

ear hawkweed (*Hieracium pilosella*) which could be a serious competitor with native species. Dr Geoff Rogers, of Forest Research Institute (FRI) at Rotorua, reports that *Acaena rorida*, a bidibidi species of these hollows which is endemic to the north-west Ruahines, is seriously threatened by hawkweed. This bidibidi is rated as 'rare' by David Given.

After many years without livestock, land around Makirikiri has been recently grazed by cattle. Physical damage by cattle hooves opening the turf also assists the entry of weeds, such as hawkweeds and pasture grasses. Dr Gillian Rapson of Massey University describes (pers. comm.) similar impacts of cattle in string bogs and associated ephemeral wetlands of the Lammerlaw Range in Otago.

A very similar situation occurs around the highest parts of the Maungaharuru and Te Waka Ranges in inland Hawkes Bay. Turf mats on hard substrates resist the trampling of cattle, sheep and goats which graze the surrounding pasture (at over 1,800m altitude). Soft-bottomed, seasonally wet areas are badly trampled and adventive plants (for example jointed rush, *Isolepis setacea*, and *Carex ovalis*) have invaded them. Searches in 1989 and 1990 failed to re-find a New Zealand endemic asphodel, *Iphigenia novae-zelandiae*, on Te Waka Range, the site of its only North Island record.

Wild animals can also have considerable impacts on wetlands. For example, in periodically wet areas of the Moawhango River, southern Kaimanawa Ranges, wild horses are modifying the habitat of nationally threatened plants. On-going research by Geoff Rogers has already shown that the present high numbers of horses are incompatible with the conservation of the diverse native flora of these wetlands. One remarkable site on the shoulder of a ridge above Awapatu Stream can be empty or full of water at any time of the year because its water comes from the overflowing of an adjoining creek. Plants at risk there include *Gnaphalium ensifer* in its only North Island site, and *Amphibromus fluitans*. Ironically, the horses are protected under the Wildlife Act but the threatened native plants have no formal protection.

The majority of the southern Kaimanawa wetlands are "flushes" in tussockland – permanently damp areas which have trickling surface water during wet weather. *Carex berggrenii* occurs only here in the North Island. Both the buttercup *Ranunculus recens* (brown hairy form) and a fine-leaved, small sedge, *Carex uncifolia* are here and in only one other North Island site each. The original population of the latter plant was wiped out during road construction by the army. Fortunately, it had been taken into cultivation by botanist Tony Druce, from whom Geoff Rogers obtained material to replant it recently in several places with similar habitat nearby.

Ephemeral saline wetlands

The Protected Natural Areas (PNA) programme was set up to identify and protect the best remaining examples of all types of natural area in each ecological district. However, PNA surveys have sometimes failed to recognise that ephemeral wetlands exist as, for example, ephemeral saline wetlands in Old Man Ecological District.



Makirikiri Tarns from Te Rakaunuiokura, north-west Ruahine Range. Surrounded by red tussock, some of these pools have permanent water, but

others dry out for different lengths of time, creating habitats for a wide range of native plants.

Inland saline areas of Central Otago were comprehensively surveyed and described by Department of Conservation (DoC) scientist Brian Patrick in 1989. A subsequent article in *Forest & Bird* (February 1990) gave some of the highlights. Although these areas have some similarities in flora and fauna to coastal salt marshes, long periods of isolation from the coast have produced unique ecosystems with endemic biota. Agriculture has eliminated many sites, and adventive plants are invading those that remain. Brian Patrick makes a strong plea for the conservation of remaining saline areas, but he stresses the need for management to retain or restore their natural character. One area of 125 hec-

shore of Lake Wairarapa, sand dune formation has isolated parts of the lake bed, and produced quite different habitats from the lake shore itself. One example is Boggy Pond Reserve, a wetland isolated by stopbanks. The Reserve comprises a large pond and several shallow basins which become discrete ephemeral wetlands when water levels drop. One of these basins we dubbed "Wader Pond" in 1983 because, as water levels dropped in January, Peter Moore found it was used regularly by pied stilt, banded dotterel, white-faced heron, sharp-tailed sandpiper, pectoral sandpiper, and, less often, wrybill and lesser yellowlegs.

By March, Wader Pond was dry and the



Cattle in an ephemeral wetland on the crest of the Maungaharuru Range, inland Hawkes Bay. *Iphigenia novae-zelandiae*, in its only North Island location, was in a similar site in the

adjoining Te Waka Range some years ago but could not be found in two recent surveys. Some other uncommon species remain, despite cattle trampling.

tares, including Sutton Salt Lake, has been purchased recently as a reserve by DoC.

Ephemeral wetlands of lake shores

Other types of ephemeral wetlands can be found on lake shores, such as DoC scientists Peter Moore, Kevin Moynihan and I described for Lake Wairarapa in 1984. On the eastern

native turf plant community was found to contain an aquatic fern called pillwort (*Pilularia novae-zelandiae*), and again that characteristic grass of ephemeral wetlands, *Amphibromus fluitans*.

Shortly after, gamebird managers cut through the stopbank to allow water from an adjoining reserve, Matthews Lagoon, to "top-up" Boggy Pond. Matthews Lagoon received