

## UPDATE SURVEY ON THE DISTRIBUTION OF PACIFIC OYSTERS IN MAHAU AND KENEPURU SOUNDS: 3-4 AUGUST 1994

### Background

This survey is the third undertaken to determine the abundance and distribution of Pacific oysters in Mahau and Kenepuru Sounds. The other two surveys were in August 1991 (Osborne 1991) and July 1993 (Bull 1993).

The principal objectives of this survey were:

1. To evaluate the success of spat recruitment from the 1993/94 summer spawning;
2. To compare the distribution and abundance of Pacific oysters in the area surveyed with that of the 1993 survey.

### Methods

The survey was carried out on 3 and 4 August 1994 and covered sites in Mahakipawa Arm and Motapu Bay (Mahau Sound) and within Kenepuru Sound. Access to sites was by car and all sites covered in the 1993 survey were revisited. At each site the beach was walked, photographs taken and notes made on the distribution and relative abundance of oysters on the beach and the predominant size of oysters at each site.

At several sites rough counts<sup>1</sup> were made within plots of one square metre area of live and dead oysters. Subsamples of oysters within the plots were measured across the widest point and grouped into 20 mm size classes. Oysters less than 20 mm shell diameter were assumed to be from 1993-94 spat settlement. Patches of oysters were measured with a steel tape or paced off to obtain an estimate of patch size.

### Results

#### 1. Mahakipawa Arm (site 1)

The area was mostly mud with marginal strips of cobble (about 150 mm diameter) and a few outcrops of old ballast rocks.

Three plots of one square metre each were sampled amongst the cobbles. Density varied from 10 m<sup>-2</sup> to 35 m<sup>-2</sup>. Most oysters were 40-80 mm with only a

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<sup>1</sup>Rough count means that the oysters were counted without clearing the area and closely checking the underside of each rock or the inside of the shells dead oysters where the top shell remained. No attempt was made to determine the date of mortality.

couple 20-40 mm (photo 1). No new spat was found amongst the cobbles. Overall mortality appears similar to that found during the 1993 survey.

Two samples were counted from the ballast rock piles (photos 2 and 3). Densities were as high as 500 m<sup>-2</sup> and average size was larger than on the cobbles. Some spat was found in the higher density plot but was restricted to the inside of clean shell of dead oysters. Total mortality was comparable with the 1993 survey.

Overall recruitment appears to be greater than that found during the 1993 survey.

## 2. Motapu Bay (Mahau Sound) (site 2)

On the cobble beach at the freshwater inflow there were very few oyster shells (1 m<sup>-2</sup>) all dead. There are larger cobbles to the west also with very few oysters (mostly dead). Live oyster (60-70 mm) were occasionally found.

West of the cobble beach there is an exposed tree stump and a couple of larger rocks with small patches of oysters, mostly dead. All the surface is covered by a brown algae which may limit recruitment. (photo 4).

On a large rock in the same area there are clusters of live oysters mostly around 60 mm in size. There has been a good spat settlement of about 20 m<sup>-2</sup>, all alive.

On large cobbles between the large rock and a rock outcrop were many adult sized oysters and spat recruitment was good (5-10 m<sup>-2</sup>) with a high level of survival.

Blue mussels covered a fair portion of the rock outcrop. The oysters present were mostly 40-60 mm at a density of about 50 m<sup>-2</sup> (photo 5). Predation by oyster borers has caused about 10% mortality.

There is still a significant amount of apparently suitable habitat not colonised.

## 2. Kenepuru Sound

At Broughton Bay (site 3), oysters were limited to a wooden boat ramp, a private pier and rocks (photo 6) on either side of those structures. The substrate on the main part of the beach appeared too fine to support colonisation. Densities were similar to the 1993 survey with very little spat. Most oysters were 40-60 mm in size and there was about 50% mortality.

At Te Mahia (site 4, not done in 1993), there were patches of adults 40-60 mm and 60-80 mm. Mortality appeared to be around 50% due primarily to borer predation. There were small areas of spat but all were dead, again due to borer predation.

At Portage(site 5), oysters were found as scattered individuals over the main beach (photo 7) and on the wharf piles (photos 8 and 9) . Some spat recruitment was found on the cobbles on the west end of the beach, density about 5-10 m<sup>-2</sup>.

At Black Rock (site 6), one clump of four medium sized individuals was found on the beach cobbles in the vicinity of freshwater inflow. West of the main beach were a few scattered individuals and the occasional shell scar.

At Kenepuru Head (site 7), no oysters were found on the few exposed rocks. Most of the area was mud substrate, unsuitable for colonisation.

At Ohuaparuparu Bay (site 8), small patches of adult oysters were found in areas of freshwater inflow. There was one large patch (300 m<sup>2</sup>) of adult size (60-80 mm) oysters at a density of about 10 m<sup>-2</sup>. This is the area referred to as the north side of Kenepuru Head in the 1993 report.

At Fish Bay (site 9), the large cobbles at the freshwater inflow on the main part of the beach had moderate size patches of adults 40-60 mm. Most were alive but there were small areas of high mortality. There was a very good spat recruitment (200-300 m<sup>-2</sup>) (photo 10) with high survival, mostly on the underside of the large cobbles. There is evidence of people dumping empty shells on the seashore in some places.

There were 2-3 patches (100-200 m<sup>2</sup>) of adult oysters 40-60 mm in size at an area of freshwater inflow to the west of the main beach. There was some spat found on the adult shells but not as heavy as in the previous area.

At the head of Waitaria Bay (site 10), there are two patches of oysters 25 m<sup>2</sup> and 10 m<sup>2</sup> in area. Most are dead and the patches appear to have been considerably larger but new silt and gravel was washed down covering part of the beds. Most oysters are 40-60 mm with about 20% at 60-80 mm. There was some spat recruitment (1-5 m<sup>-2</sup>).

