

**Management of
Native Orchids
Lake Ohia, Northland**

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Introduction

At the request of Dr Ray Pierce and Ms Lisa Forester, Whangarei District Office, Department of Conservation, I visited Lake Ohia and other orchid habitats at Kaimaumau, Lake Rotokawau, and the gumfields reserve, Ahipara on 13-14 October 1992. During this visit I was accompanied by Mr Peter de Lange, Science and Research Division, Department of Conservation, Wellington, and Ms Forester: The purpose of the visit was to assess the orchids of Lake Ohia, and to study the implications of the proposal to raise the seasonal water levels of the lake by installing a weir at the drain outlet.

Reasons advanced in support of the weir include the restoration of the lake habitat for wildlife, the preservation of the lake bed and fossil remains of a former kauri forest, and the protection of representative areas of gumland scrub. However, concerns have been expressed for other values that might be put at risk if the lake level is raised, especially threatened orchids present as well as other plant species considered to be threatened. These concerns formed the basis of my visit, and advice was sought by Dr Pierce and Ms Forester on the following:

- a. General habitat management guidelines for threatened orchids at Lake Ohia, including consideration of water levels, browsing animals, competition with weeds, etc.
- b. General direction in setting up research and monitoring programmes for threatened orchids at Lake Ohia over three years, including consideration of water regimes to test, plus methodology.

Documentation covering the weir proposal and natural values of Lake Ohia was made available to me for study following this visit. In addition, I have drawn on my notes taken during earlier visits to Lake Ohia in 1986, 1987, and 1988, and comments solicited from orchid colleagues in Australia and New Zealand.

Unfortunately, I do not have any information on the details of the weir proposal, a suitable topographic map of the lake basin, or information on historic lake levels and seasonal behaviour. This information, together with an understanding of the geology and hydrology of the basin, seems to me to be a prerequisite to the setting of water levels and the future management of the lake and its natural values.



Status of Northern Orchids

Before responding to the management questions put, it is desirable to review the status of native orchids, especially those known to occur in northern New Zealand. That way the orchids of Lake Ohia should fall into perspective.

Systematics

The nomenclature and taxonomy of the 100 or so native orchids are currently being reviewed in collaboration with other orchid specialists. Since many of the taxa are conspecific with or related to taxa in Australia, I have worked jointly with fellow orchid specialists, Mark Clements and David Jones of the Australian National Botanic Gardens, Canberra. Our major project is a Catalogue of New Zealand Orchidaceae, due to be completed in 1993, in which we review the status of New Zealand orchids based on a study of types and original literature. Significant changes of nomenclature and taxonomic status are proposed as a result of this study, and the Catalogue will form the basis for subsequent research with Canberra and New Zealand workers on the classification and description of new taxa. In the meantime the use of existing Flora and tag names is unavoidable.

Principal Northern Orchid Habitats

In Table 11 have set out a draft list of orchids known to be present in northern New Zealand, i.e. north of a line through Auckland city or thereabouts. The orchids are arranged alphabetically according to major habitats such as forest, scrub, and wetland. Orchids reliably reported from the Lake Ohia basin are also indicated, along with those believed to be shared with Australia and/or restricted to northern New Zealand.

The habitat classes are broad ones, although it is fair to say that in this part of the country "forest" usually equates with kauri forest or its derivatives, and "scrub" invariably means gumland scrub which is unique to the north. Often there is a gradation from one habitat to another, and orchids may occur in one or more, with a progressive decline in the number of taxa from forest through to wetland. It should also be emphasised that within each major



habitat there are specific sites tolerated or preferred by orchids depending on their life style and response to light, moisture, competition, disturbance, etc.

Further study will undoubtedly lead to a refinement of Table 1. Meantime, it should serve as a useful list to judge the representativeness of any northern orchid area. At Lake Ohia, for example, there is a very good representation of scrub and wetland orchids, as well as a wide selection of taxa shared with Australia, and those confined to northern New Zealand. On this score alone, Lake Ohia emerges as a valuable orchid area worthy of protection and sound management.

Conservation Status

Some of the documents on Lake Ohia I have seen raise questions about the safety of its threatened orchids should the weir proposal proceed. To some extent I must accept responsibility for these concerns since the most recent list of threatened orchid taxa in New Zealand results from my input in the past. This list is reproduced here as Table 2 and includes seven threatened taxa reliably reported from Lake Ohia; three ranked as "Endangered", four as "Vulnerable". Of these, five also occur in Australia, including the three ranked as "Endangered".

