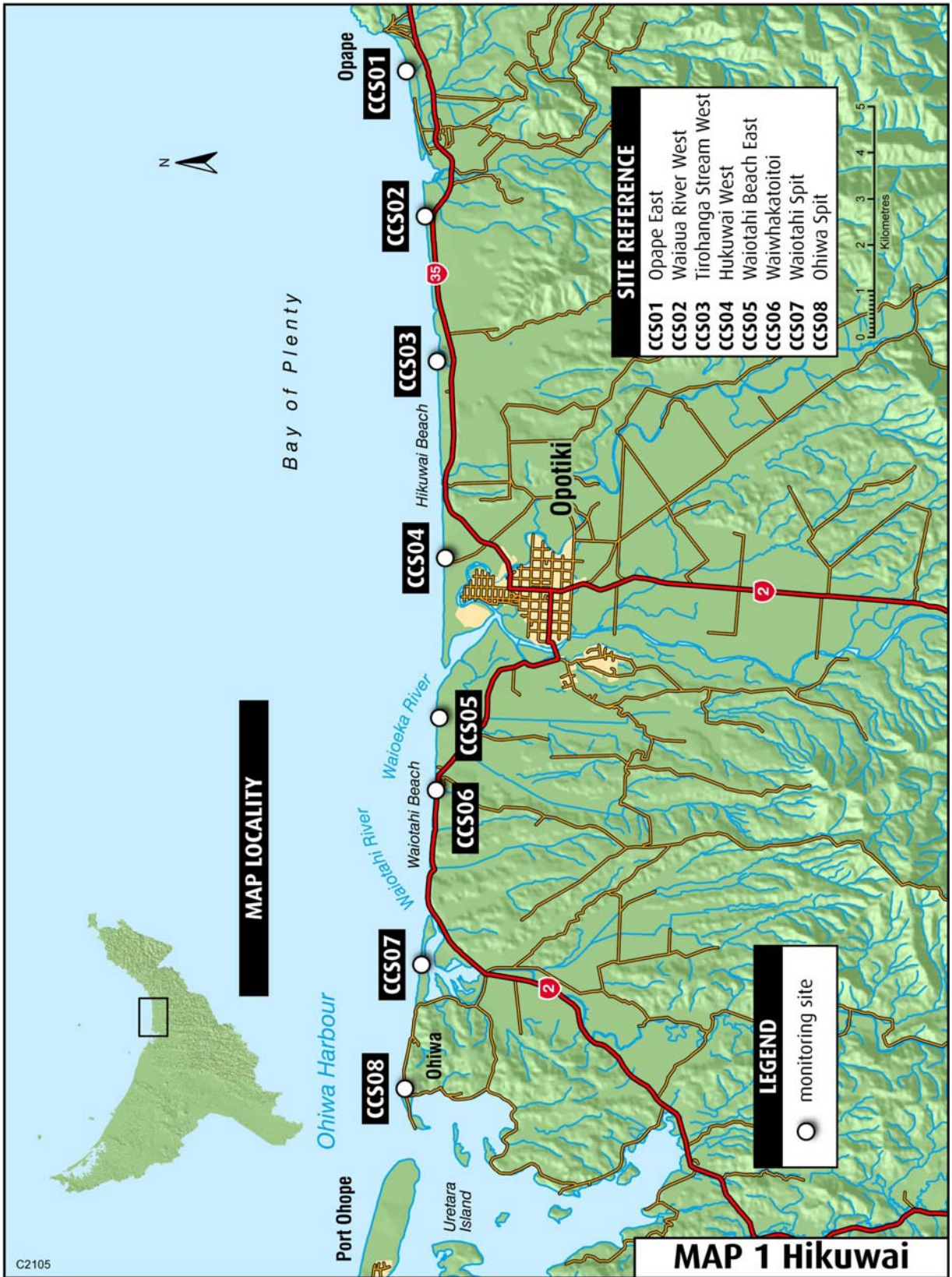


### 5.3 Hikuwai Beach system



### 5.3.1 Opape East (CCS 01)

#### Discussion

This site is located 1 km to the west of the Tarakeha headland and is approximately centrally located in the 2.5km long sandy beach which is bounded in the west by the Waiaua River. The beach borders a narrow Holocene coastal plain composed of a 140m wide dune barrier protecting a swampy flood plain. Foredune width is ~25m.



Monitoring data indicates that the beach was in its most landward position in 1991 and most accreted position in 1996. The surveys show the establishment of a new frontal dune (see maximum envelope). Offshore profiles show the development of a small offshore bar typical of profiles seen in proximity of other headlands within the Bay of Plenty. A zone of convergence occurs at -6m.

The frontal dune plot shows a seaward building of the frontal dune in the period 1996 to 2001. The frontal dune position is ~10m seaward when compared with the first recorded profile; the volume shows an increase over this period with a marked increase in elevation throughout the near shore profile. The statistical analysis shows that for this record the *beach trend is stable* with marked variation in the dataset and corresponding low correlation coefficients. Gibb (1994) stated the long-term trend (1880-1994) of shoreline retreat of approximately 25m, ranging from 15 to 34m.



