

RESTORING SMALL WETLANDS ON PRIVATE FARMS

Wendy Lynch

November 1995



All purpose pond constructed for multiple uses of erosion control, irrigation and duck shooting. Fenced off with a wide margin. Fed by a spring.

"Everything we have been taught in contemporary times is that monocultures are necessary, to increase both production and growth. But this type of thinking is really one-dimensional. It negates our true human and ecological state, which is diversity. And we destroy this at our peril."

Yandana Shiva - India June 1994

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1. Introduction

This paper has been researched by the author as part of the 1995 Kellogg Scholarship.

The aim is to encourage anyone who has any remaining wet patches of land to consider creating a wetland or pond for indigenous flora and fauna. Restoring habitats for our native plants and animals and plants is a better alternative to calling in the drain digger! A newly restored area can be created for the many birds, fish, animals and plants whose habitats have been destroyed all over New Zealand.

As a result of modifying the environment for farming, helped by heavy investment by Government to subsidise large scale drainage and modification of river systems, many large wetlands have been lost.

All the productive land created by these Government schemes has undoubtedly repaid the Government and the land owners many fold, so now it is time to restore a little of what was taken from the indigenous environment.

New Zealand is still losing more of the natural wetlands, ponds and small streams, through the continued draining of wetlands by farmers and developers. There are approximately 500 species of plants and animals on the endangered list. Many of these species require wetlands as their habitat. These habitats have been slowly depleted or silted up. Twenty-two percent of New Zealand's birds require wetlands as a full or part requirement, but have only one percent of their previously available habitat left.

Wetlands are understood little by the general public and the farming community, but they form a crucial part of the life cycles and ecosystems of the New Zealand flora and fauna.

1.1. What is a wetland ?

Wetlands can be described as bogs, swamps, marshes, mires, flushes, seepage s, puddles and ponds. They can also include margins of streams, rivers, and sea estuaries.

The plants in wetlands require constant water, and can tolerate flooding and waterlogging. The wetlands provide a special habitat for plants, fish, birds, small animals and insects. Wetlands are unique ecosystems and are dynamic systems. They are diverse in their nature and provide valuable food sources for a huge variety of birds, fish and other animals, many at the beginning of the food chain. (1)

1.2. What is the current state?

New Zealand has less than 8% of the original wetlands left, while in the Bay of Plenty less than 1.6% remain. Most of these remaining wetlands are in Crown control, administered by the Department of Conservation. DOC have responsibility for the National Parks, scenic reserves, crown lands and some offshore islands. All of the large protected wetlands, especially the ones with heritage orders, are under DOC control. There are very few large wetlands in private ownership.

By 1985 the old Wildlife Service had purchased 73,140 hectares for a variety of wildlife. This included 105 wetlands totalling 10,430 ha. (1) (2)

The Acclimatisation societies, (now Fish and Game Council) had purchased a further 800 ha. No figures are available since 1985.

Through the efforts of many environmental groups and conservationists during the 1970's, a partial ban was imposed on milling native timbers on crown land. Efforts were made to conserve much of what was left of our lowland native forests, especially wetland areas with large stands of kahikatea.

Retaining small native forest areas on private lands has been encouraged, by various environmental trusts, along with the help of Regional and District Councils who recognise the value of keeping and adding to our reserve stock of native vegetation. Under the Resource Management Act 1991, provisions are made to retain existing natives areas. Most District Councils have written into their District Plans, policies that encourage the saving of "indigenous, historic or significant vegetation". In fact many of these scattered remnants of native bush have been severely damaged by logging, browsing by animals, and plant pests.

Most of these indigenous forest remnants on private land are in inaccessible places such as gullies and steep ridges. Almost all of the flat land (much of which was wetlands) has been converted for farming, forestry or horticulture.

Wetlands have not featured as much as forest remnants up until the early 1980's, when Gordon Stephenson and Simon Smale (3) (4), published papers and books on wetlands. It is only now, that more information and effort is being made to inform the public, farmers, and people owning land, that, as with natives forests, wetlands are also endangered.