At Waitaria Bay just west of Clark Island (site 11), there was the odd oyster (20-40 mm) but no freshwater inflow.

Adjacent to Clark Island there was a 25 m<sup>2</sup> area with adult oysters (60-80 mm) at a density of 80-100 m<sup>-2</sup>. About 75% were dead and the patch seems to have been reduced in size by new silt and gravel. Large numbers of tubeworms were observed. No spat was seen and there was a large amount of suitable area not colonised.

Further east there is no freshwater inflow with the odd cluster of dead oysters. Much of the area has been colonised by tubeworms.

At the next permanent stream to the east there was a 200 m<sup>2</sup> patch of oysters (mostly 40-60 mm) at a density of 30-50 m<sup>-2</sup>. About 60% were live and there was some spat (5 m<sup>-2</sup>).

At Mills Bay (site 12), there was the odd oyster (40-60 mm). No spat were seen and there was a significant amount of suitable area not colonised.

At Nopera (site 13), several dense patches were found (photos 11 and 13). Densities and distribution were similar to 1993 except that in one large patch (200 m<sup>2</sup>) (photo 11) there has been a heavy spat recruitment (200 m<sup>-2</sup>) (photo 12) and a good spat recruitment in a small 20 m<sup>2</sup> area.

At Raetihi (site 14), there was good freshwater inflow but the substrate was generally too fine to support oysters. There was the odd dead oyster and a few scattered scars. No oysters were seen on the wharf piles.

At Hopewell (site 15), there were several large dense patches (200-400 m<sup>-2</sup>) of adults (photos 14 and 15). Densities and area covered appear to be similar to that found in 1993 but the animals average a slightly larger average size (60-80 mm). Only occasional spat were found.

## Discussion

### **Available Habitat**

In almost all cases surveyed, oysters were only limited to wherever there was freshwater inflow combined with shelter and suitable substrate indicating wide dispersal of larvae throughout the survey area.

Oysters had colonised large areas of rocky beach which can no longer be walked on in bare feet. However, there were still significant areas of rocky habitat, especially away from freshwater inflows, that had not been colonised. Sandy beaches remain uncolonised and appear to be unsuitable habitat.

It is not known if the lack of oysters on suitable substrate was the result of spat failing to arrive or whether settlement was inhibited by some environmental factor (eg. lack of freshwater).

### **Adult Distribution and Abundance**

Pacific oyster distribution in the survey area was found to be similar to that of the 1993 survey. The highest adult densities and greatest percentage of cover of available habitat were found at Mahakipawa Arm, Motapu Bay and Hopewell.

At all but one site, the abundance of adults has changed little since the 1993 survey suggesting a relative failure of spawning, spat settlement and/or recruitment over the 1992/93 summer. At the head of Waitaria Bay, two patches found in 1993 were greatly reduced in size because they were covered by new silt and gravel deposited during a recent flood event.

Other than at the Waitaria Bay site adult mortality did not appear to be significantly greater than during the 1993 survey.

## **Spat Production**

The adult population of oysters appears sufficient to provide parent stock for rapid increase in oyster densities given favourable environmental conditions.

## **Post Settlement Spat Survival**

There was noticeable spat recruitment throughout the survey area. This contrasts with the situation found during the 1993 survey when almost no spat recruitment could be found.

Spat recruitment was light in areas where most of the available substrate was already occupied and, in Mahakipawa Arm, limited to the clean, inside surfaces of dead adult shell.

Patches with high densities of adults had only a light (5-10 m<sup>-2</sup>) spat recruitment. Dense (up to 300 m<sup>-2</sup>) spat were only found in patches of moderate adult densities. There was very little spat recruitment in areas where there were no adults.

Spat recruitment in some locations was greatest on the underside of large cobbles/small rocks and therefore the extent of the 1993/94 spat recruitment may be greater than noted.

Recruited spat survival was over 75% in most areas where settled spat have survived to a size visible to the naked eye. The few locations with lower survival rates showed significant predation by oyster borers. Recent research into spat settlement and survival in Kenepuru Sound has shown that oyster borer predation is highest in areas away from freshwater inflow (J. Jenkins pers. comm.).

The only factors that currently limit widespread, successful spat recruitment appear to be the availability of suitable habitat and suitable environmental conditions.

Should survival rates continue to be high, adult densities will significantly increase in the dense recruitment areas over the next year.

## **Contribution of Farmed Oysters to Spat Settlement**

Since oyster farming is prohibited in Kenepuru Sound, the spat recruitment found during the survey must be the result of spawning by either the resident wild population or by oysters from outside the area.

The successful spat recruitment found during this survey shows that, with adequate environmental conditions, pacific oysters could quickly spread to most available habitat regardless.

Oysters farmed on sub-surface longlines in other areas have not spawned at the time of the year necessary to be responsible for the spat recruitment found during this survey (J. Jenkins pers. comm.).

### RECOMMENDATION

Given that:

1. there are some tens of thousands of live adult pacific oysters growing wild in the survey area;
2. further recruitment appears more dependant on favourable environmental conditions than on the size of the resident population;

we recommend the ban on suspended culture of pacific oysters in Kenepuru Sound be lifted.

M L Stevenson / P D Kirk  
13 September 1994

### REFERENCES

- Osborne, T. 1991: A survey of pacific oyster distribution in the Nelson Marlborough Region, Part 1. Unpublished report (copy held on file at MAF Fisheries Central, Nelson).
- Bull, M.F. 1993: Update survey on the distribution of pacific oysters in Mahau and Kenepuru Sounds - July 1993. Unpublished report (copy held on file at MAF Fisheries Central, Nelson).