**CCS 01 - Opape**

**State: Stable**

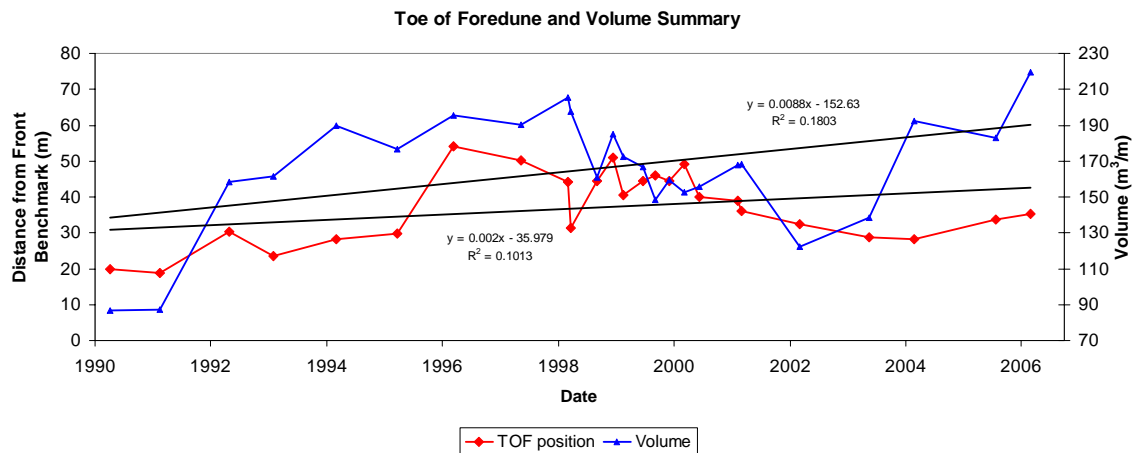
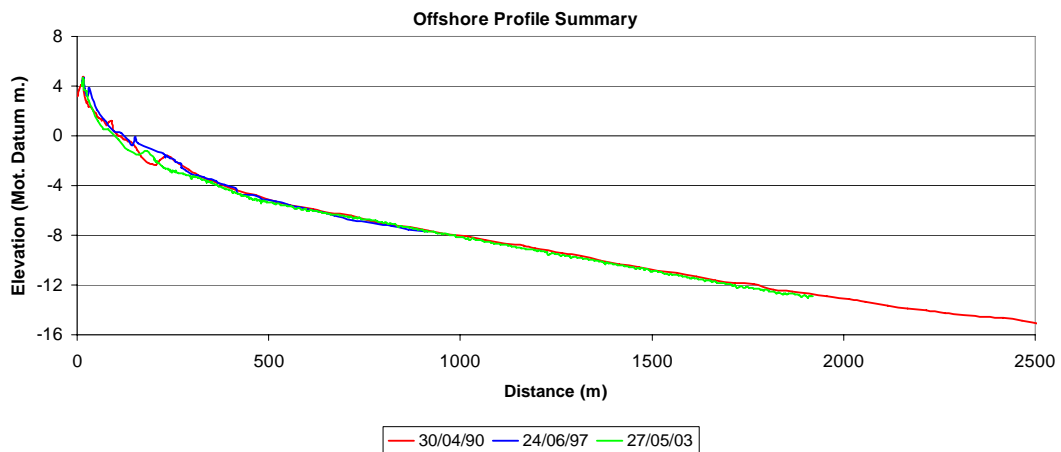
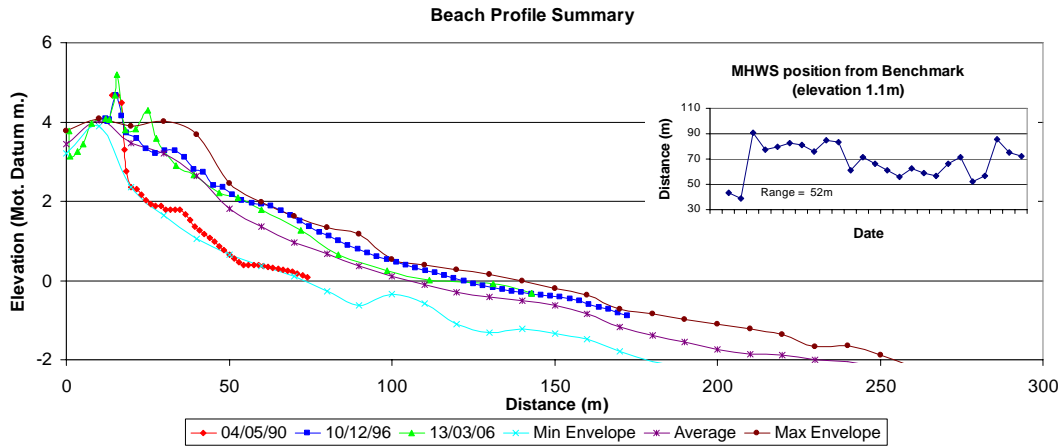
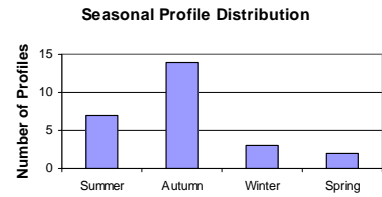
**Location:** NZMG 2897738E 6348644N

**Period of record:** 1990 – 2006

**No. of profiles:** 25

**Morphodynamic type (Wright Short model):** Longshore Bar and Trough

**Volume p-level – 0.03 TOF p-level – 0.12**



### 5.3.2 Waiaua River West (CCS 02)

#### Discussion

This site is located 700m to the west of the Waiaua River, which has migrated up to 1300m in the past (Gibb, 1994). The foredune barrier has an average elevation of 5m and is subject to wind erosion as shown in the 1978 photograph below. The 2006 photography shows a steeply faced dune with overhanging vegetation (*Carpobrotus edulis*).



The measured profiles show the characteristic shape for a sandy beach. In the 1992 profile a well developed berm exists. Most variation on the profile is shown in the highly active mid to lower section of the beach. A variation of 32m is measured at the projected MHWS position. Offshore profiles are similar to those at CCS1 with a small offshore bar present and a well developed trough in 2003. Convergence occurs at -7m.

The toe of foredune position shows no significant trend with a slight variation of ~5m evident. The volume trend is significant with a negative coefficient highlighting a *possible erosion trend* for this site.

Long-term trend (1866-1994) of stability with short-term fluctuations of 10 to 15m increasing to 20 to 30m near the Waiaua River mouth has been recorded (Gibb, 1994)



# CCS 02 - Waiaua River West (CCS 02)

State: Erosion?