By grouping together, on a catchment basis, several farmers can plan wetland based wildlife corridors alongside streams, rivers, steep ridges and gullies.

2. Progress Versus Civilisation

Wetlands are often the first to suffer in any farming development, as being on the flatter ground, they are easier to clear, than any surrounding hills.

New Zealand has the worst record in the developed world in loss of wetland. Now at only 8% of the original area, this loss is part of the reason that there are so many endangered species.

American figures show that 50% of their wetlands have been lost in the last 200 years, but in California only 9% remain, whilst in Ohio, Iowa and Indiana only 10%. There is a lot of work being done restoring salt marshes and large wetlands in Southern California and New York State. (5)

Ecologists around the world are beginning to realise that this wetland loss is causing the loss of habitat and biodiversity. (6) (7) (4)

There are no Australia wide figures, but in Victoria there is 82% of original wetland left since European settlement. An active state government sponsored voluntary programme, called Land for Wildlife, has been started. This programme concentrates on wetlands, but includes many varied native tree plantings. These areas provide corridors for wildlife between farms, rivers and reserve sites.

The World Bank in 1985 issued a policy controlling the draining of significant wetlands and the building of new dams. This applied especially to the Third World which has suffered large scale environmental damage in the name of development.(7)

In New Zealand there are 81,196 farms (1993 Department of Statistics) 55,682 in the North Island and 25,446 in the South. There are many natural wetland areas remaining on the 2,394 larger farms over 1000 ha.

There is enormous scope on the smaller farms to educate and encourage farmers to stop any more drainage and to help to restore and provide a new habitat for native flora and fauna.



2. *Stock watering dam. Note erosion on unfenced side, and lush native bush behind fence on the other.*

Landowners are now realising the value of having a native area or reserve on their farms. These indigenous reserves add to the value of the property, both aesthetically and monetarily.

Native plants are enjoying a resurgence in nurseries as the public are planting native trees particularly for birds. Some councils are replanting their recreation reserves and roadside gardens with natives rather than exotic annuals.

3. Uses of Wetlands

Having once made a decision to restore a wet area of land, the land owner must decide what type of wetland to enhance and rebuild, and how much area to set aside, including buffer zones.

3.1. Preservation of indigenous wetland flora and fauna

As the state of our indigenous wildlife is closely related to the availability of high quality habitat, this must be one of the main reasons for preservation and enhancement of any wet areas that already exist on the farm.

3.2. Ornamental and recreational ponds

There are fine examples of ornamental ponds in some of the older farmsteads in New Zealand.

By planting deciduous, nut and berry trees, adding water lilies, goldfish and a few ducks and swans, owners can make a huge difference to the aesthetic nature of the land. If an adjoining wetland can be added in, a combination of native and exotic ponds can be achieved.



3. *Built in 1950's, the two ponds at Rathmore Homestead near Hunterville are a feature of the whole property. Large autumn toned trees - maples, oaks and cypresses have been planted on one side, with sweeping lawns, and flaxes on the water's edge. The pond is now home to many ducks, swans, scaup and fish.*

The Fish and Game Council and Ducks Unlimited (22) have been providing small grants to farmers to establish such wetlands and ponds. These provide habitat for ducks, pheasants and quail as well as native birds under threat of extinction. The magazine Growing Today has published many articles on ponds for ducks and aesthetic reasons. (8 - 14

3.3. Wetlands for purifying effluent

There are trials in Waikato and Bay of Plenty to determine whether artificial wetlands can be used to purify effluent from dairy sheds, before the water is discharged into surface waters. Environment BOP have a wetland trial attached to a dairy shed effluent pond. This wetland is planted with *glyceria maxima*, which is known to grow well in nitrogen enriched waters. In theory the discharged water from the ponds are passed through the *glyceria*, which will take up extra nitrogen before the water is then discharged into a nearby waterway.