In retrospect, and with the experience of several visits to orchid habitats in Australia behind me, I am now firmly of the opinion that priority must be given to threatened orchids endemic to New Zealand in orchid conservation programmes. Trans-Tasman migrant orchids that are widespread, common, and protected in Australia do not, in my view, justify continued threatened plant status in New Zealand. Migrants that are rare and possibly endangered in Australia e.g. *Thelymitra matthewsii*, do merit consideration. While this is not the place to debate the issue, I feel compelled to flag it for serious consideration by the New Zealand Threatened Plant Committee and the wider botanical community. I also have strong reservations about the threat categories assigned to several of the orchids in Table 2, but that too can be taken up later with the above Committee.

Of the seven threatened orchids known to be at Lake Ohia, priority for management should be given to the two endemics, *Prasophyllum* aff. *patens* and *Spiranthes* "Motutangi". Among the other five, all migrants from Australia, both *Cryptostylis subulata* and *Thelymitra malvina* are widespread and locally common to abundant there and occur in several protected areas. The other three, *Calochilus herbaceus*, *Thelymitra* "Ahipara", and *Thelymitra* "rough leaf" are less well known from taxonomic, and conservation viewpoints. For the moment it seems best to re-assign them to the "Indeterminate" category until these issues are resolved.



Threat categories apart, we should not lose sight of the long-term evolutionary potential of migrant orchids since it is now clear that the orchid flora of New Zealand has evolved largely from successive migration events and subsequent speciation in this country. Viewed in this light, the orchid flora of Lake Ohia with its mix of endemics and migrants assumes a far greater significance.

Management of Orchids at Lake Ohia

In my opinion the management of Lake Ohia for its total orchid flora is more important than just singling out one or two of its threatened taxa. Attention to the former should meet the needs of the latter:

In brief, the two primary habitats at Lake Ohia favoured by orchids are the sedge-covered lake floor and the scrub-covered dune ridges. The dune ridges are old, relatively stable features that harbour more than half the orchids recorded at Lake Ohia. The very best in terms of their orchid content are elevated above the present and historic lake levels as far as I can judge from their soil profiles and wave-cut bases. Thus they are unlikely to be affected by the weir proposal. In fact, a return to something like the natural lake level could have positive advantages in reducing the risk of uncontrolled fires and the further ingress of woody weeds such as *Hakea sericea* and *Acacia longifolia*. However, the use of controlled fire for the maintenance of this orchid habitat, as well as for other floristic values, should be considered as part of an overall management plan for Lake Ohia.

The lake floor is a more varied habitat where the dominant sedge cover (*Schoenus* and *Baumea* spp.) is broken up by a large central area dominated by *Eleocharis sphacelata*, and many small mounds and raised "islands" of shrubs, ferns, mosses, and sedges. Around the periphery the lake floor sedge cover grades into gumland scrub on the dune ridges. I am unable to say whether this pattern is inherited from the days of natural lake level fluctuations, or whether it has been induced by the draining of the lake, first by the gumdiggers, and secondly by the County in 1972.

Since the lake was drained a large area near the outlet and extending eastwards has "dried out", exposing logs, stumps, and peg roots of a former kauri forest, planed off level by previous wave action. Further east the brown sandstone hardpan or "coffee rock" on the edge of the concave floor has also been exposed.

The mounds and "islands" and sedge wetlands in the central and northern part of the lake floor seem to be the main habitats for the two threatened endemic orchids, *Prasophyllum* aff. *patens* and *Spiranthes* "Motutangi", as well as the migrants *Cryptostylis subulata* and *Calochilus herbaceus*. It is likely that these habitats will be enhanced by maintaining a constant and higher lake level, but this outcome needs to be examined.



Without doubt the drying out of the lake floor near the drain outlet, and the spoil left by deepening this drain, have resulted in an influx of orchids probably not present before the lake was drained. Moisture-tolerant sun orchids such as *Thelymitra pulchella*, *T. "Ahipara"*, and *T. "darkie"* are relatively common on exposed and decaying kauri stumps, *T. malvina* is dominant on rotting kauri debris in the spoil excavated from the drain as well as on some of the kauri stumps, and the weedy *T. camea* is common on exposed sandstone around the edges. Other sun orchids such as *T. pauciflora*, *T. aff. longifolia*, and *T. "rough leaf"* also occur here but in lower numbers.

