

Ecological Monitoring

North Shore Busway Shorebirds

CASE STUDY

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Replenished City of Cork nesting site

The North Shore Busway (the 'Busway') is situated along the East Coast of the North Shore, Auckland. Two species of shorebird – the Northern New Zealand dotterel (*Chardrius obscurus aquilonius*) and the variable oystercatcher (*Haematopus unicolor*), are known to nest within and adjacent to the Busway verge between the Auckland Harbour Bridge and Esmonde Road Interchange.

Through the Busway's consenting process it was recognised that construction and operation of the Onewa to Esmonde Road section would result in loss and disturbance to a number of shorebird nesting sites. Shorebird mitigation measures were implemented and included provision of new alternative nesting sites, verge management to discourage nesting in construction areas, and mammalian predator control. Conditions of consent required that the success of the shorebird mitigation measures be monitored.

This case study focuses on the shorebird monitoring

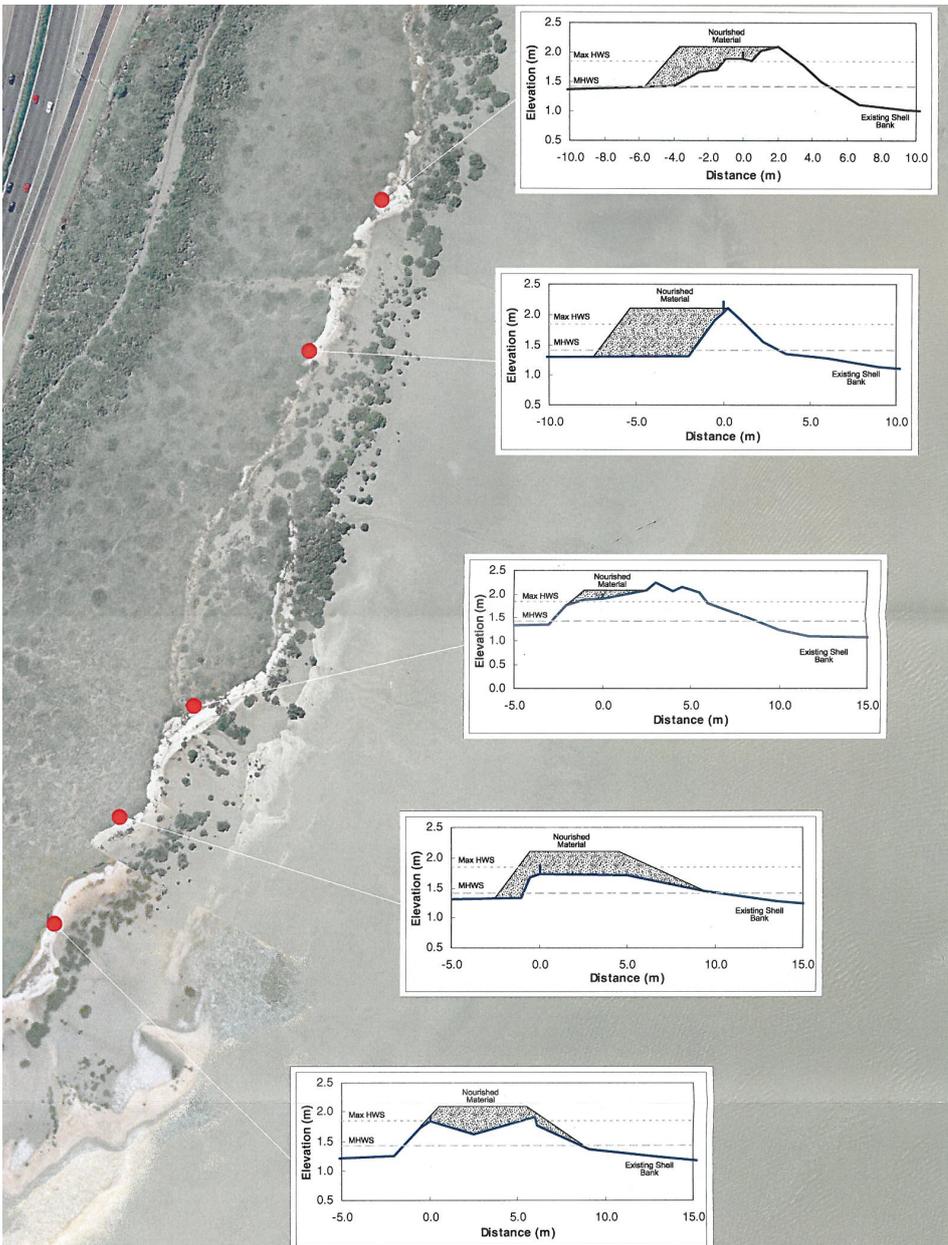
requirements associated with establishing alternative nesting sites. It addresses the question of whether the resource consent monitoring conditions achieved their purpose, and presents lessons learned from the monitoring programme.