4. *Environment BOP's Wetland trial attached to a dairy effluent pond at Rotoma. After two years the wetland is thick with glyceria maxima which has been used as a nitrogen stripper. This trial still has one year to run.*

The other trial is being undertaken by Environment Waikato using native wetland plants to evaluate their suitability for purifying effluent. Some city councils such as Tauranga and Whangarei have built and modified huge wetlands which are used in conjunction with their sewerage schemes.

These trials are still in their early stages and results will not be available for some time.

3.4. Wetlands for food production

Although still in its infancy in New Zealand, wetlands and ponds can be created to produce food. There are some trials at Hortresearch growing wasabi a Japanese vegetable, and several eel farms in Northland. Other possibilities could include commercial growing of water cress, grass carp, or mullet.

4. Creating a pond

OK, so I have a small wet part on my land what do I do?

First check with your local soil conservation officer with the Regional Council, DOC Office, or District Council.

There are many rules as to what you can or can't do on your land, and which activities require a consent. In most areas you may construct a pond or dam on your own land without a consent, providing the walls do not exceed 1.5 metres, and providing you do not block existing streams. Any wall over 1.5 m will require a consent and possibly an engineer's assessment. Water is very heavy in large volumes, and badly constructed dams can cause serious damage further downstream.

First find a boggy area, seepage or spring and then establish the depth of hole and area to be dug for the pond. The bigger the better, as more birds & fish can be sustained on a larger area. Allow plenty of surrounding land for planting shrubs, trees, flaxes etc.

A large hole can be dug, depending on the area you plan to restore. It is better to have a sloping floor, with a deep end or middle and shallow parts sloping to the water's edge. This will allow wader birds easy access and marginal plants to grow easily.

Try to create a small island in the middle of the pond to provide shelter for nesting birds away from rats.

If you have built near a spring or small stream, make an overflow pipe at least 100 mm below the top of the wall of the pond or dam, then channel the run-off back into the waterway.

The whole area has to be securely fenced from stock. This is most important, as stock will damage the walls and trample on precious plants.

If planting natives, try if possible to plant them from the local area. These plants can be propagated in advance, obtained from nearby wetlands, or purchased from specialist nurseries.

If there are already stock watering ponds, simply fence them off from stock, and plant flax, carex, rushes, ferns and a few shade trees.

To give stock access to the water, either build a small trough down stream from the overflow from the pond or allow access to a small unfenced area. Create a small access-way paved with rock or metal to stop pugging.

Simply planting and fencing, will make a big difference to the appearance of the pond and its acceptability to wildlife. More birds and possibly fish, will use these ponds, as shelter is very important to their survival and provides refuge from predators.

If the wetland can be incorporated into a nearby conservation area and a large enough area is involved, a special covenant can be placed against the title of the land. Some councils allow rates relief on the area under Section 180 G of the Ratings Act 1992.

Part funding can also be applied for to District and Regional Councils, if the work can be seen as in the local or regional benefit. This could come under land improvement schemes, farm or environmental plans.

Additional funds may be obtained from grants from conservation groups such as Royal Forest and Bird or the Lottery Board.

5. Case Study

We decided to build a small pond and wetland in September 1994. The area where we live has been heavily drained, and we felt we wanted to put something back into our environment. Next door we have 100 acres of native forest. so we were keen to provide wildlife corridors, both in trees and waterways.

We have several springs coming from a gully which had been fenced from stock and was well covered with natives, including a large puriri tree. The seepage from this gully went across a flat area, which was extremely boggy in the winter. From there the water entered a small stream.

Initially we were going to dam between the two hills, but after discussion with the soil conservation officer from the Regional Council we decided instead to dig out an area at the bottom of the flat land.

We employed an experienced digger operator who dug out the pond to a depth of 2 metres at one end and sloped to ground level at the other end. A wall was made at the deep end from the spoil and fill. There was a lot of peat below the surface.