Location: NZMG 2894604E 6348238N

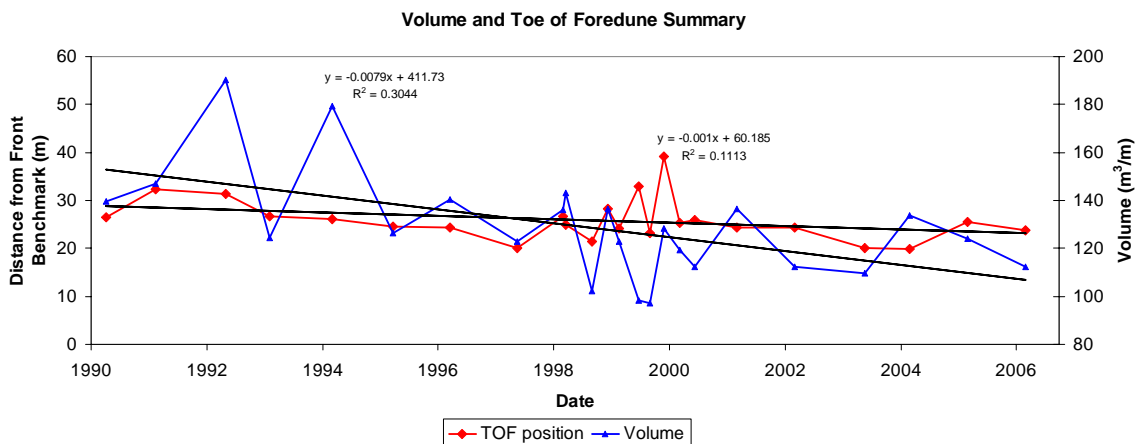
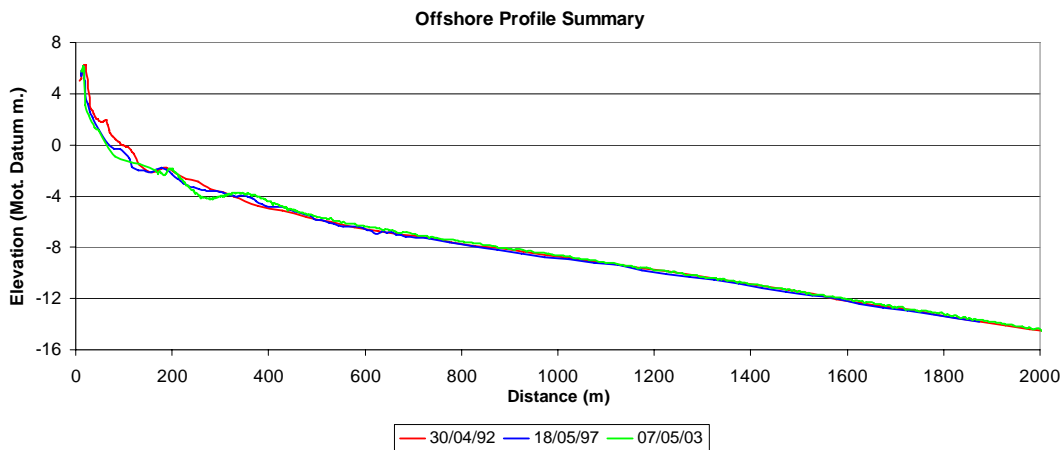
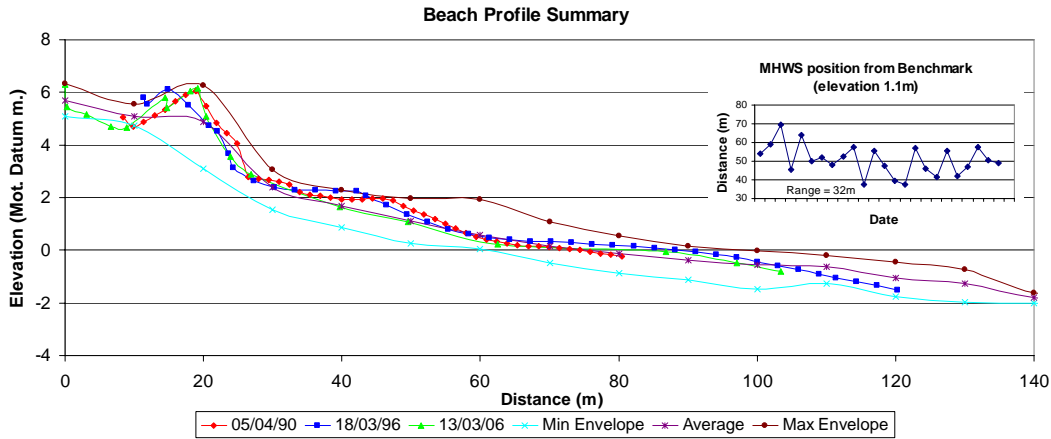
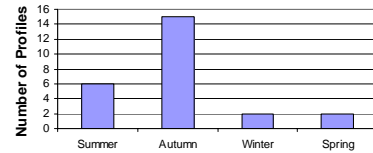
Period of record: 1990 – 2006

No. of profiles: 24

Morphodynamic type (Wright Short model): Rhythmic Bar and Beach

Volume p-level – 0.01 TOF p-level – 0.11

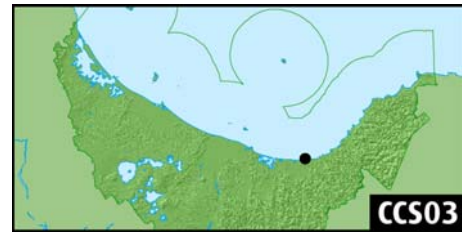
Seasonal Profile Distribution



### 5.3.3 Tirohanga Stream West (CCS 3)

#### Discussion

CCS3 is located 200m to the west of the Tirohanga Stream. This stretch of beach bounded to the west by the two streams draining the Tablelands area comprises of a 50m wide dune barrier protecting a narrow Holocene coastal plain. The photographic record shows a marked change. In 1978, well developed *spinifex* is present with runners established on the lower section of the frontal dune (some wind erosion is also evident). The 2006 photograph shows an eroded undercut dune with sparse vegetation cover (predominantly grass transported from the dune crest).



The most eroded profiles have been recorded since 2001, a short period of accretion occurred in 1992 to 1995. A maximum horizontal variation of 36m occurs at the berm (~3m elevation). The MWHS position has a variation in position of 32m. The offshore profiles exhibit a zone of convergence at -6m and the seaward movement of the moderately developed bar during the period of monitoring.

Both statistical tests are strongly significant with negative coefficients calculated for both datasets; the trend for the reported period of record is one of *erosion*. Gibb (1994) states a long-term trend (1866-1994) of shoreline retreat of approximately 20m, ranging from 12 to 26m, averaging 20m, with short-term fluctuations of 10 to 15m.



# CCS 03 - Tirohanga Stream West

**State:** Erosion

**Location:** NZMG 2891449E 6347983N

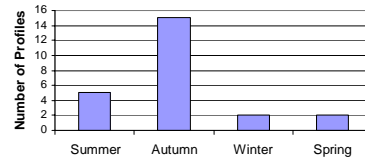
**Period of record:** 1990 – 2006

**No. of profiles:** 24

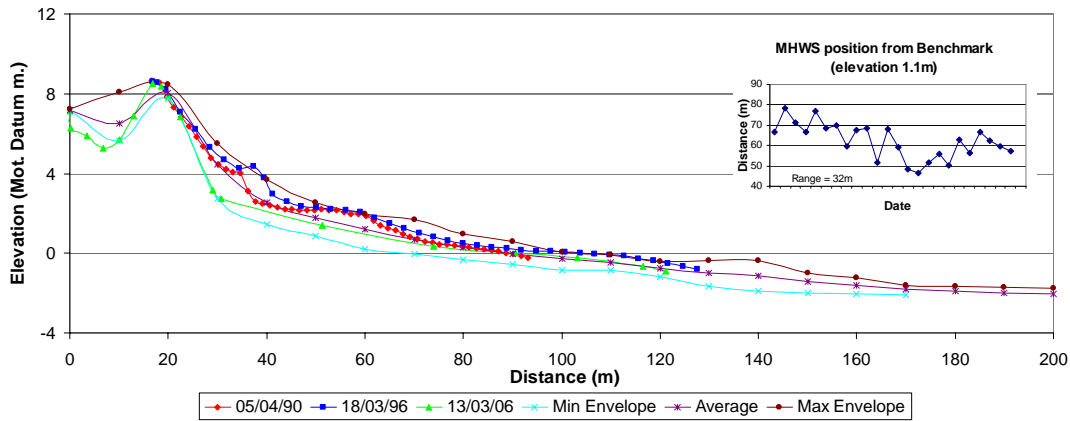
**Morphodynamic type (Wright Short model):** Rhythmic Bar and Beach

