Ecological survey of the Opotiki Ecological District coastal zone

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Summary

In response to pressures on conservation values and a lack of an existing ecological inventory, a field survey of the coastal zone of the Opotiki Ecological District was carried out in September 1990. This report documents the results of that survey, providing natural history descriptions for successive sections of the coast. A conservation rank is also given to each section, indicating its ecological value and priority for protection. A broad reconstruction of the scene prior to human arrival is then sketched. Finally, management recommendations are made for each coastal section in turn, using two time frames: short term (next 5 years) and long term (5 years - next century).

1. Introduction

Opotiki lies at the bottom (southernmost) of the great sweep of the Bay of Plenty. Several large rivers (the Waiotahi, Waioeka, Otara and Waiaua) emerge from the rugged flanks of the ranges and flow to the sea here. They have created broad alluvial flats on the coast, and a series of estuaries at their mouths.

Opotiki Ecological District encompasses the flats and low hills behind Opotiki, and the coast from Ohiwa in the west to Opape, where there is an abrupt change to the hard-rock topography of the eastern Bay of Plenty (see Figure 1).

People have lived in this landscape for many centuries, and wrought innumerable changes on the scene. There is still pressure on the natural values: from subdivision, waste disposal, farming, roading, weeds, feral mammals, fires, sprays, off-road vehicles, and various forms of recreational activity. Several threats, such as a proposed camp ground at Waiotahi, pasture expansion at Huntress Creek, and prospective sewage treatment (site not yet determined) are imminent, hence the requirement for an ecological survey and assessment.

The Opotiki Ecological District can be neatly divided into three clear topographic units:

- the coastal strip of cliffs, estuaries, sandy beaches and flats;
- the broad alluvial surfaces of the valleys and plains inland of the coastal strip;
- the hills.

This survey focuses on the coastal strip. Rather than concentrate on the most threatened sites, it was decided to survey the entire coast of the Opotiki Ecological District. This would thereby fit into the nationwide Protected Natural Areas Programme, which revolves around full ecological surveys of ecological districts, and would provide an ecological basis for selecting priorities for conservation.

About one-third of the coastal strip is vested in the Crown and is under Department of Conservation control: much of this, though, is currently leased for grazing. The rest of the land is in European freehold or Maori ownership. The only formally protected land is Waiotahi Spit, which is a scenic reserve administered by DoC.

Several past natural history surveys have covered this area, though not specifically (they have been wider in scope): a biological survey of the reserves of West Gisborne (Clarkson & Regnier 1989); a survey of mangroves and saltmarshes (Daniel 1982); a listing of the wild plants of the Opotiki - East Cape region (Heginbotham & Esler 1985); and a compilation of wildlife and wildlife habitats in the East Cape region (Rasch 1989). This survey zeroes in on a smaller area and attempts to be more holistic in its approach.

2. The field survey

The field survey was a very down-to-earth one, and took place over three days (25-27 September 1990). Vehicles and a boat were used for access, but most time was spent exploring on foot. Sections of the coast that presented themselves as obvious topographic units were each progressively visited and notes taken on the spot of plants, animals, vegetation patterns, landforms, signs of human occupation or use, threats to natural values and management issues. Working in this way, the entire coast was eventually surveyed. Ecological descriptions, conservation assessments and the identification of management priorities follow.

3. Ecological descriptions

This is the information section of the report. Each coastal section with significant ecological values is described in turn, from Ohiwa in the west to Opape in the east.

The numbers below correspond to the surveyed sections of the coast as they appear on the accompanying map (Figure 2). Each portion is given a conservation rank based on its actual or potential ecological values:

1 outstanding conservation value: containing natural features of national significance, or outstanding within ecological district;

2 high conservation value: natural features significant within ecological district;

3 moderate conservation value: much modified; major value lies in restoration potential;

4 low conservation value: highly modified; lowest priority for conservation management. This ranking applies to the portions of coast not mapped in this survey.

Obvious archaeological features and known historical values have been interwoven into the fabric of the features of landform, vegetation and fauna in arriving at these rankings. However, a comprehensive archaeological/historical survey should also be done, and the surveys complement each other.

1 Bryan's Beach and coast between Ohiwa and Waiotahi Estuary

Conservation Rank = 1, 3

On the coastal hillslopes west of Bryan's Beach are large pohutukawa* trees forming pockets of forest. They have a sparse understorey of taupata, houpara and kawakawa. Pohutukawa is regenerating on bare faces. This is the only pohutukawa remnant on the coast not disturbed by a road. A major pa site is here, too.

On the tiny areas of sand flats at Bryan's Beach not now covered in road and beach houses are pockets of spinifex among various adventive herbs, grasses, trees and shrubs.

2 Waiotahi Spit and Estuary

Conservation Rank = 1

Although somewhat modified, this area remains one of the natural gems of the Opotiki coast and the only one with any formal protection. It retains a rare combination of features: a sandspit, an estuary, rivermouth flats, adjacent low hills, pa site, urupa, pohutukawa forest, several rare birds (NZ dotterels, banded rails, bitterns, fernbirds), important shellfish beds, mangroves, culturally valuable plants (pingao), and a fish breeding zone (whitebait and others).

The spit is mainly vegetated in bracken-grassland following clearance of the original forest. There are, however, clumps of pohutukawa trees at its base and at the pa and urupa at the outer (eastern) end. Spinifex, with some pingao, occupies the foredune strip to seaward. The dotterels, and oystercatchers and stilts, breed at the tip of the spit. The only weeds of note are small patches of gorse, a couple of pine trees, and some boxthorn bushes. Rabbits and possums are resident, cattle sometimes stray on to the spit, and trailbike riders make use of it. Nevertheless, regeneration of pohuehue is vigorous and the revegetation potential is enormous.