The pond then slowly filled up with water over the next week, and the 800 mm bank held the water. An overflow was installed at the side of the pond 100 mm below the height of the wall. This overflow was then channelled back into the nearby drain.

At the end of the day the whole place looked like a huge muddy disaster



5. *Fencing the pond in September 1994. The area was originally a swampy portion at the base of a spring.*

We then built a fence around the whole area, and included a wide buffer margin of flat land around the edge. We planted grass seed on all the bare land exposed by the digger, and scattered manuka seeds on the drier areas.

The trees and shrubs we planted included, pittosporums, ake ake, flax, totara, kahikatea, fuchsia, coprosma, five finger, manuka, cabbage trees, calla lilies and Japanese bog iris. We spot sprayed around the base of them to suppress weeds, and also sprayed the blackberries.

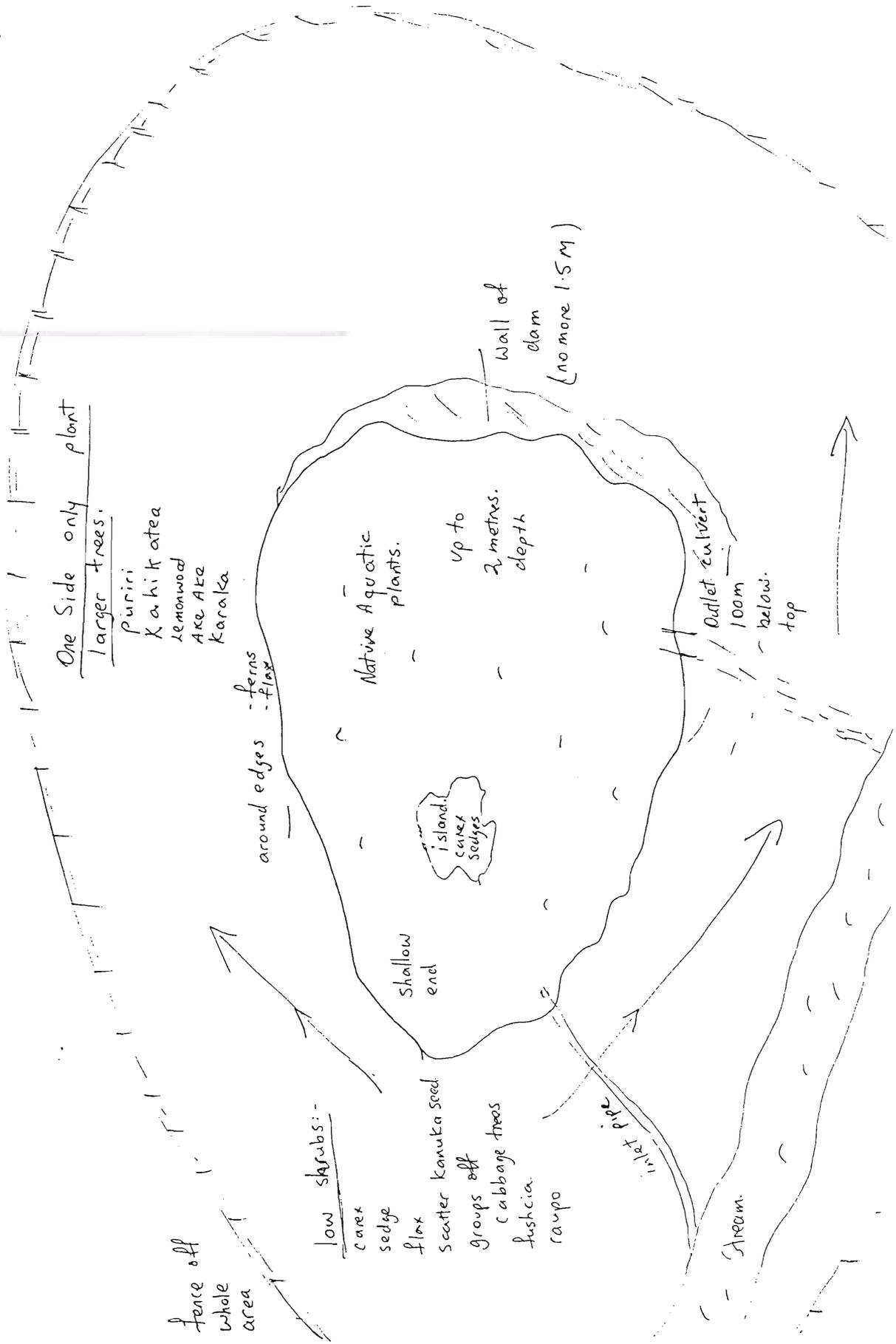
After six months (March) the top of the wall area was heavily infested with willow weed and a grass was growing around the waters edge. Many of the plants were smothered, and the grasses in the flat area had matted up to a depth of 100 mm. There were many frogs, and we saw elvers crawling up the overflow into the pond.