Since my first visit to Lake Ohia in 1986, *T. malvina* has extended its area near the drain outlet quite markedly. Its numbers in the gumfields reserve at Ahipara have also increased over the same period, and it appears to be cropping up in other places as well, e.g. Ngawha Springs. In all cases this attractive orchid is associated with decaying fossil kauri stumps. At Kaimaumau for example, stumps exposed quite recently in fire breaks and test holes are now populated by vigorous colonies of *T. malvina*:

If the surface-water level of Lake Ohia is raised and maintained at 15 cm above the top of the fossil forest remains, as has been suggested, then most of the orchids now present on exposed stumps will almost certainly disappear, and there would seem little point in monitoring their demise or worrying about browsing animals. Likely survivors would be *T. malvina* on the elevated spoil from the drain, and other sun orchids in scrub/sedgeland near the drain outlet.

It is difficult to suggest water levels to test if we accept that the fossil remains must be completely covered in order to survive. The very presence of orchids on the exposed stumps attests to their steady decay with exposure. The fossil forest can't be replaced, whereas the orchids can by manipulating the habitat in their favour. To this end the possibility of maintaining an orchid habitat near the weir by earthworks or controlled water levels should be examined. At the very least the habitat of *T. malvina* could be enhanced by adding similar kauri debris to the existing excavate, or building new heaps as has already been suggested.

It would be a pity, and somewhat wasteful, to lose the existing orchid populations near the drain outlet, including the transplants of *Thelymitra "Ahipara"* salvaged by the Department of Conservation from a threatened wetland nearby. Assuming that the water level can be adjusted and controlled by the proposed weir, a practical solution might be to gradually raise the level in stages and assess the impact on all orchid habitats as well as on other threatened species at each stage. That way some compromise might be reached to balance all the natural values perceived. It may be, for example, that some of the orchids and some of the fossil forest remains near the outlet will need to be sacrificed to achieve this compromise. I should point out though, that the exposed fossil remains will have a limited life and may need to be replenished periodically from other sources.

I assume that peak floods can be controlled. For most orchids (and many other plants), brief periods of flooding are of little moment; constant inundation is another matter.



Research and Monitoring

As a matter of course, I will provide updated information on the taxonomic and conservation status of the orchids found at Lake Ohia as it comes to hand. This information is best channelled through Mr Peter de Lange. A limited amount of data on the biology of native orchids is held at Lincoln, generated mainly from cultivated plants used to prepare a chromosome atlas of New Zealand Orchidaceae. For example, we can safely say that most of the orchids at Lake Ohia, except *Cryptostylis subulata*, are self-fertile and autogamous, and therefore will not be constrained by their breeding system.

Having regard for the total orchid flora at Lake Ohia, I recommend the following:

1. A preliminary late-summer survey of the wetlands overall to assess the status of *Spiranthes* and *Prasophyllum* aff. *patens*. From this a monitoring procedure could be discussed with Mr de Lange in view of his experience with another wetland rarity, *Corybas carsei*. Other orchids encountered in this survey could be considered as part of this monitoring programme.
2. Monitor the impact of different lake levels on resident orchid populations in the "dried-out" area. The methodology used by British workers seems most appropriate (copies attached), but again Mr de Lange should be consulted for guidance on site selection, timing, and methodology.
3. Systematic survey of gumland scrub at Lake Ohia to assess its orchid population.
4. Continue to monitor the transplants of *Thelymitra* "Ahipara".

In all these monitoring projects, as much information as possible on the biology and state of each plant should be noted, including browsing (mainly rabbits), incidence of rust, etc.

Acknowledgement

I am grateful for the opportunity to advise on this matter, and I thank Mr Peter de Lange for arranging the field transport, and Ms Lisa Forester the accommodation.



Table 1 Northern Orchids and Their Principal Habitats and Occurrence at Lake Ohia

Orchid Taxa	Forest	Scrub	Wetland	Lake Ohia
<i>Bulbophyllum pygmaeum</i>	X			
<i>B. tuberculatum</i>	X			
<i>Caladenia</i> aff. <i>iridescens</i>	X			
* <i>Chiloglottis cornuta</i>	X			
<i>Corybas acuminatus</i>	X			
<i>C. oblongus</i>	X			
<i>C. rivularis</i> s.s.	X			
<i>C. trilobus</i> s.s.	X			
<i>Dendrobium cunninghamii</i>	X			
<i>Drymoanthus adversus</i>	X			
<i>Earina mucronata</i>	X			
<i>Gastrodia cunninghamii</i>	X			
<i>Pterostylis banksii</i>	X			
+ <i>P. brumalis</i>	X			
<i>P. cardiostigma</i>	X			
<i>P. graminea</i>	X			
+ <i>P. "rubricaulis"</i>	X			
+ <i>Thelymitra tholiformis</i>	X			
<i>Yoania australis</i>	X			
<i>Acianthus sinclairii</i>	X	X		
<i>Caladenia</i> "green column"	X	X		X
<i>Corybas cryptanthus</i>	X	X		
+ <i>Cyrtostylis oblonga</i>	X	X		
<i>Earina aestivalis</i>	X	X		
<i>E. autumnalis</i>	X	X		
* <i>Genoplesium nudum</i>	X	X		
<i>Orthoceras novae-zeelandiae</i>	X	X		