Shorebird Technical Working Group

As required by consent conditions, a Shorebird Technical Working Group (SBTWG) was established in 2002. The group comprised of Department of Conservation, Auckland Council, NZTA and a shorebird expert. Their duties included contributing to the Shorebird Monitoring Programme and Contingency Plan (the plan), and monitoring the implementation and success of the mitigation. The approved plan allowed the monitoring to be iterative and flexible with technical expertise from the SBTWG and lessons learned providing feedback into the plan. The SBTWG met annually to review monitoring results and amend the methodology as necessary. This approach worked well by capturing technical expertise early in the process and allowing unforeseen events or advances in monitoring capacity to be included within the lifetime of the programme.



North Shore Busway - Onewa to Esmonde Road section (source: Auckland Council GeoMaps)



Shellbank profiles (source: Boffa Miskell)

Alternative nesting sites

The establishment of alternative nesting sites was identified by the SBTWG as a suitable measure to mitigate the effects of nest site loss and the high levels of disturbance incurred as a result of the construction and operation of the Busway. Historically shorebirds have used the City of Cork shell banks, situated approximately 100m east of the mainland, however the shell banks were being inundated during spring high tides. Analysis of the City of Cork shell banks indicated that increasing the height of the existing shell banks would be an effective approach to create additional nesting sites that were safe from natural weather events. Five alternative nesting sites were established in late 2003 by adding shell to the existing banks increasing the height to 2.2m RL. This elevated the top of the platforms above the predicted highest spring high tide of 1.86m RL. Five years after the mounds were established small silt fences were placed along their landward side in response to concerns they were eroding.

Shorebird monitoring programme

Monitoring entailed direct observations at pre-determined locations, one to two times per week, during the breeding season (August to February) from 1997 to 2013. The plan required numbers of single adults and breeding pairs observed to be recorded, together with number of chicks successfully fledged. Whilst resource consent conditions only required breeding pairs to be present on the shell banks for the alternative nesting sites to be considered successful; fledglings were also recorded in order to determine the level of breeding success for NZ dotterels and variable oystercatchers. Breeding success is measured by productivity which is described as the number of chicks fledged per pair per breeding season. Additionally, annual bird banding, whereby coloured or metal bands are attached to the legs of the birds to allow individual identification was attempted in order to maximise the effectiveness of the monitoring programme. It should be noted that bird banding, particularly of shorebirds, is a well-established monitoring technique and reduces the

chances of an individual being counted more than once.

Although not specified in the plan, data collected also included location, date, tide level, weather, bird location, and location of any nests, eggs, or chicks seen. If the bird was banded its band combination was recorded.

Shorebird monitoring success

Breeding pairs and fledglings of both NZ dotterel and variable oystercatchers were observed on the City of Cork shell banks during the course of the study. The Busway shorebird monitoring resource consent conditions achieved their purpose by establishing that the five alternative nesting sites were being used by shorebirds. However, there were a number of challenges faced and lessons learned that can be applied to other projects. These are detailed below.

Challenges

Control vs treatment

Ideally ecological monitoring is undertaken following 'BACI' ('Before-After-Control- Impact') survey methods. Ecological monitoring pre-construction allows a baseline survey level to be obtained that can be compared to monitoring results post-construction at the affected site and allows the effectiveness of environmental mitigation to be assessed. Monitoring of a control site is required in order to compare 'treated' or 'affected' ecosystems with systems that have not been treated or affected. This allows estimates of variation that are associated with a treatment or control to be distinguished from variations that derive from other sources such as weather.