6. *By March 1995, grasses had covered all the exposed area. Willow weed had crept in growing in places up to 800 cm high. All the natives were well established.*

During the late spring and early summer the pond had been host to a pair of white faced herons, one mallard duck and her family (the local hawk demolished all the ducklings), kingfishers, a pair of paradise ducks (briefly) pukekos, fantails, and tuis. Many rushes and clumps of carex had appeared.

By June, the willow weed had died down, and upon closer inspection most of the trees had survived, except the manuka and cabbage trees. We then planted ferns, pongas, more cabbage trees and kahikatea and more flax around the edge of the pond at 2 metre centres.



Sketch of pond design

There was no bare soil, everything had covered over, but the grass growing on the water's edge was a problem. It was identified as mercer grass. We contacted the pest officer, who advised us to spray in the spring, as there was a danger this weed would smother the whole pond when the warmer weather arrived.



7. *The pond after one year. Sedges, flaxes and pittosporums have grown up to one metre.*

There are as many noxious water plants as there are land plants. Unfortunately they are hard to treat, and generally very invasive. These water weeds such as oxygen weed, water hyacinth, poppy and lilies look pretty but make the growing of native water plants almost impossible.

We anticipate that it will take five years before there is good vegetation over the whole wetland, and hopefully we will be able to keep it weed free. We will continue to plant more trees and ferns as they become available, so that they can provide food and shelter for the birds.

6. Conclusion

In the last 150 years New Zealand has lost much of the original wetlands. There is an estimated 8% left, very little of which is unmodified, and some is severely degraded by pests, both plants and animals. Most of these remnant wetlands are in public, crown or trust ownership. With the embarrassingly high number of endangered species, now estimated at 500 plants, birds and animals, land owners and farmers are urged to restore a small wetland area on their farms.

This can be done in conjunction with an existing patch of native forest, and preferably with a group of neighbours, who together will be able to provide a wildlife corridor for birds, fish and animals.

Not only will restoring a new habitat serve conservation purposes, but a wetland or a small pond will provide unending delight in monitoring the progress of wildlife which will quickly take up residence. It will also add both financially and aesthetically to the property.



8. *Pond for irrigation for citrus orchard. Planted up for aesthetic purposes with flax, weeping willow, water lilies and red hot poker.*

With a bit more thought in providing irrigation and stock watering ponds, they can not only supply precious water for the farm, but can provide another habitat for the many animals and plants whose habitats have been destroyed, in the rush for productive farming.

A sustainable future is what we should be aiming for; particularly on our farms and in our farming practices.

If we are serious in our claim that as a nation we are clean and green and believe in sustainable land management, we should at least endeavour to have a small part of each farm devoted to native trees and plants for birds and animals. If possible this native area should include a small wetland to provide some of the habitat that has been destroyed in the name of progress.

By grouping together, on a catchment basis several farmers can plan a wildlife corridor based on streams, rivers, steep ridges and gullies.