Within the estuary are large areas of oioi (jointed wire rush) rushlands interspersed with some sea rush, *Baumea juncea,* three-square, and shrubs of *Olearia solandri* (apparently the only place this occurs on the Opotiki coast) and saltmarsh ribbonwood. These are also small areas in which raupo and jointed twig-rush are dominant at the base of the spit. Banded rails and Australasian bitterns, both nationally threatened birds, have been recorded here recently. Fernbirds, regionally threatened, are also present.

* for botanical names see appended glossary

The estuarine mudflats are habitat for wading birds, several fish species, and numerous invertebrates, including shellfish. Whitebait spawn in the seawater/ freshwater wedge where the river and streams enter the estuary. Where the Waiotahi River enters are two small mangroves, the only remnants of the former mangrove forests of the estuary (Daniel 1984). These, and the population in the Waiaua Estuary (23) are at the south-eastern extreme of the range of mangroves in New Zealand.

For wildlife habitat values alone, Waiotahi Estuary has been ranked as of moderate-high conservation value (Rasch 1989). When the additional values of the immediate surrounds are looked at, as in this survey, a considerably higher rank is warranted.

3 Seacliffs just east of Waiotahi River mouth

Conservation rank = 3

Many pohutukawa trees grow on the cliffs above the road, and some pohutukawa regeneration is taking place. Weeds (gorse, pampas, and pines) are abundant though, so that native species such as taupata, karo, and houpara are largely excluded.

4 Sandflat, west Waiotahi Beach

Conservation rank = 2-3

On a tiny sandflat at the mouth of a small creek is a plant of pingao among spinifex. The significance of this is that it represents the former abundance of these plants along this coast.

5 Waiotahi Beach pohutukawa avenue (west)

Conservation rank = 1

Large pohutukawa trees grow on the outwash gravel sea cliffs and interlock canopies, despite a major road running through their midst! This avenue is protected from domestic stock by fences, and has a diverse understorey of broadleaved trees and shrubs (karo, taupata, houpara, ngaio, kawakawa, and hangehange), with several coastal ferns. There are a few planted macrocarpa and some pampas plants, but otherwise the natural character of this avenue is very strong.

It, 1 and 6 are the best remnants left of the former coastal pohutukawa forests of this coast.

6 Waiotahi Beach pohutukawa avenue (east)

Conservation rank = 1-2

This avenue is very similar to that to the west (5), except that through browsing and grazing it has little understorey vegetation. Its conservation rank is lower accordingly, though the potential for regeneration is high.

7 East Waiotahi Beach

Conservation rank = 3

This area is a broad hummocky dune field between Huntress Creek and the sea.

It is vegetated in a mosaic of vinelands, shrubs, bracken and rough pasture, with the occasional cabbage tree and pine. The main vines are pohuehue and blackberry which form dense thickets, often around clumps of boxthorn, barberry, privet, gorse and elder. lnkweed is an additional rampant weed.

On the low foredunes, spinifex is most common, with areas of kikuyu grass and smaller patches of exotic iceplant.

Fernbirds use the pohuehue, gorse and blackberry alongside the estuary at the mouth of Huntress Creek, and NZ dotterels and oystercatchers breed on the driftwood-strewn storm beach nearby (see 9). Cattle browse and trample the entire area, and help perpetuate rather than alleviate the weed problem.

8 Huntress Creek saltmarsh ribbonwood

Conservation rank = 1

Near the mouth of Huntress Creek (=Te Karaka Stream) is a small wetland of about 1 ha in area formed where most of the creek has been re-routed artificially to cut off an old meander. The wetland is a dense shrubland of saltmarsh ribbonwood 1-3 m tall, with the occasional harakeke. On three sides is a fringe of raupo, whereas the landward side is flanked with a sedge-rushland of jointed twig-rush, marsh clubrush, sea rush, oioi, and giant umbrella sedge.

This area, ecologically, is outstanding in the ecological district. This is reflected in that, despite its small size, it is occupied by Australasian bitterns, nesting harriers, and numerous fernbirds. It possibly also contains marsh crakes and banded rails.

9 Huntress Creek mouth

Conservation rank = 1

Where Huntress Creek enters the Waioeka-Otara estuary is a surprisingly intact area of rushes and sedges alongside mudflats. It is a quite colourful mosaic of oioi, sea rush, marsh clubrush, and jointed twig-rush, with small amounts of *Baumea juncea* and three-square. On the dryland side is a fringe of saltmarsh ribbonwood, and small patches of creeping herbs (bachelor's button, remuremu and sea primrose).

Australasian bitterns and fernbirds are certainly present, and marsh crakes and banded rails most likely. Harriers and black-backed gulls breed there, and numerous ducks and wading birds use the area. NZ dotterels breed on the storm beach at the north-eastern tip of this area. Cattle wander through the area unimpeded at present.

9a Entrance, Waioeka-Otara Estuary, east side

Conservation rank = 1

The low sand-spit here has a driftwood-strewn storm beach. Spinifex grows on much of the more consolidated sand, and there are a few plants of shore bindweed and sea rocket. NZ dotterels nest here, so too do white-fronted terns.

Behind the low sand-spit is a higher consolidated sand ridge, which contains an urupa. The vegetation is mainly boxthorn, pohuehue, and rough pasture, used by sheep and cattle.

