for investors.

Both Tim and Jill explained that part of their strategy was determining the potential for locals to farm managed plots and re-seed fallow areas. Re-seeding kelp, to encourage re-growth in the marine environment, has been successfully achieved in New Zealand.

Tim advised the evidence suggests *Ecklonia radiata* does not grow well on rope structures. However, there has been some success in Japan for growing kelp on submerged concrete structures.

Using artificial structures would enable growers to maximise the benefits of sunlight while minimising impacts on wild stocks.

Tim confirmed it would take a minimum of five years research to adequately understand the effects of harvesting on *Ecklonia radiata* itself, the gastropods that live on the kelp, the sponge, fish and lobster communities.

Changing oceanographic climate also has an effect. Currently New Zealand is experiencing an El Nino climate phase, two years ago there was La Nina conditions. These patterns create a different a suite of nutrient levels, water temperatures and light levels that affected the kelp stands.

Juvenile fish gathered in the kelp beds. Tim had witnessed young snapper, moki, schools of kahawai and john dory during their fish counts in both the control and harvested areas.

Kina seem to prefer the juvenile kelp plants. Adult kelp has higher phlorotannin content; this appears to make them less palatable. *Ecklonia radiata* has been found in the diet of crayfish and greenbone.

The biodiversity on the plant blades (leaves) is very high. These creatures attract fish such as spotties, which in turn attract larger fish to the vicinity. Therefore, kelp is critical as food and habitat for multiple species.

Kelp has very high social and cultural value. Given that a moratorium has existed for twenty years it was difficult to determine what a kilo of *Ecklonia radiata* is worth commercially.

A kilo of dry *Macrocystis pyrifera* (Bladder kelp) is worth between $15 and $25 wholesale. A kilo of dry kelp is equivalent to around five to six kilos of wet kelp.

Jill advised caution for anyone buying overseas seaweed powder. Most of those powders are byproducts that have undergone extractions, looks black and dead.

Jill's recommendation: If you cannot smell the sea in a seaweed powder, do not buy it.

As public awareness increases and more concerns are raised about the commercial harvesting of kelp it would be helpful to have access to a list of Frequently Asked Questions. A FAQ list on the Seaweed Association of New Zealand (SANZ) website would be ideal. Jill will consider this idea, discuss it with her colleagues and advise the outcome.

It was very worthwhile having both Jill Bradley and Tim Haggitt at the hui and sharing their information on seaweeds, kelp biology, marine diversity and the potential for sustainable harvesting practices. Both committed to attending a future Hokianga Accord hui to present their findings once their research is completed. Completion date will be around late 2012.

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