**Volume p-level – 0.00      TOF p-level – 0.00**

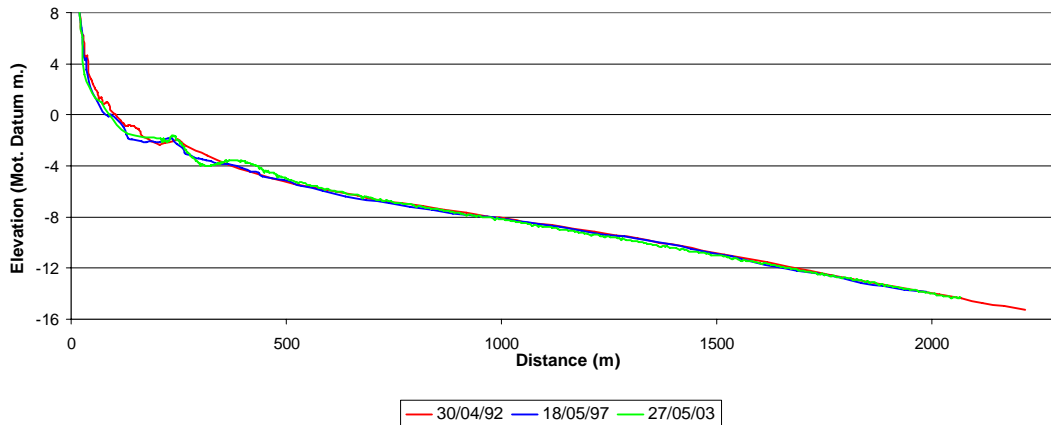
Seasonal Profile Distribution



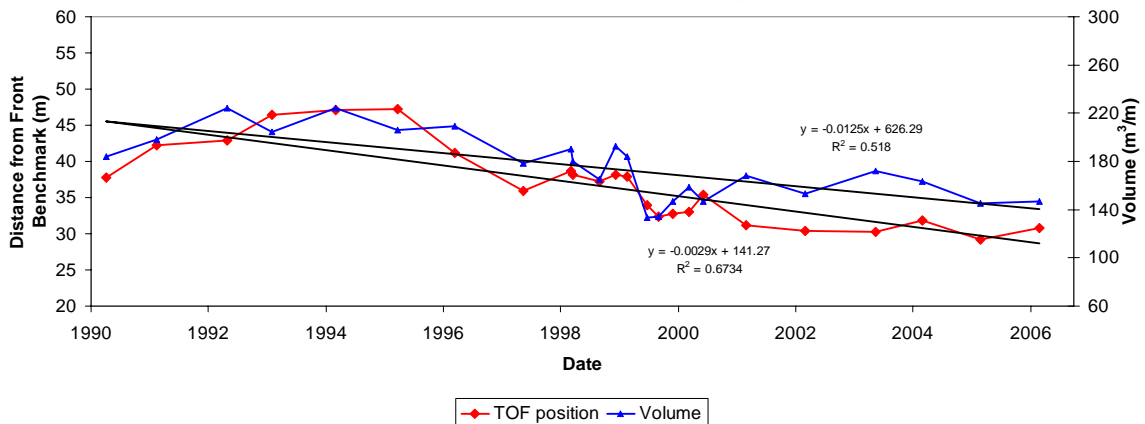
Beach Profile Summary



Offshore Profile Summary



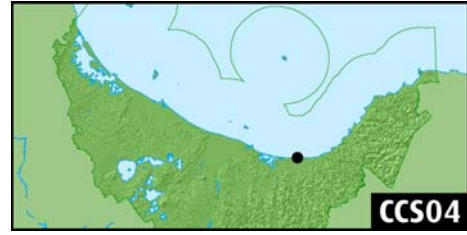
Volume and Toe of Foredune Summary



### 5.3.4 Hukuwai West (CCS 4)

#### Discussion

This site is located 2.4km to the east of the Waioeka River entrance. This section of beach borders a 60 to 200m wide dune complex that forms the seaward boundary of the Waioeka fluvial plain. Waiotahi Contractors Limited and their predecessor, Connelly & Hustler Limited have been mining sand from Hukuwai Beach for around 20 years (Lawrie, 1997). In the past up to 4000 m<sup>3</sup> was extracted per year but more recently coastal permit 04 0123 has allowed the removal of 2000 m<sup>3</sup> annually with not more than 300 m<sup>3</sup> taken per month.



Offshore profiles show a low offshore bar and accompanying shallow trough the same pattern exists as recorded at CCS3 with a seaward migration of the offshore bar in 2005. Convergence occurs at -6m.

The volume calculations show marked variability during the period of record with no significant trend in this parameter. The photographic and toe of foredune record show signs of erosion with the loss of the *spinifex* covered incipient dune shown in 1978. In 2006 a planar beach surface with no berm present and a partly undercut toe of the frontal dune exists. The trend at this site was determined to be *towards an erosive state*. The long term trend by Gibb (1994) was determined to be of shoreline retreat (1866-1994) of approximately 25m, ranging from 20 to 37m.



1978



2006

# CCS 04 - Hukuwai West

**State: Erosion?**

**Location:** NZMG 2887195E 6347805N

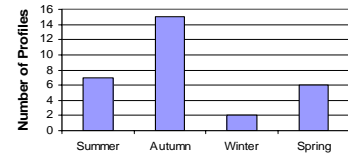
**Period of record:** 1990 – 2006

**No. of profiles:** 28

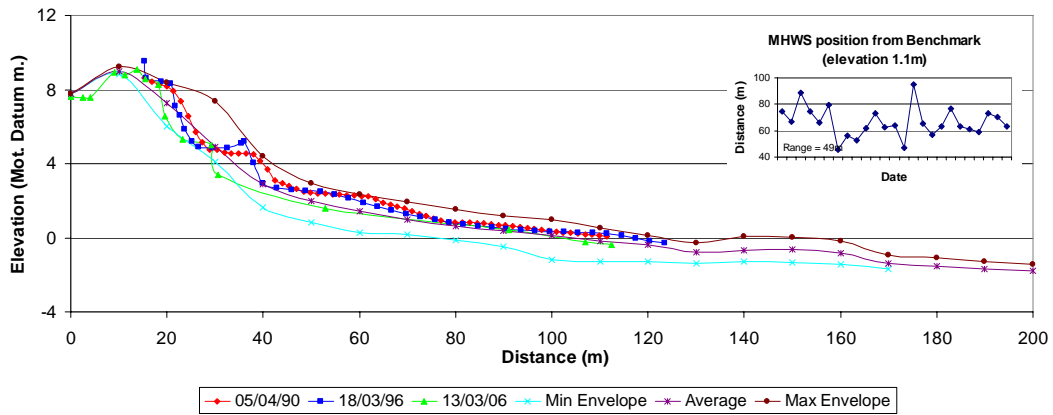
**Morphodynamic type (Wright Short model):** Rhythmic Bar and Beach