10 Waioeka-Otara Estuary, waterways and mudflats

Conservation rank = 2

Two major rivers coalesce and flow to the sea via a tidal estuary. This provides a variety of aquatic environments from freshwater riverine to marine, and twice daily exposure and inundation of large mudflats. The area is therefore valuable to native wading birds, fish and invertebrates on a considerable scale. On the shores are small fringes of sea rush, oioi and saltmarsh ribbonwood, but otherwise the vegetation is largely adventive grasses, shrubs and trees, much used by domestic stock. Mangroves were present in the estuary until at least 1945 (Daniel 1984), but are now gone.

11 Waioeka-Otara Estuary, rushland

Conservation rank = 2

On the western side of the estuary is a dense area of marsh clubrush, with some oioi and sea rush and the occasional bush of saltmarsh ribbonwood. It is undoubtedly home to native birds, fish, and invertebrates characteristic of such habitats.

12 Waioeka River mouth, whitebait spawning zone

Conservation rank = 1

Where the river enters the estuary is a zone where saltwater and freshwater mingle. This is where the whitebait spawn, if there is suitable riverbank vegetation. A few such areas are suitable: patches of raupo, three-square, marsh clubrush, and smaller rushes and grasses. The majority though is too modified - grazed pasture or willows - but the chance exists for rehabilitation to make this critical area the best whitebait spawning site in Opotiki Ecological District.

13 Otara River mouth, whitebait spawning zone

Conservation rank = 1

A similar area to 12, though smaller, exists where the Otara River enters the estuary. It is similarly important.

14 Hikuwai Beach, dune ridge

Conservation rank = 2, 3

This description covers the coastal section from the Waioeka-Otara estuary mouth to Tirohanga, a stretch about 6.5 km long. Here is an elongated strip of sand dunes, wider in the west and quite narrow in eastern places. Some of the dunes are piled over 10 m high. In places there is a steep sea-cut scarp, elsewhere a narrow low foredune: both are typically covered in spinifex, with smaller amounts of shore bindweed and some patches of kikuyu grass.

A portion of the dunes is a recreation reserve, with exotic trees planted among mown grass. Elsewhere though is a complex mosaic induced and shaped by past farming efforts and current grazing regimes: shrubs and small trees of boxthorn, woolly nightshade, gorse, and tree lupin; extensive vinelands of pohuehue; bracken; various pasture grasses and herbs forming patches, enclaves and expanses; weeds such as inkweed and blackberry. A lone pohutukawa tree gives a clue to the former sand-ridge forests that grew here.

Despite its highly modified nature, the vegetation on the dunes, especially the eastern section, retains a strong native element in the pohuehue, bracken and spinifex. It is likely that this area harbours many native invertebrates and lizards.

It also offers a wonderful opportunity for the restoration of a sizeable stretch of duneland forest.

15 Hikuwai Beach, wetland

Conservation rank = 2

On flats behind the dune ridge is a wetland about 1 ha in extent. There is some open water, but most of the area is covered in raupo, with a little giant umbrella sedge, puurei, jointed twig-rush, and willow. The wetland is filled with birds; pied stilts, pukekos, paradise shelducks, mallards and grey ducks at least. The area is currently used by cattle, though surprisingly intact nevertheless.

16 Tirohanga wetland

Conservation rank = 1

Within a loop in the Tirohanga Stream near its mouth is a superb sickle-shaped wetland. Most of it is covered in rushes (oioi, jointed twig-rush, and *Baumea juncea,* with smaller amounts of marsh clubrush and sea rush). There are shrubs of saltmarsh ribbonwood and patches of bracken on drier ground, areas of raupo where it is wetter, and a few clumps of harakeke, gorse, and blackberry.

Australasian bitterns and fernbirds are numerous, marsh crakes and banded rails are likely to be present, and more common water birds are abundant.

This wetland is mainly a freshwater one, with saline influence only under abnormal circumstances (very high tides and on-shore storms). It is in good condition.

17 Tirohanga pa site

Conservation rank = 1

A greywacke headland at the mouth of the Tirohanga Stream is an impressive site for a former pa, terraces and other earthworks of which some are still prominent. Large pohutukawa trees grow on the site; so too do smaller trees and shrubs of mahoe, karaka, ngaio, kawakawa, houpara, cabbage tree, taupata, and koromiko. On the almost sheer seaward scarp grow plants of whaririki, native iceplant, and pohuehue.

18 Tirohanga Beach, marram grass

Conservation rank = 4

Where a vehicle access track emerges on to the beach is a small patch of marram grass, about 50 m x 10 m in extent. Apparently the only area of marram grass on the whole coast, it poses a severe potential threat to the structure of the sandy coastline and the existence of spinifex and pingao.

19 Kelly's Beach, dune ridge

Conservation rank = 2 and 4

There is an elongated undulating dune ridge on the coast here, similar to that at Hikuwai Beach (14), but the dunes are lower. Most of the area is quite stable and vegetated in a cover of pohuehue, boxthorn shrubs, and rank pasture. There is also some gorse, privet, tree lupin, blackberry and inkweed, and scatterings of bracken. At present it isn't being much used by domestic stock, and provides good habitat for small landbirds, lizards, and invertebrates. The western portion is being grazed in places and is less advanced in terms of regeneration of pohuehue. All, however, has wonderful potential in terms of restoration of native dune forests.

On the shore here is a steep little sea scarp, mostly covered in boxthorn and pohuehue, with only very small areas of spinifex.

There is a small elongated pond at the south-east of the dune ridge. It has few obvious natural values, but is of high historic importance. An urupa is also in this vicinity.

20 Waiaua Estuary, south-western freshwater wetland

Conservation rank = 3

A small freshwater wetland about 0.5 ha in area on flat land is mainly vegetated in oioi, with some searush, jointed twig-rush, raupo, and saltmarsh ribbonwood. It is very modified, is used by domestic stock and is being drained. However, it has the potential to be restored to ecological health.

