

ADVISORY NOTES ON RESTORATION USING INDIGENOUS PLANTS, WAINUI AND MAKORORI BEACHES, EAST COAST

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Wainui Beach



Makorori Beach

REPORT INFORMATION SHEET

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EXECUTIVE SUMMARY

Brief advisory notes are provided to the Gisborne District Council and for local communities for restoration and management of sand dunes at Wainui and Makorori beaches, east of Gisborne city.

Dune restoration programmes require realistic expectations of the role of vegetation regarding erosion issues, and these East Coast beaches are no exception. There are some sections at each beach where it will be difficult to reinstate a foredune dominated by indigenous sand binders and therefore restore natural dune form and function. However, there are spinifex-dominant foredunes along parts of both beaches. Restoration work in selected areas already underway by the council and local communities is likely to enhance both the resilience of dunes to erosion at these sites and also increase indigenous biodiversity.

Management and restoration options are provided for mainly the foredune zone with some suggestions for selected sections of semi-stable landward zones at each beach.

Advisory notes on restoration using indigenous plants, Wainui and Makorori beaches, East Coast

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Introduction

As part of an Envirolink project (Regional Council Advice No. 833-GSDC72), the Gisborne District Council required advice on the potential of indigenous coastal plant species to address erosion issues while enhancing indigenous biodiversity, most particularly at Wainui and Makorori Beaches, east of Gisborne.

Site inspections of these beaches, discussions with council staff and a field-based meeting with the local community at Wainui Beach were undertaken. A brief outline of restoration and management options for these Gisborne beaches is provided, including realistic expectations for use of coastal vegetation, with a focus on the role of indigenous species.

Site inspections

Wainui Beach was inspected on the morning of 27th October 2010 with Gisborne District Council staff De-Arne Sutherland and Jenney Allen, and Don McLean from the Department of Conservation. This site visit covered the beach and dune system from the centrally located Hamanatua Stream adjacent to the Wainui Surf Club northeastward for approximately 400 m along the steep partially vegetated foredune faces. The lower foredunes and backdunes associated with recent work on a culvert north along Moana Road (State Highway 35) toward the whale grave were also viewed briefly.

Following a meeting with District Engineer Jurgen Komp at the council, the beach and foredunes south of the Wainui Surf Club were inspected with the local community including seaside residents concerned at significant erosion that had occurred over the last year or so and their interest in establishing and managing dune vegetation.

The Makorori Beach was inspected on 29th October 2010 at several points from the northern settlement on Makorori Beach Road southward to Makorori Point.

Role of vegetation

As described in detail by Dahm et al. (2005), dune vegetation plays an important role in natural beach and dune dynamics and in beach and dunes values. Natural dune repair after storms is *critically dependent* on the presence of appropriate sand trapping vegetation on the seaward face of the dune. The key indigenous sand binding species on

the seaward dune face are spinifex (*Spinifex sericeus*) and pingao (*Desmoschoenus spiralis*, recently renamed *Ficinia spiralis*). Guidelines for the establishment and management of these species are provided in Bergin and Herbert (1998) and Bergin (1999) and copies of these bulletins were given to the council and the Wainui Beach community.

While many exotic species have been used to stabilise dunes such as marram grass (*Ammophila arenaria*), ice plant (*Carpobrotus edulis*), and kikuyu grass (*Pennisetum clandestinum*), all of which occur along parts of Wainui and Makorori beaches, experience has shown that these species are not as effective as spinifex and pingao in repairing storm-damaged frontal dunes. Without a good cover of spinifex and pingao on the seaward dune face, natural dune repair between storms tends to be very limited. This can result in the next storm picking up where the last one left off, giving rise to more serious dune erosion than would have occurred with some more natural dune recovery between the two events (Dahm et al. 2005).

Wind erosion problems also occur if the cover of sand binding species on the seaward dune face is disrupted and can lead to severe dune damage (e.g. blowouts) and to problems with wind blown sand further inland. The sand blown inland is often permanently lost from the beach system.