**Volume p-level – 0.03      TOF p-level – 0.00**

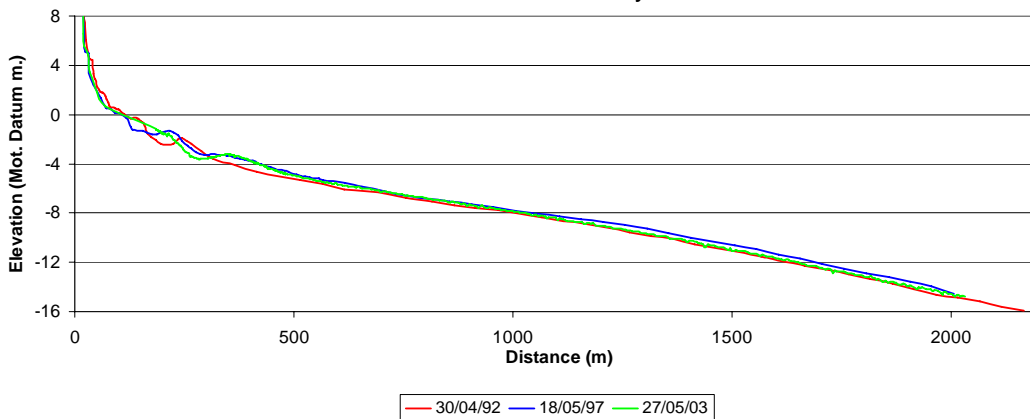
Seasonal Profile Distribution



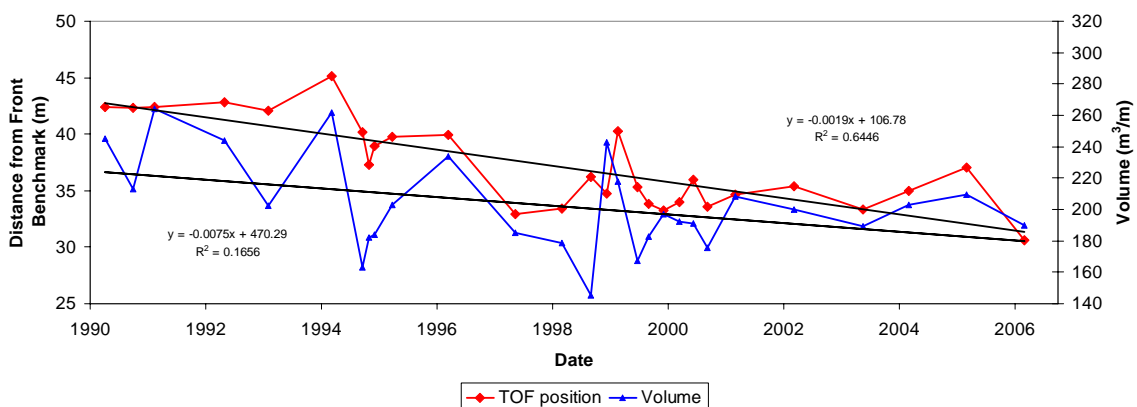
Beach Profile Summary



Offshore Profile Summary



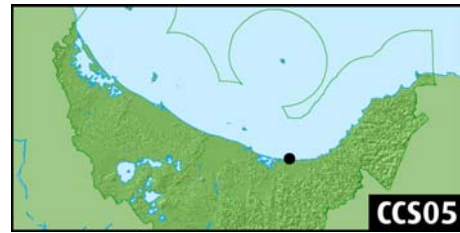
Volume and Toe of Foredune Summary



### 5.3.5 Waiotahi Beach East (CCS 5)

#### Discussion

This site is located 680m to the west of the Waioeka River entrance (based on 2003 aerial photography). Gibb (1994) stated that during the period 1866 to 1994 the entrance migrated 2km. This section of beach borders a 200 to 370m wide dune complex built from sediment supplied by the Waioeka River (Eco Nomos Ltd, 2005). As evidenced in the photographic record the foredune is subject to wind erosion, overtopping and inundation from storm wave runup.



Envelope plots show a mobile beach system with marked variation in berm position and sporadic development of incipient dunes as sediment becomes available. A fixed elevation of 1.1m (MWHS) shows a horizontal variation of 68m for the period of record.

Minor offshore bar development is evident in the two earlier plots. The 2003 profile shows a well developed bar and trough system. These offshore features would be strongly influenced by sediment yield from the adjacent river. Offshore convergence of the profiles occurs at -5.5m.

Statistical analysis showed strong trends in the data with both parameters having negative coefficients highlighting an *erosion trend* for this period of record. A long-term trend (1940 - 1994) of shoreline advance of approximately 30m, ranging from 25 to 50m, was determined by Gibb.