21 Waiaua Estuary, western entrance

Conservation rank = 1

A low relatively flat sand spit here has spinifex and a little shore bindweed on the foredune. NZ dotterels, stilts, terns and gulls breed here. Behind is pasture with boxthorn, gorse and pohuehue. On the estuary margin are small areas of

sea rush, marsh clubrush, three-square, slender clubrush, *Carex pumila,* and bachelor's button.

22 Waiaua Estuary, eastern entrance

Conservation rank = 1

There is an almost identical, though larger, flat sand spit to that on the western entrance (21) here. There are a few plants of pingao and scattered clumps of exotic iceplant. This is the best area on this coast for breeding NZ dotterels. Stilts, terns and gulls also breed here. Cattle wander across both areas.

23 Waiaua Estuary, open water and main mudflats

Conservation rank = 2

There are narrow fringes of rushes flanking the mudflats and waterways of the estuary. Wading and diving birds make extensive use of the estuary, which evidently provides a wealth of small fish, shellfish and other invertebrates.

24 Waiaua River mouth, whitebait spawning zone

Conservation rank = 1

There is a small section of the river above and below the main road bridge where saltwater and freshwater mingle. This is where the whitebait spawn, although there are few rushlands or reedlands left: the area could be enhanced accordingly.

25 Waiaua Estuary, south-eastern freshwater wetland

Conservation rank = 1

Here is a 5 ha freshwater wetland, beside the estuary, filled with fernbirds. Its vegetation is a colourful mosaic dominated by the rush *Baumea juncea,* with some sea rush, oioi, giant umbrella sedge, raupo, marsh clubrush, and saltmarsh ribbonwood. Gorse and grazed pasture flank this precious wetland. The Omarumutu cemetery is just to the east.

26 Waiaua Estuary, eastern arm mangroves

Conservation rank = 1

Here is the easternmost natural colony of mangroves in New Zealand (Daniel 1984). There are only a few dozen mature plants of low stature (less than 1.5 m tall), scattered over about 0.5 ha. However, there are plenty of seedlings, and with specific management the area of mangroves could be increased. Whilst the mangroves live in the tidal mud, this arm of the estuary is fringed with rushlands of sea rush, oioi, marsh clubrush, and three-square, with a little saltmarsh ribbonwood and small herbfields of sea primrose and remuremu.

27 Omarumutu-Opape dune ridge

Conservation rank = 3

This low undulating sand ridge is used by cattle and horses. It is covered in rank pasture, bracken, blackberry and pohuehue, with some gorse and tree lupin. On the driftwood-strewn foredunes spinifex is common, and there are a few small recent plantings of pingao, a plant that has undoubtedly grown there in the past.

28 Opape wetland

Conservation rank = 3

Most of the coastal flats behind the Omarumutu-Opape dune ridge are clothed in pasture. There are small strips of freshwater wetlands in hollows, though, supporting various combinations of raupo, sea rush, *Baumea juncea,* jointed twig-rush, marsh clubrush, and giant umbrella sedge. Though heavily browsed, grazed and trampled by domestic stock, they would respond favourably to protection.

4. A pre-human reconstruction

Looking at the Opotiki coast now, it is hard to imagine what the place was like a thousand years ago. But there are some clues: forest remnants, patches of swamps, sandy shore plants, native birds, fish, and shellfish .... and the land itself and its waterways.

Extrapolate from these, and take away the roads, houses, straight lines of cultivation and fences, and all the exotic plants and animals (including people), and you get a picture like this:

Sea beating on the great sweep of a sandy shore punctuated by rocky headlands and lazy river mouths. Spinifex and pingao binding the foredune faces with a rich display of silver and gold.

Low forests on the dune ridges behind the shore, smoothed to the ground by wind on the foredune crest and composed of a colourful mixture of ngaio, pohutukawa, karaka, totara, manuka, rimu, mapou, nikau, taupata, aki-raho, puriri, karo, tauhinu, *Olearia solandri* and pohuehue.

Wetlands in dune hollows around the estuarine river mouths and in low-lying places on the coastal plain and river flats. Clothed in mosaics of rushes, sedges, shrubs and flaxlands, with fringes of trees different from those of the adjacent forests: kahikatea, pukatea, swamp maire perhaps. Mangroves in sheltered muddy arms of the estuaries.

Tall dark forests on the fertile alluvial plains, of huge kahikatea, totara, matai, miro, rimu, puriri, tawa and pukatea towering over a profusion of smaller trees and understorey shrubs, ferns, creepers, and herbs. The crowns of these great trees festooned with perching and scrambling plants.

On the riverbanks, scoured from time to time by floods, a diverse specialised vegetation of relatively ephemeral opportunists: kanuka, manuka, brooms, shrub daisies, tauhinu, kowhai, cabbage tree, putaputaweta, koromiko, karamu, hangehange, rangiora, kohuhu, small-leaved coprosmas, etc.

Seacliffs and rocky headlands cloaked in a mantle of spreading pohutukawa, with a profuse undergrowth of vivid green taupata, houpara, ferns and broadleaved herbs such as renga lily, sea spinach, and sea celery.

Nearby low hills and gullies covered in diverse forest mosaics of hard beech, tanekaha, rewarewa, puriri, tawa, rimu, miro, hinau, kohekohe, nikau, pukatea, and maire, threaded through with ferns, vines, shrubs, and epiphytes.

Picture all this teeming with native birds, bats, frogs, lizards, fish, and invertebrates and not a human sign anywhere. From the sea to the inland ranges, it was so different from now.