Scope of advice

There needs to be realistic expectations of the role of vegetation on dunes regarding erosion issues on dunes particularly at Wainui Beach, and to a lesser extent at Makorori Beach. There are some areas at each beach where it will be difficult to reinstate a foredune dominated by indigenous sand binders, and therefore natural dune form and function, due to the confined area between properties and infrastructure and the high tide mark. However, there are spinifex-dominant foredunes occurring in parts of both beaches and there is highly worthwhile restoration work already underway by the council and local communities.

Most of the focus during the discussions and field visits was on the role that indigenous vegetation plays along the toe of the existing dunes. Management and restoration options are therefore provided for mainly the foredune zone although some suggestions for increasing indigenous biodiversity of selected sections of semi-stable landward zones is also given.

Management and restoration options

The council and local communities at Wainui and Makorori beaches have several initiatives underway involving the planting and management of key indigenous sand binding species along foredunes. Recent visits and a community presentation by Wayne O'Keefe, who is involved in successful dune restoration programmes in the Bay of Plenty, have provided locals with considerable practical information to undertake planting projects at Wainui Beach. Building on this information and based on the site visits and discussion of issues at Gisborne, notes on site characteristics and restoration options are provided, including both general comments and specific advice for selected areas at each beach.

Wainui Beach

Foredunes at Surf Club

Site description:

- The foredune face immediately seaward of the Surf Club building is dominated by dense exotic grasses such as buffulo grass (*Stenotahum secundatum*), rip gut brome (*Bromus diandrus*) and praire grass (*Bromus willdenowii*).
- There is a dense margin of the native marsh clubrush (*Bolboschoenus fluviatilis*) at the toe of the dune near the stream mouth.

Recommended action:

- Establishment of small groups of spinifex along toe of dune is recommended to encourage development of an incipient dune if desired by the local community (Figure 1); however, restoration here is likely to be a challenge due to high use.
- Any plantings will require basic guide fencing to keep beach users off plantings. Demarcation of accessways and erection of signs and information boards would encourage locals and visitors to respect restoration efforts.



Figure 1: Establishment of a narrow zone of spinifex and pingao could be attempted if locals are interested by planting small groups of sand binders at toe of the steep face dominated by exotic grass (e.g., areas either side of accessway circled). Demarcation of accessways and basic fencing of stakes or pegs with tape and would be essential to protect any plantings in this high-use area.

North of Surf Club

Site description:

- Immediately north of the Surf Club, the steep foredune face along several hundred metres is partially vegetated in mostly exotic grasses (Figure 2).
- It will be difficult area to establish indigenous sand binders in this area as the high water mark is at the base of the steep foredune face. It is also difficult to provide accessways and to stop beach users running down bare foredune faces.

Recommended action:

- Continue to plant groups of spinifex in areas of bare sand above high water mark. The spread of spinifex can be encouraged by applying light dressings of fast-release fertiliser (e.g., urea) in spring and autumn when rain expected.
- Any planted areas will require basic fencing to discourage beach users; try signage and information boards placed at entrances to beach accessways in an attempt to keep people to formal accessways.



Figure 2: This steep dune face immediately landward of high water is very difficult to revegetate in indigenous sand binders. A continuation of the planting of spinifex in small groups on bare sand is recommended but will require continued maintenance of fencing and formal accessways.

South of Surf Club

Site description:

- This area was walked with some of the local community and Gisborne District Council staff.
- Foredunes up to 10 m wide immediately south of the Hamanatua Stream comprise a dispersed cover of healthy spinifex with some evidence of a storm scarp at the dune toe.
- There are recent plantings of spinifex and some pingao along the bare seaward face of parts of the foredune and along the dune toe (Figure 3). Basic stake and tape fencing is effectively protecting planted sand binders from trampling by beach users. There appeared to be no sign of rabbit browsing.
- Further southward, the spinifex foredune runs out where a steep bank occurs dominated by exotic grasses and garden escapes. This is likely to be a very difficult area to establish a zone of indigenous sand binders due to lack of available space between the bank and high tide mark (Figure 5).