We should be handing over to our children a legacy of working with nature not against her.

7. Acknowledgments

^{Plant}
Stephen Land for Wildlife-Victoria
Derek Gosling, DOC, Whakatane
Karen Denyer, Environment Waikato
Environment BOP, various staff.
Simon Smale, DOC, Rotorua
Mike Collins

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USEFUL ADDRESSES

New Zealand Wetlands Course. Open Polytechnic of New Zealand
Contact Grant Moffat 0800 507 333
Ducks Unlimited Box 9795, Auckland
Terra Firma Ltd, Taupo Native Plant Nursery, 155 Centennial Dr, Box 437, Taupo. Ph 07 378 5450
Fax 07 378 6038
Environmental Grants, Lottery Boards PO Box 805, Wellington

9. Appendices

These plants, trees and shrubs can tolerate wet roots and are suitable for planting in wetlands (17,20)

9.1. *Native trees*

Pentaphragma peltatum, Bog primrose
Dacrydium dacrydioides-Kahikatea
Elaeocarpus hookerianus-pokaka
Weinmannia racemosa-Kamahia
Cordyline australis-cabbage tree and aquatic plants
Pittosporum eugenioides-Lemon wood
Coprosma repens-Taupata
Coprosma robusta-Karamu
Corrynocarpus laevigatus-karaka
Agathis australis-Kauri
Vitex lucens-puriri

9.2. *Native shrubs*

Typha orientalis - raupo, bulrush
Carex secta -niggerhead
Phormium tenax - New Zealand flax
Blechnum minus -common swamp fern
Leptospermum ericoides -kanuka
L. scoparium -manuka
Dodonaea viscosa - green akeake
d. pupurea purple akeake.

9.3. *Aquatic native plants*

Bryophytes-liverworts
Chara corallina -stoneworts
Myriophyllum triphyllum water milfoils
Utricularia australis -bladderwort
Elatine gratioloides
Isoetes kirkii -quillworts
Lilaeopsis ruthiana Affolter

Pilularia novae-zelandiae -pillwort
Ranunculus limosella
Potamogeton cheesmanii -fl oating leaved pondweeds
Azolla pinnata -fern azolla
Alisma plantago aquatica-water plantain
Baumea articulata -jointed twig rush
Eleocharis sphacelata -tall spike rush
Nasturium microphyllum -water cress
Schoenoplectus validus

9.4. *Weeds - aquatic and marginal*

Ceratophyllum demersum - hornwort or coontail
Egeria densa Planch- oxygen weed
Lagarosiphon major - oxygen weed
Ranunculus sp -water buttercup
Vallisneria spiralis-eelgrass or wild celery
Aponogeton distachyon Linn-cape pond weed
Hydrocleys nymphoidea-water poppy
Nymphaea alba-water lily
Nymphoides geminata-marshwort
Eichhornia crassipes -water hyacinth
Glyceria maxima- reed sweet grass
Alternanthera philoxeroides -alligator weed
densa Planch- oxygen weed
Glyceria flyceria -floating sweet grass
Myriophyllum aquaticum Cambess -parrot's feather
Polygonum decipiens - swamp willow weed

9.5. Exotic trees

Taxadium distichum Swamp Cypress
Alnus glutinosa black alder
Willows
Poplars
Liquid amber styraciflua
Carya aquatica, cordiformis - hickories
Nyssa aquatica -water tupelo
Eucalyptus botryoides, ovata, elata
macarthurii.