# CCS 05 - Waiotahi Beach East

State: Erosion

Location: NZMG 2883728E 6347934N

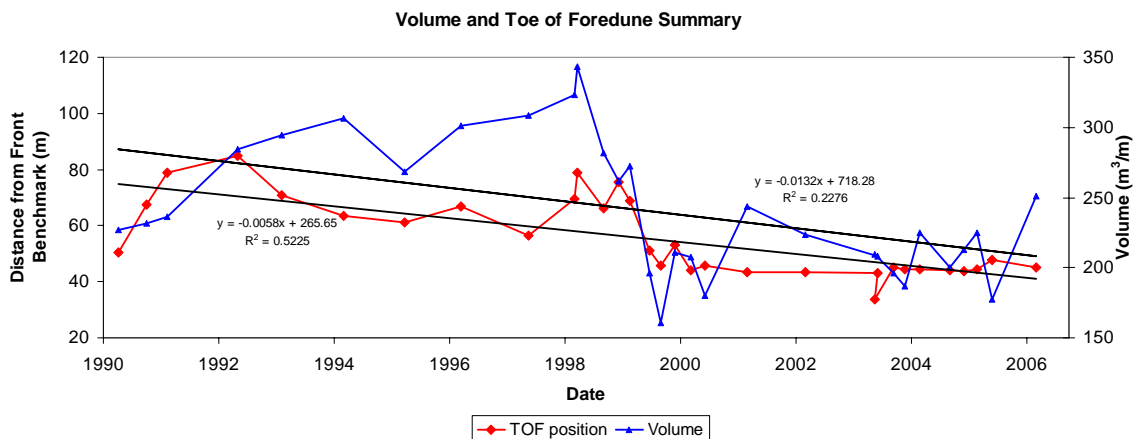
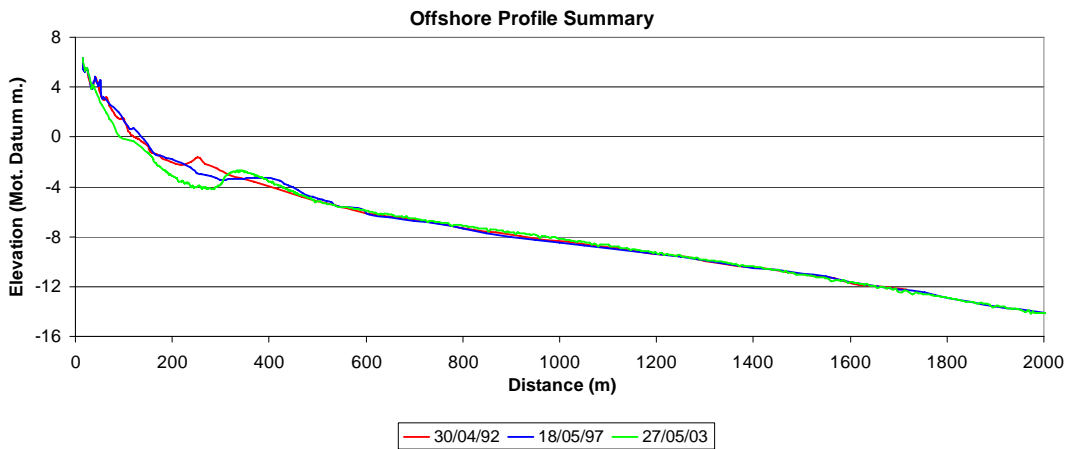
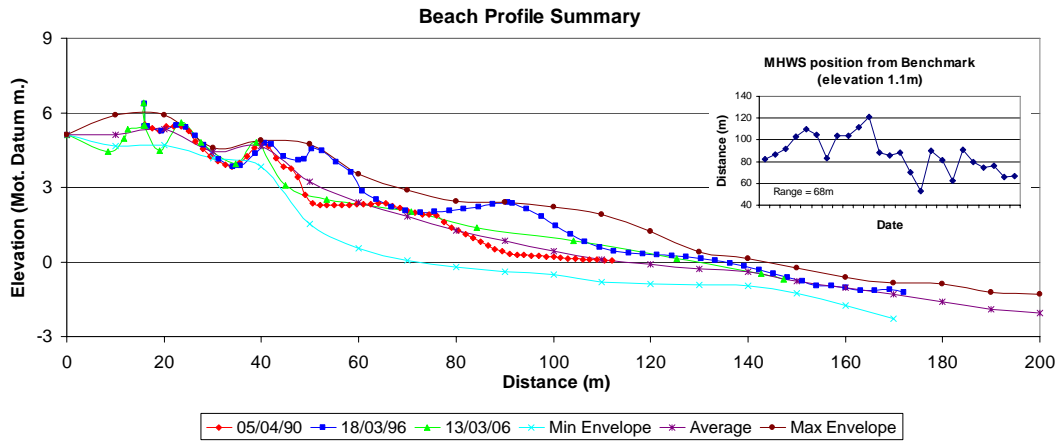
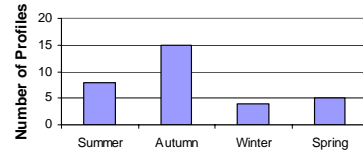
Period of record: 1990 – 2006

No. of profiles: 31

Morphodynamic type (Wright Short model): Longshore Bar and Trough

Volume p-level – 0.01 TOF p-level – 0.00

Seasonal Profile Distribution



### 5.3.6 Waiwhakatoitoi (CCS 6)

#### Discussion

This site is located 300m west of the Waitotahi Surf Life Saving Club and 800m east of Waiwhakatoitoi Stream. This section of beach is bounded landward by stranded seacliffs. Historically the dune has been subject to wind erosion and overtopping. Recent photography shows a vegetated (*spinifex*) lower dune, with pockets of erosion probably caused by human activity accessing the beach from the carpark area located in the back dune.



The most eroded profile was measured in February 1993 and accreted profile in March 1992 with a maximum cross shore horizontal distance variability of 39m. Maximum movement of the toe of foredune is determined to be 15m for the period of record analysed.

Offshore profiles show well developed bar and trough structures in the 1997 and 2003 measurements. Convergence occurs at -6m.

Previous studies Hodge & Deely (1997) and Gibb (1994) have reported an accretionary trend. For the period of record analysed a strong trend in the toe of foredune with a slight negative coefficient highlights a *possible erosive period recently*.



### CCS 06 - Waiwhakatoitoi

State: Erosion?

Location: NZMG 2882159E 6348004N

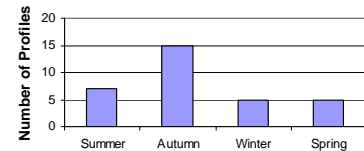
Period of record: 1990 – 2006

No. of profiles: 31

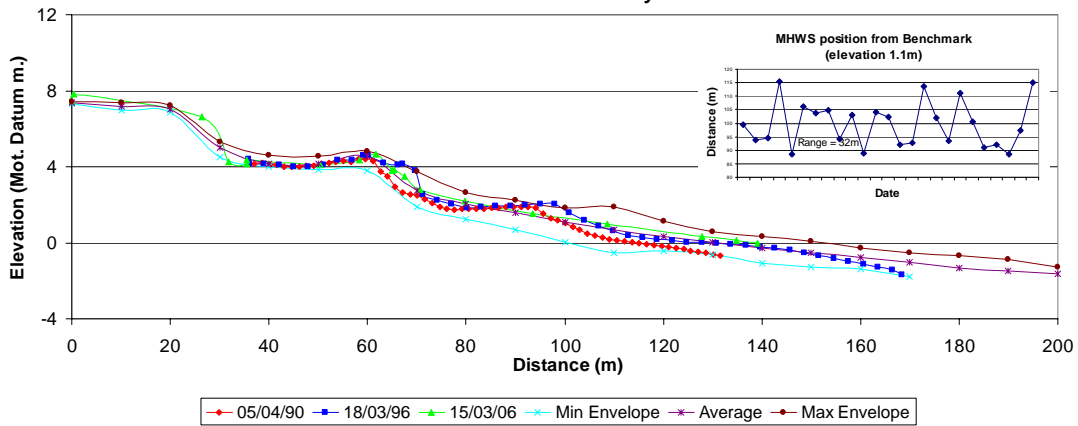
Morphodynamic type (Wright Short model): Longshore Bar and Trough

