Gulf Islands National Park Reserve

Intertidal Bivalve Monitoring

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In April 2008, Gulf Islands National Park Reserve (GINPR) staff began monitoring bivalve (clam) populations at several locations in the southern Gulf Islands as part of the Park Reserve's long-term ecological integrity monitoring program. Bivalves are long-lived (up to 20 years or longer), widely distributed and spend most of their lifetime in one location. Because of these characteristics, they are an excellent indicator for the overall condition of intertidal areas.

For millennia, bivalves have been a staple part of coastal First Nations people's diet, as evidenced by the substantial shell deposits found at ancient village and camp sites throughout the Gulf Islands. Bivalves have also been an important, readily available food source during subsequent waves of settlement, and continue to be an important food source for coastal residents.

Figure 1. Most faunal remains associated with ancient First Nation sites consist of bivalves

The primary monitoring questions relate to changes in abundance of native and non-native bivalve species, as well as changes in the abundance of harvestable species as a result of harvest management actions.

Method

Following a standard approach developed by Fisheries and Oceans Canada, bivalve monitoring involves randomly selecting a minimum of fifteen 0.25m^2 plots and digging out all clams found within that plot to a depth of 25cm. Clams are then identified to species and counted to determine overall abundance for each species. If the clam belongs to a harvestable species (cockle, or butter, littleneck, or manila clam) it is also categorized into one of three size classes: immature, mature, or harvestable. Monitoring is repeated annually at 8 different intertidal sites in the GINPR

Comparing successive years of data helps answer the following questions:

- Has the average native bivalves abundance changed by 1 standard deviation from the baseline?
- Has the average non-native bivalves abundance changed by 1 standard deviation from the baseline?
- Has the harvestable bivalves abundance changed by 1 standard deviation from the threshold level?

Figure 2. Parks Canada staff sampling bivalves

Results

Since the start of the bivalve program as a pilot project in 2008, the approach to monitoring bivalves has been further refined, sampling strategies have been tested, baseline data has been gathered, and threshold values have been proposed.

Preliminary data is showing that not all sites follow the same trends in abundance, and that different factors affect populations both at a regional and local level.

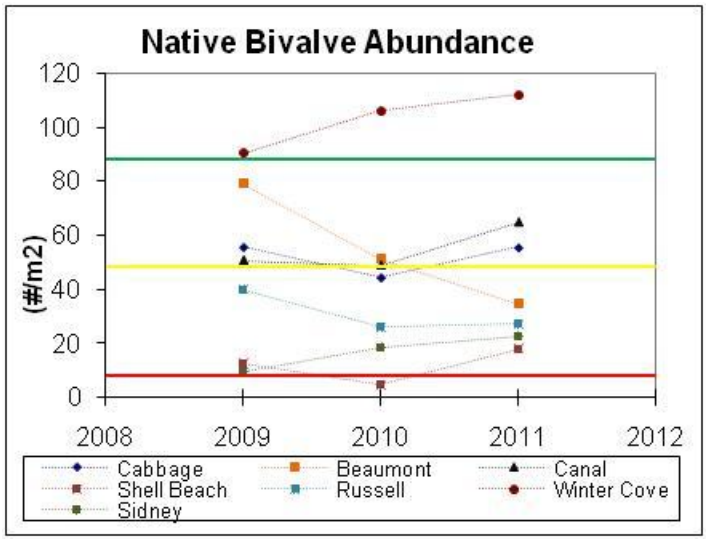

Figure 3. Trend in bivalve abundance at monitoring sites in the GINPR

Comparing the abundance of native, non-native, and harvestable bivalves will help track the spread and impact of invasive species, the role of harvest in bivalve abundance, and the factors impacting bivalve growth and abundance, as well as provide insight into the health of the overall intertidal region.

Next Steps

Scientific study and analysis only provides one part of the story. Parks Canada staff are working with local First Nations to gather traditional knowledge on shellfish, which can inform future bivalve management in GINPR. Insight into traditional techniques such as clam gardens can improve understanding surrounding harvest, bivalve abundance, and ecosystem health. Working with other organizations such as Fisheries and Oceans Canada and Environment Canada, Parks Canada is learning about the complex concerns around water quality and biotoxins impacting shellfish health. Studies of heavy metals in local shellfish populations have helped staff explore other important impacts to shellfish and human health.

Over time, future bivalve monitoring will identify long term trends in bivalve abundance and the impact that harvesting and invasive species have on intertidal ecosystems. Continued monitoring will also help document what impact larger processes such as climate change may have.

Figure 4. Bivalve monitoring crew hard at work