5. Management - what to do

The obvious place to start in deciding on priorities for management is the conservation rankings. This gives the following classification of sites into:

- Key sites - those of highest rank;
- Complementary representative sites - not of highest rank, but ecologically valuable and representative;
- Potential restoration sites - of relatively low rank, but offering restoration potential;
- Problem sites.

The second way to look at management is through different time frames:

- short term - next 5 years
- long term - 5 years plus, ideally thinking 25-100 years ahead at least!

Combining these two approaches, the following recommendations can be made.

5.1 KEY SITES

These are the most ecologically valuable sites on the Opotiki coast, and therefore of highest priority for conservation. There are 16 such sites.

1 Bryan's Beach and coast between Ohiwa and Waiotahi Estuary

Short-term management: Regular inspection to check on health of pohutukawa trees and spinifex colonies.

Long-term management: Formal protection, weed control, planting and fencing to exclude domestic stock as required, so that pohutukawa forests and spinifex colonies remain.

2 Waiotahi Spit and Estuary

Short-term management: Statutory protection of estuary (spit is already protected); continued rabbit and possum control; mustelid control; eradication of gorse, boxthorn, and exotic pines; prevention as much as possible of access by trail bikes, horses, and cattle; protection of NZ dotterel breeding site from human disturbance; planting of pohutukawa on spit.

Long-term management: Restoration of dune forest on spit by fostering regeneration of native trees and planting of native trees (pohutukawa, ngaio, karaka, karo, taupata, etc - see 14, Hikuwai Beach, below); retention of rushlands and mangroves in estuary.

5 Waiotahi Beach pohutukawa avenue (west)

Short-term management: Weed and possum control; formal (legal) protection.

Long-term management: Weed and possum control; ensuring regeneration of pohutukawa, either naturally or via planting.

6 Waiotahi Beach pohutukawa avenue (east)

Short-term management: Weed and possum control; fencing to exclude domestic stock; formal (legal) protection.

Long-term management: Weed and possum control; ensuring regeneration of pohutukawa, either naturally or via planting.

8 Huntress Creek saltmarsh ribbonwood

Short-term management: Fencing to exclude domestic stock; formal (legal) protection.

Long-term management: Weed and predator control (if required); maintenance of high water table (if required).

9 Huntress Creek mouth

Short-term management: Formal (legal) protection; fencing to exclude domestic stock.

Long-term management: Weed and/or predator control (if required); maintenance of existing water regime.

9a Entrance, Waioeka - Otara Estuary, east side

Short-term management: Protection of breeding area for NZ dotterels and terns as required (predator control, visitor control, weed control, fencing to prevent vehicle and stock access); formal protection (legal and/or district scheme).

Long-term management: Maintenance of breeding area for seabirds and of archaeological/historical values of adjacent land.

12 Waioeka River mouth, whitebait spawning zone

Short-term management: Formal protection (legal and/or district scheme); prevention of invasion by willows or other woody weeds; fencing to exclude stock if required.

Long-term management: Maintenance of optimum vegetation/habitat for whitebait spawning, whatever that is shown to be.

13 Otara River mouth, whitebait spawning zone

Short-term management: As for 12 (above).

Long-term management: As for 12 (above).

16 Tirohanga wetland

Short-term management: Formal (legal) protection; fencing to exclude domestic stock.

Long-term management: Weed and/or predator control, if required; maintenance of current water regime.

17 Tirohanga pa site

Short-term management: Formal (legal and/or district scheme) protection; grazing by sheep only (cattle, goats and horses excluded because of the damage they do to earthworks and native vegetation).

Long-term management: Planting to ensure the continued presence of pohutukawa trees; restoration/interpretation of pa features

21 Waiaua Estuary, western entrance

Short-term management: Formal protection (legal andlor district scheme); fencing to exclude domestic stock; predator and/or weed control if required.

Long-term management: Maintenance of breeding area for NZ dotterels, stilts, terns and gulls using whatever protective/enhancement measures are required.

22 Waiaua Estuary, eastern entrance

Short-term management: As for 21 (above); also maintenance of pingao colony (planting if necessary).

Long-term management: As for 21 (above); also maintenance of pingao colony, and eradication of exotic iceplant if it becomes a threat to either the pingao or the nesting birds.

24 Waiaua River mouth, whitebait spawning zone

Short-term management: Formal protection (legal and/or district scheme); prevention of invasion by willows or other woody weeds; fencing to exclude domestic stock (especially cattle).

Long-term management: Maintenance of optimum habitat/vegetation for whitebait spawning (could include enhancement of rushlands and reedlands by planting or encouraging natural regeneration).

25 Waiaua Estuary, south-eastern freshwater wetland

Short-term management: Formal protection (legal and/or district scheme); fencing to exclude domestic stock (especially cattle and horses).

Long-term management: Weed and/or predator control (if required); maintenance of wetland water regime (as at present).

26 Waiaua Estuary, eastern arm mangroves

Short-term management: Formal protection (legal and/or district scheme); fencing of estuary margins to exclude cattle.

Long-term management: Maintenance of water regime sufficient to maintain health of mangroves; planting of mangroves if necessary to replace losses.

5.2 COMPLEMENTARY REPRESENTATIVE SITES

These sites also require protection. Although they are slightly less ecologically outstanding than the key sites (and therefore have a lower conservation ranking), they nevertheless complement the key sites and are important in representing the spectrum of the natural diversity that remains on the Opotiki coast. There are 6 such sites.

