In April 2006, traditional harvesting, which ceased in 1991 following the establishment of the Solitary Island Marine Reserve, was re-introduced at Arrawarra Headland. To ensure that harvesting is sustainable, the effects of collecting are scientifically monitored.

Monitoring

With financial support from the Environmental Trust, a combination of university scientists (University of New England), Garby Elders and members of government agencies are all involved in monitoring. The first step in the process was to identify the main food species: this involved field inspections with Garby Elders and traditional knowledge holders. Turban shells (gugumbal) were identified as the most important species and so subsequent work focused on this species.

Methods

In addition to Arrawarra Headland, the main site where renewed harvesting activities were planned, three other, similar sites are being surveyed. As most of these are protected from collecting by the Solitary Islands Marine Park zoning plan, they are acting as reference (no collection) sites. Each site is surveyed three times per year by counting and measuring (shell height) all gugumbal that are found within quadrats (survey areas of 4m²) at the bottom of the shore. The height measurement is taken by placing a set of vernier calipers so that one side touches the highest point (or apex of the shell) and the other the base. All four species of turban shell that occur within this habitat are assessed: Turbo militaris, Turbo torquatus, Turbo undulatus, and Astralium tentoriformis.

At one further site, controlled collecting is taking place to simulate steady harvesting. Controlled harvesting involves the collection of 50 suitably sized animals twice per year. This is undertaken by a Garby Elder, who selects animals within the usual harvesting size-range.

Did you know?

Quadrats are a common method of gathering scientific information about the number of organisms in a nominated area. The quadrat’s size depends on the size of the organism that is being assessed.

Photo

The height of each gugumbal is measured to the nearest millimetre using vernier calipers.
The monitoring is also giving scientists the opportunity to learn more about the biology and ecology of *gugumbal*. Despite the fact that turban shells are an important food resource that is utilised throughout southern Australia, there is currently very little scientific information that can be used to help manage their populations sustainably.

### Results

There is a lot of natural variation in the average size and abundance of *gugumbal* across the survey sites. However, some sites consistently have denser populations and/or bigger animals. There has been no obvious change in the number or size of *gugumbal* at Arrawarra Headland, but little harvesting has occurred at this site over the period of monitoring to date. In contrast, there has been a notable reduction in size and abundance of *gugumbal* at the site where controlled collecting is taking place.

The controlled collecting, together with evidence from the Arrawarra Midden (see Fact Sheet 8), indicates that mid-sized animals are selectively harvested, leaving larger breeding stock and smaller juveniles to replenish those collected.

### Ongoing Work

Surveys are continuing to document the natural cycles of abundance at each of the five headlands. This information can also be used for long-term evaluations of changes in populations due to events such as climate change.

*Did you know?*

Although *Turbo militaris* occurs from the low high tide mark all the way down to 10m below the surface, the highest densities are found just above the low tide mark, amongst the Neptune’s necklace (*Hormosira banksii*) and worm tubes (*Idanthrysus pennatus*).