9.6. Exotic shrubs

Gunnera maculata
Pentaphragmum peltatum, Bog primrose

9.7. Native birds

Once a suitable habitat is established, some of the following birds may visit:- (18)

New Zealand Dabchick
Pukeko
Crake - marsh, spotless
NZ pidgeon, kereru
NZ kingfisher
Fantail
Tui
Bellbird
Fernbird
Shag, black and little black
Heron, white faced
Blue duck

Scaup

Northern Shoveler
NZ Falcon
Weka

9.8. Introduced birds

Ducks ; mallard, grey, grey teal, brown teal
Paradise Shelduck
Quail, brown, bobwhite, California
Welcome swallow
Partridge
Pheasant
Swan, black, white

9.9. Native fish

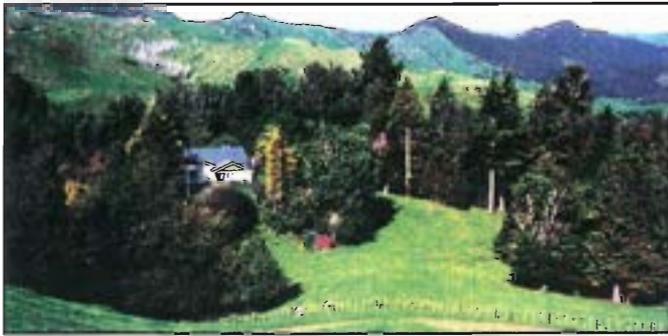
If there is a suitable fish pass built, so that fish may enter your pond or wetland, some of the following fish may find their way into a new habitat. (19)

Geotride - lamprey
Anguillida - eels
Retropinnidae - smelt
Galaxiidae -kokopu, mudfish inanga

9.10. Introduced fish

Salmonidae -Salmon, brown & rainbow trout
Ictaluridae - catfish
Cyprinidae Goldfish European Carp
Eleotridae -bully

"KOPPIN YARRATT"
381HA 942 ACRES 3700 S.U.

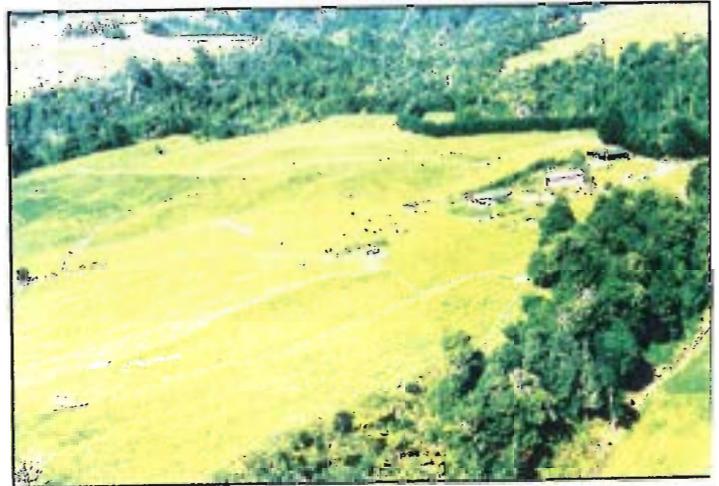


- Attractive contour
- Recognised area (Ohuka).
- Good implement/covered yards/woolshed complex
- Nice home in attractive setting.
- Further 300 acre development block available.

ASKING PRICE \$890,000 L & B (+GST IF ANY)

From
Wrightson's Rural Sales

"Improved Farms"



DEER AND CATTLE

77.14ha of which 54ha (133 acres) in excellent pasture. 19ha Q.E. 2 Trust bush. Modern 3 brm home. 2 stand woolshed, deer shed, \$545,000 + GST. (Ref 374)