Orchid Taxa	Forest	Scrub	Wetland	Lake Ohia
<i>Pterostylis alobula</i>	X	X		
<i>P. trullifolia</i>	X	X		
+ <i>Thelymitra aemula</i>	X	X		X
* <i>T. carnea</i>	X	X		X
<i>T. decora</i>	X	X		
* <i>T. ixioides</i> s.l.	X	X		
<i>T. longifolia</i> s.s.	X	X		
+ <i>T. aff. longifolia</i>	X	X		X
* <i>T. pauciflora</i> s.l.	X	X		X
+ <i>T. sansscilia</i>	X	X		
+ * <i>Caladenia alata</i>		X		X
+ <i>C. minor</i>		X		X
<i>Corybas cheesemanii</i>		X		
+ <i>C. rotundifolius</i>		X		
<i>Gastrodia aff. sesamoides</i>		X		
* <i>Genoplesium pumilum</i>		X		X
* <i>Microtis parviflora</i>		X		X
* <i>M. unifolia</i>		X		X
<i>Prasophyllum colensoi</i>		X		X
* <i>Pterostylis nana</i>		X		
* <i>P. plumosa</i>		X		
+ * <i>Thelymitra matthewsii</i>		X		
* <i>T. "rough leaf"</i>		X		X
+ * <i>Calochilus herbaceus</i>		X	X	X
* <i>C. paludosus</i>		X	X	
+ * <i>Thelymitra "Ahipara"</i>		X	X	X
+ * <i>T. "darkie"</i>		X	X	X
+ * <i>T. malvina</i>		X	X	X
<i>T. pulchella</i> s.l.		X	X	X



Orchid Taxa	Forest	Scrub	Wetland	Lake Ohia
+ * <i>Cryptostylis subulata</i>			X	X
<i>Prasophyllum aff patens</i>			X	X
+ <i>Spiranthes "Motutangi"</i>			X	X

+ taxa confined to northern New Zealand = 17 (L. Ohia 10)
 = taxa shared with Australia = 19 (L. Ohia 12)

No. taxa/habitat	L. Ohia
Forest 19	-
Forest/shrub 18	5
Scrub 13	7
Scrub/wetland 6	5
Wetland 3	3
Totals 59	20

Note: Taxa previously recorded from northern New Zealand but not supported by modern records:

- * *Caleana minor*
- * *Chiloglottis formicifera*
- Corybas carsei*
- Petalochilus calyciformis*
- P. saccatus*
- Pterostylis micromega*
- * *P. nutans*



Table 2 **Threatened Indigenous Orchids in New Zealand**
(extracted from N.Z. Botanical Soc. Newsletter 29: 1992)

	Present/Lake Ohia
Extinct (Ex)	
+ * <i>Chiloglottis formicifera</i>	
+ * <i>Pterostylis nutans</i>	
Endangered (E)	
* <i>Caleana minor</i>	
+ * <i>Calochilus herbaceus</i>	X
* <i>Chiloglottis valida</i>	
<i>Corybas carsei</i>	
<i>Earina aestivalis</i>	
* <i>Pterostylis nana</i>	
<i>P. "linearis"</i>	
+ * <i>Thelymitra malvina</i>	X
+ * <i>T. matthewsii</i>	
+ * <i>T. "Ahipara"</i>	X
Vulnerable (V)	
<i>Caladenia iridescens</i>	
<i>Corybas "short tepals"</i>	
+ * <i>Cryptostylis subulata</i>	X
<i>Prasophyllum aff. patens</i>	X
<i>Pterostylis micromega</i>	
+ <i>Spiranthes "Motutangi"</i>	X
* <i>Thelymitra "rough leaf"</i>	X
Rare (R)	
<i>Thelymitra tholiformis</i>	
Indeterminate (I)	
<i>Corybas cryptanthus</i>	

- + taxa confined to northern New Zealand
* taxa shared with Australia