10 Waioeka-Otara Estuary, waterways and mudflats

Short-term management: Formal (legal and/or district scheme) protection; fencing of margins to exclude domestic stock; opposition to uses that threaten the natural integrity of the estuary.

Long-term management: Maintenance of the estuarine system in as natural a state as possible, by whatever means are required.

11 Waioeka-Otara Estuary, rushland

Short-term management: Formal protection (legal and/or district scheme); fencing of dry land margin to exclude domestic stock.

Long-term management: Predator and/or weed control (if required); maintenance of tidal wetland regime.

14 Hikuwai Beach, dune ridge (eastern section)

Short-term management: Formal protection (legal and/or district scheme); grazing on short-term lease only; survey to assess levels and identities of native lizards and invertebrates.

Long-term management: In medium term, elimination of grazing and fostering of native vegetation (by natural regeneration, planting, seed-sowing and judicious weed control); in longer term, exclusion of grazing totally and maintenance of small open grass areas by mowing, as regeneration, continued planting, weed control and feral mammal control carry the vegetation towards native coastal forest and shrubland. Recommended native trees and shrubs to plant: pohutukawa, ngaio, taupata, karo, kohuhu, aki-raho, houpara, manuka, kanuka,

karaka, kowhai, kawakawa, cabbage tree, whararikí, harakeke, tauhinu, koromiko, *Olearia solandri*, mapou, totara, puriri, nikau, maire, wharangi, karamu.

15 Hikuwai Beach, wetland

Short-term management: Formal protection (legal and/or district scheme); fencing to exclude domestic stock; eradication of willow.

Long-term management: Predator and/or weed control, if required; maintenance of freshwater wetland regime.

19 Kelly's Beach, dune ridge (eastern half)

Short-term management: As for 14 above.

Long-term management: As for 14 above.

23 Waiaua Estuary, open water and main mudflats

Short-term management: Formal (legal and/or district scheme) protection; fencing of margins to exclude domestic stock; opposition to uses that threaten the natural integrity of the estuary.

Long-term management: Maintenance of the estuarine system in as natural a condition as possible, by whatever means are required.

5.3 POTENTIAL RESTORATION SITES

These sites rank low in a conservation sense, and therefore deserve less urgent attention to protect conservation values. What they offer, though, is the chance for restoration of natural features formerly there (coastal forests, dune vegetation, wetlands, and associated native fauna). There are 8 such sites.

3 Seacliffs just east of Waiotahi River mouth

Short-term management: Regular inspection to check on health of pohutukawa trees.

Long-term management: Formal protection; weed control (pampas and pines); fencing to exclude domestic stock; planting of pohutukawa if necessary.

4 Sandflat, west Waiotahi Beach

Short-term management: Regular inspection to check on health of pingao and spinifex.

Long-term management: Planting of pingao and/or spinifex if required.

7 East Waiotahi Beach

Short-term management: Grazing on short-term lease only; survey to assess use by fernbirds and levels and identities of native lizards and invertebrates.

Long-term management: Fencing of core areas to exclude grazing/browsing stock, and within these fenced areas, planting of native coastal trees and shrubs (for recommended species see 14, Hikuwai Beach, eastern section, above), judicious weed control, possum and rabbit control, and fostering of native regeneration; grazing elsewhere. Progressively, core areas expanded and grazed areas diminished until restoration of coastal forest and shrubland is complete.

14 Hikuwai Beach, dune ridge (western section)

Short-term management: As for 7 above.

Long-term management: As for 7 above.

19 Kelly's Beach, dune ridge (western half)

Short-term management: As for 7 above.

Long-term management: As for 7 above.

20 Waiaua River, south-western freshwater wetland

Short-term management: Regular inspection to check on condition.

Long-term management: Formal protection (e.g. covenant), fencing to exclude stock, and restoration of wetland water regime.

27 Omarumutu-Opape dune ridge

Short-term management: Regular inspection to check on condition; nurturing of planted pingao.

Long-term management: Formal protection, fencing to exclude domestic stock from all or part and planting/fostering of regeneration of native trees and shrubs as in 7 above; encouragement of pingao on foredunes by continued planting and by control of rabbits, possums, and weeds.

28 Opape wetland

Short-term management: Regular inspection to check on condition.

Long-term management: Formal protection, fencing to exclude stock and maintenance of wetland water regimes.

5.4 PROBLEM SITES

There is only one site at which urgent action is required to prevent a potentially serious problem:

18 Tirohanga Beach, marram grass

Short-term management: Eradication of marram grass as soon as possible, to prevent its spread along this coast.

Long-term management: Regular inspections of here and elsewhere on the coast to check on presence or absence of marram grass - if present, immediate eradication.

5.5 PROTECTION

For land not vested in the Crown, protection can only proceed with the willingness of the landowners. Approaches to them should be made to sound out conservation prospects, where their land has important natural values, archaeological or historic sites, or significant restoration potential.

6. Conclusion

A surprising wealth of natural features remains on the Opotiki coast. This ecological survey and assessment provides basic site descriptions. It also provides an ecological framework for conservation rankings. These, combined with (a) current and perceived future threats, and (b) restoration potentials, have led to a series of short-term and longer-term management recommendations for each site.

If these recommendations are followed, the Opotiki coast will not only retain its remaining naturalness, but will become quite magnificent in future and be an outstanding national asset. The potential is there for sure, and the management techniques required to realise it are known and are not economically prohibitive. We just have to want to do it.