Recommended action:

- Recent community plantings on dunes south of the Surf Club indicate there is scope for continuing to plant good quality spinifex plants with some pingao within bare sand areas along seaward faces of foredunes above high tide mark.
- The presence of the naturalised sea rocket (*Cakile maritima*) along the strandline is a good indicator of the zone immediately landward in which indigenous sand binders can continue to be planted. Continue to utilise any driftwood along shoreline to create semi-sheltered habitat for newly planted spinifex and pingao.
- Lightly broadcast fast-release fertiliser over spinifex and pingao to encourage more rapid expansion over bare sand areas; refer to Bergin (1999) for details.
- Continue to demarcate beach accessways over existing and recently planted sand dunes using basic stake and tape fencing; in places, driftwood has been used effectively to demarcate access over parts of the foredune.
- Where spinifex has established, fencing needs to be relocated seaward to protect extension of runners which are highly vulnerable to trampling (Figure 4).
- Where the foredune narrows toward the south, care will be required to ensure planted spinifex on more landward sites is not invaded by exotic species; localised control by hand weeding or careful herbicide spraying may be required.
- Where replacement of exotic vegetation cover of the steep foredune is considered (such as the site in Figure 5), ensure that only small areas are removed at a time and immediately planted with groups of indigenous sand binders.
- Do not remove large areas of exotic vegetation. Large-scale reshaping and revegetation options for degraded foredunes require considerable investigation to determine the feasibility and risks associated with each site.



Figure 3: Excellent planting by the local community of spinifex and pingao within bare sand areas along the toe of the foredune will contribute to the building of an incipient dune along this zone. Simple basic fencing as erected here is all that is required to discourage beach users from walking over planted areas.



Figure 4: As the zone of spinifex narrows southward from the Surf Club at Wainui Beach, continue to densely plant spinifex with some pingao just landward of high water. Note stolons of spinifex (circled) which are growing up to a metre beyond the fence; use of simple fencing allows easier relocation seaward to protect new growth.



Figure 5: Restoration of an incipient dune along the beach further southward along Wainui Beach, where a steep slope dominated by exotics occurs at or near high water, will be difficult if not impossible to achieve. Nevertheless, any small areas of bare sand immediately above high water mark could be planted with spinifex and pingao to assist in building an incipient dune.

Northern Wainui Beach

Site description:

- Earthworks adjacent to State Highway 35 (Moana Road, Okitu) where a culvert was recently increased in size were briefly inspected.
- There is some planting of harakeke (*Phormium tenax*) on earthworks adjacent to the road. Native marsh clubbrush dominates the moister low sites while exotic grass and herbaceous species (including garden escapes) dominate sides of the watercourse and semi-stable dunes landward of spinifex foredunes (Figure 6).

Recommended action:

- Plant small groups of low-growing indigenous species in sprayed or cleared areas around the watercourse. Suggested species include pohuehue (*Muehlenbeckia complexa*), sand coprosma (*Coprosma acerosa*), *Carex testacea*, harakeke, and further seaward, sand carex (*Carex pumila*) on relatively unvegetated sand plains.



Figure 6: The indigenous biodiversity around this watercourse could be increased by planting small groups of a range of appropriate low-growing indigenous species that would have once been common on semi-stable backdunes in this region.

Makorori Beach

Makorori Beach Road settlement

Site description:

- There is an excellent example of an existing spinifex foredune immediately north of a recently planted small group of spinifex. This existing dense spinifex area (not known if it was planted or a natural remnant) has been effective in trapping sand to create an incipient dune that extends several metres further seaward than adjacent foredune sites where exotic species dominate.
- The community planting of a group of spinifex will help extend the species along the foredune; however, some spinifex plants have been located too far landward (Figure 7).

Recommended action:

- Continue to extend the planting of spinifex just landward of the high water mark within bare sand; avoid planting within semi-stable exotic grass sites further landward.
- Dense mulch placed around planted seedlings (such as the seaweed in Figure 7) may in fact suppress performance, as spinifex requires free moving sand to thrive; use only light coverings of driftwood and seaweed to provide partial protection initially.
- Where exotic grasses are extending into low foredunes, spray areas to allow the planting of small groups of spinifex and pingao to encourage sand trapping and building of an incipient dune and thereby enhance natural dune form and function.
- Continue to ensure planted spinifex is well protected from trampling by beach users such as the excellent driftwood and rope fencing already erected.
- Garden escapes and probably regrowth from garden waste dumping dominate the low backdune areas including garden nasturtium (*Trapaeolum majus*) and cape ivy (*Senecio angulatus*). Over time the local community could increase indigenous biodiversity by slowly replacing small areas of exotics with groups of low growing indigenous species.