Volume p-level – 0.28 TOF p-level – 0.00

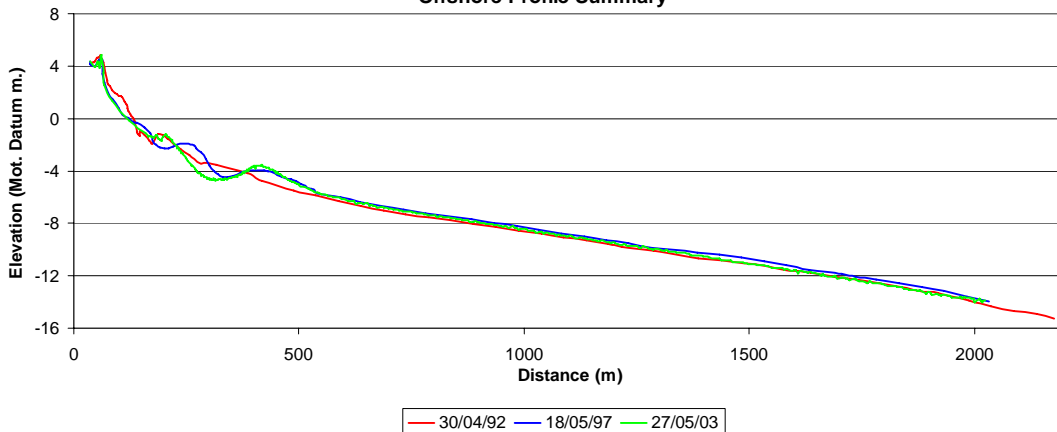
Seasonal Profile Distribution



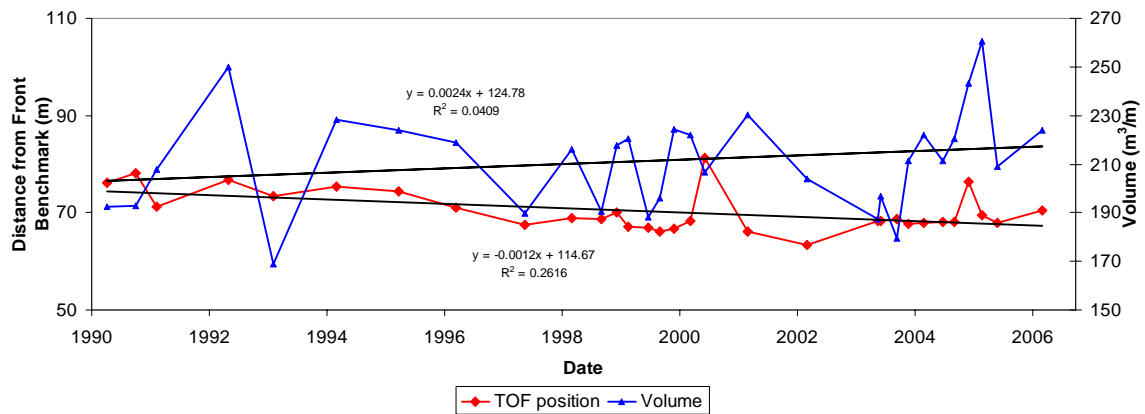
Beach Profile Summary



Offshore Profile Summary



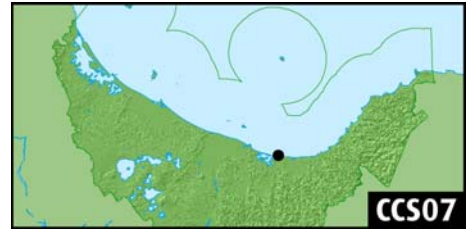
Volume and Toe of Foredune Summary



### 5.3.7 Waiotahi Spit (CCS 7)

#### Discussion

This site is located 1.1km to the west of the Waiotahi River entrance. The Waiotahi Spit is a 2.1 km Holocene sand spit that has grown from west to east suggesting a net south easterly longshore drift. At the profile site the spit is 70m wide, the narrowest section measuring only 20m is 370m to the east of the site. The photography shows a badly eroded beach in 1978, this has reversed in the 2006 photography with a well vegetated (spinifex) new fontal dune present and a healthy reservoir of sand on the upper beach.



This dune development and elevated beach shape is reflected in the beach profile summary. The MHWS position has moved approximately 30m seaward. The 2003 offshore profile shows a multiple bar configuration, the convergence with other historical profiles occurs at 7.5m.

Both the volume and toe of foredune plots show similarity in their patterns of movement. The volume statistical test was strong and coupled with a positive coefficient, the trend for the reporting period is pointing towards a *period of accretion*. The result adds to the earlier work of Gibb (1994) which states a long-term trend (1867-1994) of dynamic equilibrium with short-term shoreline fluctuations of 20 to 40m for the Waiotahi Spit.



### CCS 07 - Waiotaki Spit

State: Accretion?

Location: NZMG 2878381E 6348325N

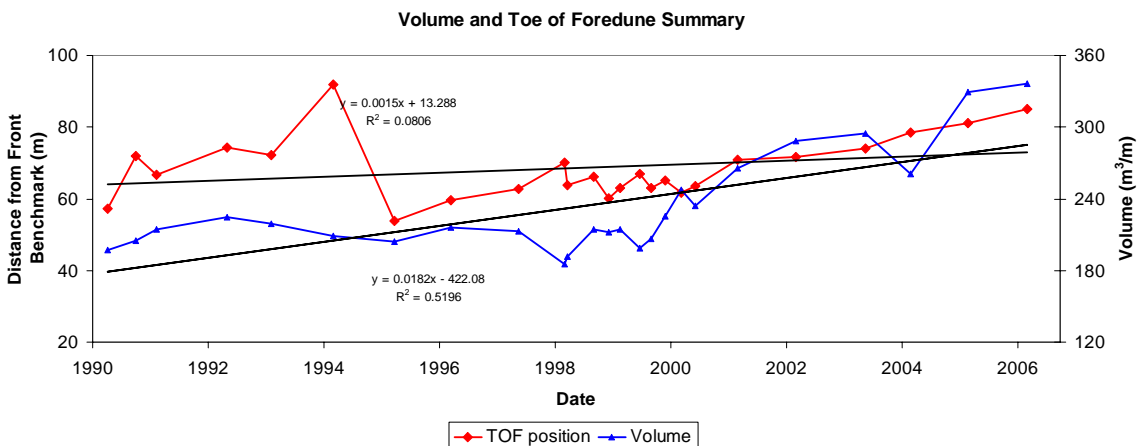
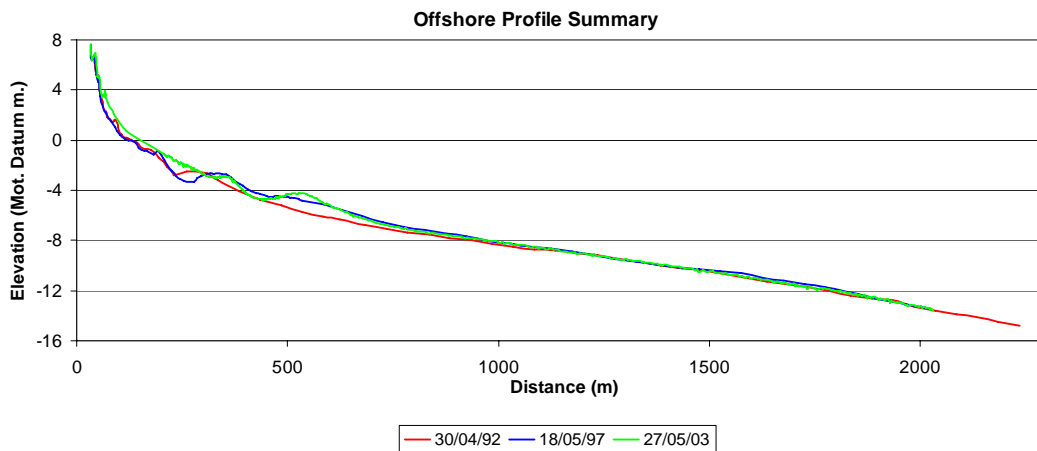
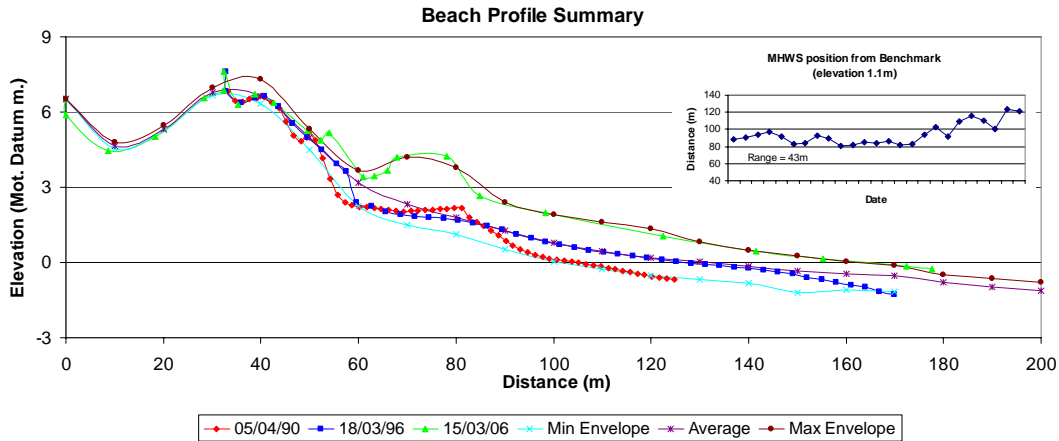
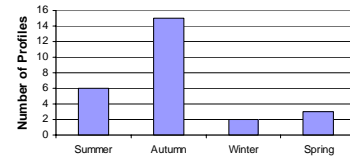
Period of record: 1990 – 2006