The mitigation treatment implemented on the Busway required monitored to be undertaken at the alternative nesting sites. NZ Transport Agency had access to five years of shorebird breeding data for the Shoal Bay area including the City of Cork shell banks prior to the commencement of the Busway construction. This provided good baseline data for 'before-after' comparison. However, in order to avoid the potential of attributing effects of environmental variability to the effects of the Busway, or poor shorebird mitigation implementation, greater confidence in the monitoring results could have been obtained by including a control site during the same monitoring period. An after 'treatment' control could have been incorporated into the design by increasing the height of only three City of Cork shell banks and leaving two in their original state to be used as a control.

Banding birds

The original intention of the monitoring was that any un-banded birds attempting to nest within Shoal Bay were to be captured and banded. Between 1997 and 2007, seven NZ dotterel and six variable oystercatchers were observed with bands in the wider Shoal Bay area. Of these birds two NZ dotterels and four variable oystercatchers were observed on the City of Cork shell banks and most banded birds were observed at the same location multiple years in a row. However, logistical reasons meant that not all birds could be banded and as such a large number of birds in Shoal Bay remained un-banded. Without all birds banded it was difficult to understand which pair belonged to a specific site. Additionally shorebirds tend to move to difference sites when feeding and are often attracted to the commotion of other shorebirds, showing defensive behaviour although they may not necessarily nest at the site where they are displaying. After a number of Shoal Bay birds were banded it became apparent that on occasion the observer was seeing the same banded bird at different locations during the same survey session. This indicated that without banding there is a risk of an individual being counted more than once. Monitoring showed that shorebirds were using the alternative nesting sites. However more widespread banding would have allowed greater confidence in what was being observed.

Productivity

Determining the level of productivity would have provided additional information pertaining to the successfulness of the alternative nesting site mitigation. However, difficulties banding adult birds as well as the nature of the City of Cork presented a challenge in monitoring breeding pair productivity for the following reasons:

- The site is small and narrow with mangroves surrounding it, making observing birds difficult without disturbing them;
- When walking out to the shell banks observers were quickly spotted by resident birds and alarm calls were given. Chicks that were present hid in the mangroves; and
- Using binoculars from the Busway verge at high tide did not reveal the entire site, and chicks could be out of sight.

Although presence of chicks can generally be detected through the parent's behavior, actual sightings of chicks are required for productivity analyses.



Dotterels on seawall at Shoal Bay



Variable oystercatchers

Lessons learnt

1. The establishment of the SBTWG was useful for determining mitigation options and ensuring monitoring was implemented during the course of the programme. Beneficial traits of the group include:
 - Early establishment of the group in the project timeline;
 - Technical expertise within the group; and
 - Regular meetings.
2. Dynamic habitats should be taken into consideration at the onset of the project. For example, coastal areas are influenced by wind and tide and other environmental factors so mitigation measures may require maintenance throughout their lifetime if they are to continue fulfilling their function.
3. Measuring the success of the mitigation would have been enhanced by being able to measure productivity more accurately. This would have required the following:
 - Adaptation of standard or recognised techniques to suit site specific characteristics. The detection of fledglings was required to determine productivity however due to limited site access, this was difficult. In the future alternative observation methods such as remote cameras could be considered.
 - Banding a larger portion of the population within Shoal Bay would have allowed greater confidence in monitoring results. However NZ dotterels form post-breeding flocks that gather predominantly at large estuaries as do some variable oystercatchers (although many remain on breeding sites year round) therefore increased banding effort would be needed across the Auckland region and require a collaborative effort between NZ Transport Agency, Auckland Council and the Department of Conservation.
4. The usefulness of monitoring data could have been enhanced by:
 - Monitoring a control site during the same period as the mitigated site. This is necessary to understand the successfulness of the mitigation whilst avoiding the potential effects of environmental variability and other effects incurred during the same monitoring period.
 - Collecting more precise information as to where nests were located to improve knowledge of the fate of shorebird eggs and fledglings (e.g. hatched, predated, washed out). This information would also increase the knowledge base of shorebird nesting, and thus requirements when designing an artificial nesting site. This would assist how and where to direct management and maintenance efforts.



Predator control



Dotterel adjacent to busway



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