Figure 7: Some of these spinifex have been planted too landward (white arrows) within semi-stable dunes where exotic grasses will prevent the sand binder flourishing. Spinifex should be planted more seaward to trap windblown sand from onshore winds. Note in the background the effectiveness of the existing dense spinifex cover in building an incipient dune several metres seaward (red arrow).

Central section

Site description:

- A well-developed relatively stable dune of spinifex occurs along most of the beach, which appears to be in good health and consequently contributes to natural dune form and function (Figure 8).

- Backdune areas comprise scattered rounded-crown indigenous trees including pohutukawa (*Metrosideros excelsa*) and ngaio (*Myoporum laetum*) amongst a cover of exotic grass allowing ready access for car parking and recreation.

Recommended action:

- No significant management is required unless the local community was keen to increase biodiversity along the semi-stable zone immediately landward of the spinifex zone; if so, planting small groups of ground cover and low growing shrub indigenous species to displace exotic grass cover is suggested.
- Occasional small clumps or individual plants of marram grass could be removed by spraying grass-selective herbicide such as Gallant; small gaps created by removal of exotic vegetation in the semi-stable zone between spinifex foredunes and recreational/car parking areas could be planted with low-growing ground cover and shrub backdune species, as listed above for Wainui Beach.



Figure 8: A considerable stretch of central Makorori Beach is relatively stable with a spinifex-dominated foredune that grades into semi-stable backdunes with increasing exotic vegetation cover. No significant management is required on the foredune other than removal of occasional clumps of marram grass. If desired, opportunities exist for increasing indigenous biodiversity of semi-stable backdunes by planting a range indigenous ground cover and shrub species.

Southern section

Site description:

- A spinifex-dominated foredune narrows along this southern section and runs out where State Highway 35 is located close to the coast resulting in a steep bank dominated by rank exotic grasses.
- Solid structures like the wooden steps are covered in sand; during storms such structures could be undermined by high seas.

Recommended action:

- Avoid placing further hard structures too far seaward. Angle accessways to onshore prevailing winds to reduce wind tunnelling and loss of sand landward.
- Some sand movement around wooden steps (arrowed) and windblown sand on the carpark indicates there could be scope to extend spinifex southward by planting and fertilising; refer to Bergin (1999) for establishment techniques.



Figure 9: Along the southern section of Makorori Beach, the spinifex-dominated dune (foreground) is replaced by a steep bank of exotic vegetation where State Highway 35 is located close to the coast (background). Windblown sand around the partially buried wooden steps (arrow) indicates that there may be scope to extend the spinifex southward to form an incipient dune.

Conclusions

Wherever practical, restoration of sand dunes using appropriate indigenous sand binding plants is essential to reinstate natural dune form and function. While dunes do not stop wave erosion, the self-repairing capacity of a natural dune system with a cover of the sand binders spinifex and pingao can help dune building and repair following storm erosion (Dahm et al. 2005).

There are areas along both Wainui and Makorori beaches where there is insufficient space to develop a fully functioning natural dune system. However, there are some sites where the community can continue to enhance existing foredunes by establishment of the indigenous sand binders spinifex and pingao along the seaward face of degraded foredunes.

Excellent scope also exists for increasing indigenous biodiversity along considerable areas of backdunes through the planting of a wide range of indigenous ground cover and shrub species. Detailed plans including a five-year programme of restoration covering the

dune systems at each beach are recommended to help the council and local communities to prioritise inputs and resources.

The Dune Restoration Trust of New Zealand is actively involved in similar coastal restoration and management projects as those underway or envisaged at these Gisborne beaches. Updates on the Trust activities throughout the country and latest information on sand dune management are on the Dunes Trust website www.dunestrust.org.nz or contacting info@dunestrust.org.nz.

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