7. Acknowledgements

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9. Appendices

Glossary of plant names

Common name	Scientific equivalent
aki-raho	*Olearia paniculata*
bachelor's button	*Cotula coronopifolia*
barberry *	*Berberis glaucocarpa*
blackberry *	*Rubus fruticosus*
boxthorn *	*Lycium ferocissimum*
bracken	*Pteridium esculentum*
brooms	*Carmichaelia* spp.
cabbage tree	*Cordyline australis*
elder *	*Sambucus nigra*
giant umbrella sedge	*Cyperus ustulatus*
gorse *	*Ulex europaeus*
hangehange	*Geniostoma rupestre*
harakeke	*Phormium tenax*
hinau	*Elaeocarpus dentatus*
houpara	*Pseudopanax lessonii*
iceplant, exotic *	*Carpobrotus edulis*
iceplant, native	*Disphyma australe*
inkweed *	*Phytolacca octandra*
jointed twig-rush	*Baumea articulata*
kahikatea	*Dacrycarpus dacrydioides*
kamahi	*Weinmannia racemosa*
kanuka	*Kunzea ericoides*
karaka	*Corynocarpus laevigatus*
karamu	*Coprosma robusta*
karo	*Pittosporum crassifolium*
kawakawa	*Macropiper excelsum*

* exotic/adventive plant

kikuyu grass *	*Pennisetum clandestinum*
kohekohe	*Dysoxylum spectabile*
kohuhu	*Pittosporum tenuifolium*
koromiko	*Hebe stricta* var. *stricta*
kowhai	*Sophora* spp.
maire	*Nestegis* spp.
manuka	*Leptospermum scoparium*
mapou	*Myrsine australis*
marram grass *	*Ammophila arenaria*
marsh clubrush	*Bolboschoenus fluviatilis*
matai	*Prumnopitys taxifolia*
ngaio	*Myoporum laetum*
nikau	*Rhopalostylis sapida*
oioi, jointed wire rush	*Leptocarpus similis*
pampas *	*Cortaderia selloana*
pines *	*Pinus* spp.
pingao	*Desmoschoenus spiralis*
pohuehue	*Muehlenbeckia complexa* (and M. *complexa x M. australis* hybrids)
pohutukawa	*Metrosideros excelsa*
privet *	*Ligustrum* spp.
pukatea	*Laurelia novae-zelandiae*
puriri	*Vitex lucens*
putaputaweta	*Carpodetus serratus*
puurei	*Carex secta*
rangiora	*Brachyglottis repanda*
raupo	*Typha orientalis*
remuremu	*Selliera radicans*
renga lily	*Arthropodium cirratum*
rimu	*Dacrydium cupressinum*
saltmarsh ribbonwood	*Plagianthus divaricatus*
sea celery	*Apium prostratum*
sea primrose	*Samolus repens*
sea rocket *	*Cakile edulenta*
sea rush	*Juncus maritimus* var. *australiensis*
sea spinach	*Tetragonia trigyna*
shore bindweed	*Calystegia soldanella*
shrub daisies	*Olearia* spp.
slender clubrush	*Isolepis cernua*
spinifex	*Spinifex sericeus*
tauhinu	*Cassinia leptophylla*
taupata	*Coprosma repens*
three-square	*Schoenoplectus pungens*
tree lupin *	*Lupinus arboreus*
wharangi	*Melicope ternata*
whaariki	*Phormium cookianum*
willow *	*Salix fragilis*
woolly nightshade *	*Solanum mauritianum*