No. of profiles: 25

Morphodynamic type (Wright Short model): Longshore Bar and Trough

Volume p-level – 0.00 TOF p-level – 0.17

Seasonal Profile Distribution



### 5.3.8 Ohiwa Spit (CCS 8)

#### Discussion

This site is located 850m to the east of the Ohiwa Harbour entrance (based on 2003 photography) on the Ohiwa Spit (Te Mawhai). Historically dwellings have been lost to erosion with the most recent episode occurring in the late 1970's. The 1978 photograph illustrates the effort that was put into halting the erosion. The beach elevation had dropped resulting in no high tide beach and a dramatically eroded dune with a 7-8m scarp in places. The 2006 photograph shows a marked reversal with a well vegetated dune system having developed.



The profile summary highlights the seaward development of a dune system at this site. The MHS position has moved 220m seaward.

The offshore profile for 2003 shows a large accumulation of sand in the nearshore zone with multiple bars present. This area of the profile is also affected by lateral channels associated with the tidal inlet and ebb tide delta.

Statistical analysis gives strong results for both parameters highlighting the obvious *accretionary trend* for this period of the record. Assessing an earlier period of record, Gibb (1994) documented a long-term trend (1945-1994) of shoreline retreat of 50 to 60m, with short-term shoreline fluctuations of 100 to 150m for the Ohiwa Spit.



# CCS 08 - Ohiwa Spit

**State: Accretion**

**Location: NZMG 2875700E 6348676N**

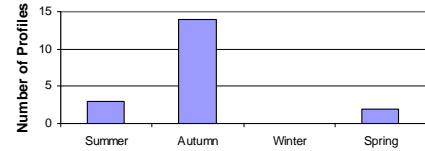
**Period of record: 1990 – 2006**

**No. of profiles: 19**

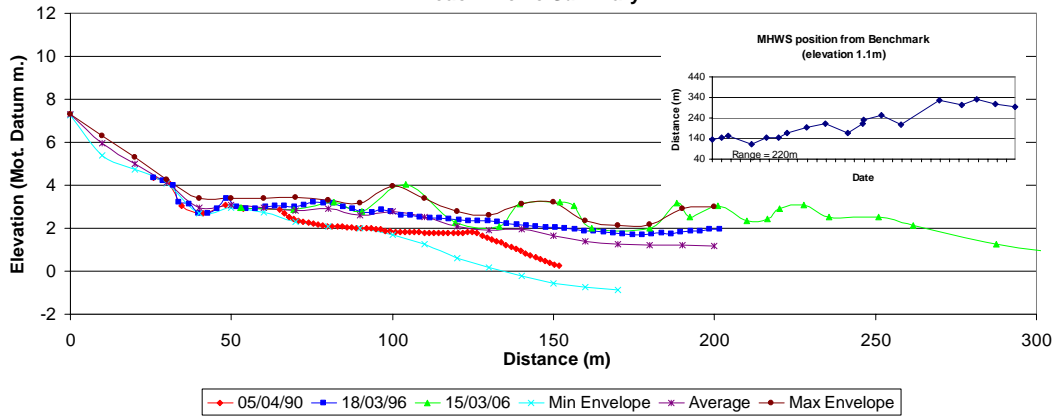
**Morphodynamic type (Wright Short model): Longshore Bar and Trough**

**Volume p-level – 0.00 TOF p-level – 0.00**

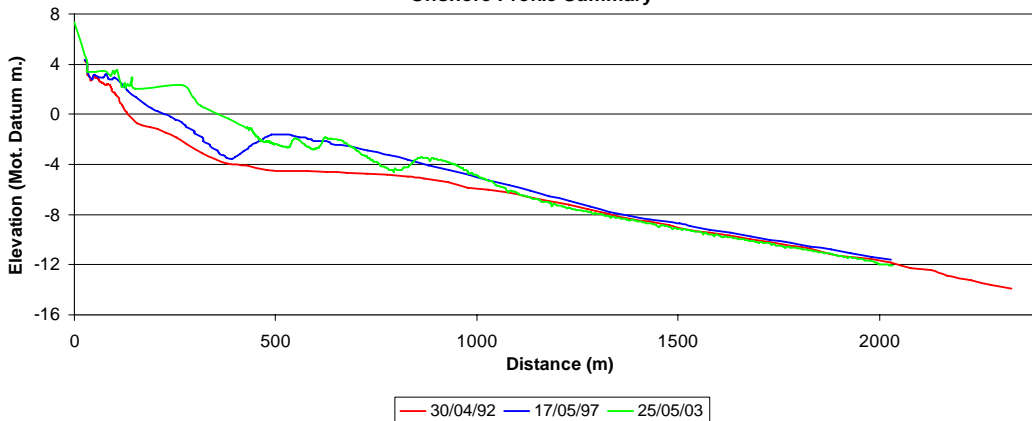
Seasonal Profile Distribution



Beach Profile Summary



Offshore Profile Summary



Volume and Toe of Foredune Summary