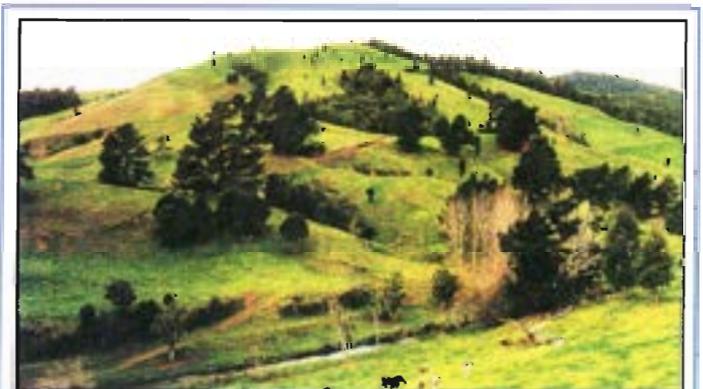
14.8HA JUST LISTED - TE KAUWHATA

1.5 km to town, 2.8ha in 6 yr old kiwi fruit, balance excellent pasture. 2 ponded areas, planted trees. 8 yr old 3 brm home, 3 bay shed. Keen vendor. \$385,000 + GST. Phone Peter.



RELIABLE RAINFALL - 482.6ha (1192 acres)

• 5,500 quality stock units • Two excellent homes and top outbuildings • Medium to steeper hill country with valley flats • Well tracked and fenced with good water • Price \$1.25 million + GST.



169HA (418 ACRES)

- Parklike surroundings
- Strong ash soils
- Lovely shingle stream
- 50 acres cut for hay
- Bare land all in pasture
- Within 1/2 hour Te Awamutu

Asking \$840,000

"Unimproved Farms!"



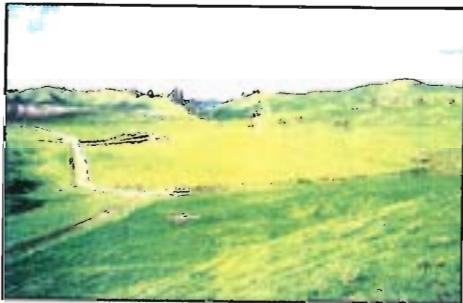
- 251ha-622 acres-2400 s.u.
- Good clean hill country
- Woolshed & yards - no house
- Good location

ASKING PRICE \$420,000 L & B (+GST IF ANY)



ELSTHORPE BARELAND - 2 BLOCKS

Both blocks in reasonable pasture with natural water and dams and consist of easy to medium contoured hill country. Lot 1 95.5ha, 8 paddocks, \$275,000 + GST. Lot 2 171.3ha, 17 paddocks, \$430,000 + GST. Ring Doug for details. (Ref F23)



60,000 KGS - POTENTIAL PLUS

207ha Dairy Farm. Excellent regrassing programme in place. 32 aside H.B. cowshed, 2 homes. Milking 400 cows and carries all replacements plus outside grazing. Price \$2,200,000 + GST. Phone John or Ken.



SOLE AGENT - EDGE CUMBE DAIRY FARM

38.3ha well subdivided into 45 paddocks, good water. Whey irrigation on most of property (manure). 12-a-side HB dairy, large haybarn, 6-bay implement shed, 4 brm home, production last 3 year ave 22,000kg from 120 cows. Some of the best land in BOP. Price \$1,000,000 L & B.



TUTIRA FARM - 314.6810HA (777 ACRES)

Approx 80ha easy contour, balance medium hill. Permanent fences - 38 paddocks, 5 sets of stock yards. Lambing 1860 ewes, 124% average + cattle. Fattens all lambs in normal season. 3/4 brm home and 4 stand woolshed. Good rainfall area. Ring Doug or Kim for details. (Ref F24)

DAIRY GRAZING - HANDY TO TOWN



124.8434ha Freehold (approx 309 acres) located just 12km from Oamaru with flat to gentle rolling contour. 15 paddocks well fenced with good water supply. 2 stand W/shed and covered yard. Attractive cropping or grazing property.

**\$360,000 plus G.S.T.
(Negotiable)**



GREAT FIRST FARM - 55.7HA (138 ACRES)

Close to Feilding, attractive easy rolling country with some steep. Excellent water supply including bore and dams, 4 bail cowshed with plant or calf rearing (400 this season), 2 stand woolshed Workshop, implement shed and hayshed. Dwelling consists of 4 brm family home. 9 acres native bush reserve. 900 12 yr pines and has pines ready to mill.