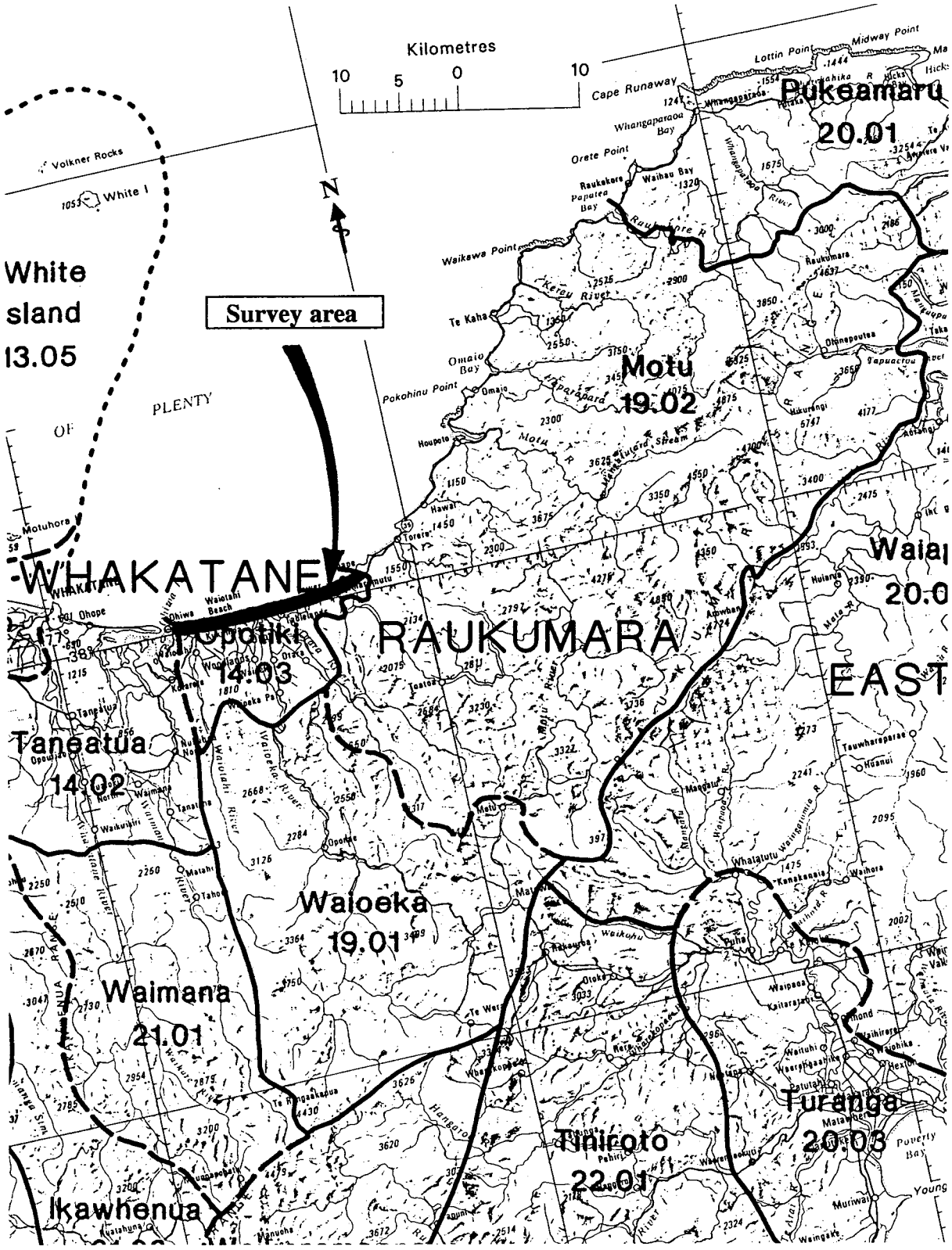

Figure 1. Location of survey area, the coastal strip of Opotiki Ecological District.

= high conservation value, rank 1
= moderate conservation value, rank 2
= low conservation value, rank 3
(unmapped parts of the coast are of very low conservation value, rank 4)

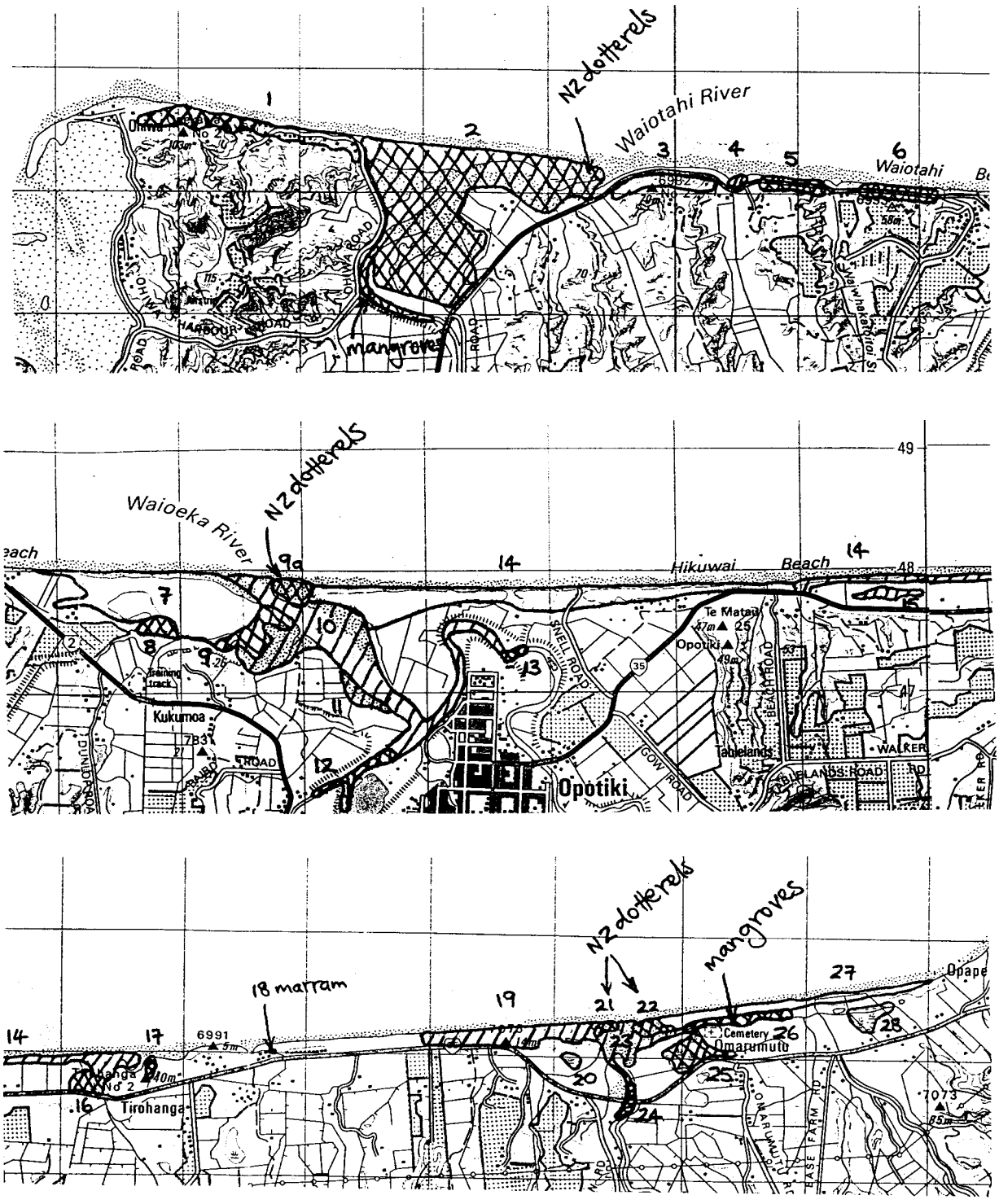

Figure 2. Conservation sites on the Opitiki coastline.