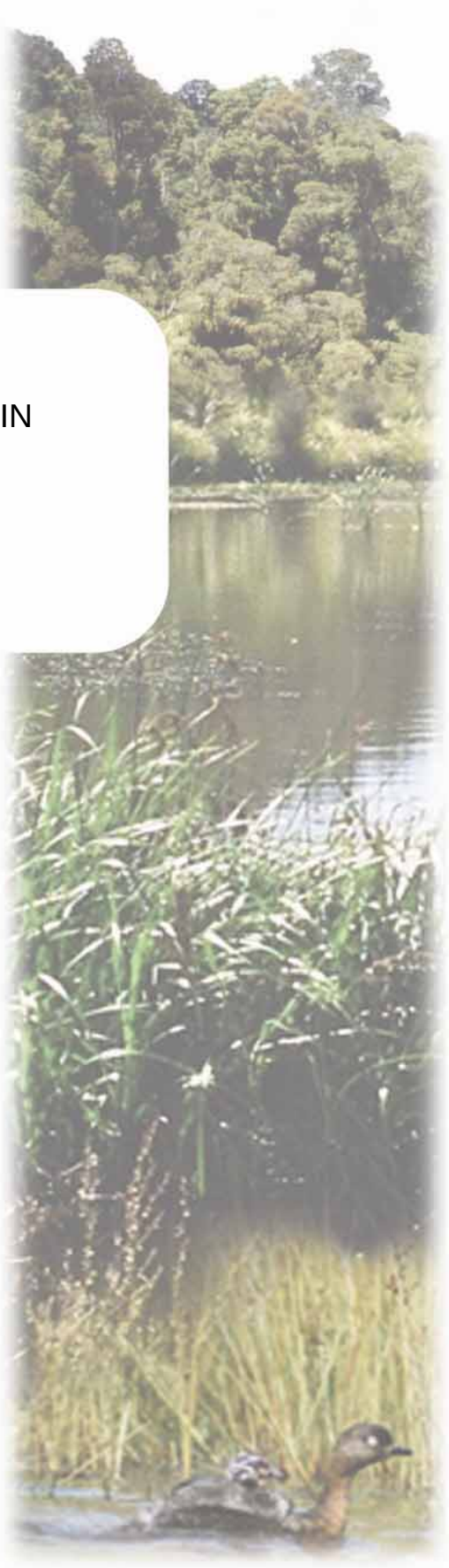

PALUSTRINE WETLANDS IN THE ROTORUA LAKES ECOLOGICAL DISTRICT

2005

Contract Report No. 815

Report prepared for

ENVIRONMENT BAY OF PLENTY
REGIONAL COUNCIL
QUAY STREET
WHAKATANE

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1. INTRODUCTION

Wildland Consultants Ltd were commissioned by Environment Bay of Plenty to map the extent of palustrine wetlands in the Rotorua Lakes Ecological District (with the exception of wetlands on the margins of 12 of the larger lakes[1] which were surveyed and subsequently mapped during a separate project). The object of this project was to create a spatial layer of the wetlands listed in the database and to search for other wetlands as a desk-based exercise. Wetlands in this Ecological District (ED) had previously been identified and listed in the Environment Bay of Plenty Freshwater Wetlands (FWW) Database - mainly from existing literature. Sixty wetlands were mapped using the Regional Digital Aerial Mosaic 2003, based on existing information and field inspections of selected sites at a scale of 1:5,000. Information on wetland vegetation and habitat types are provided for 14 of the wetlands in the BOP FWW database. This mapping project was undertaken as part of Council's Natural Environment Regional Monitoring Network's Freshwater Wetlands Module.

2. WETLAND DEFINITION

For the purposes of this project, the definition for wetland provided in the Environment Bay of Plenty Proposed Regional Water and Land Plan (2004) was followed (see Appendix 1). The definition of 'palustrine' follows that of Clarkson *et al.* 2002, "A wetland hydrosystem including lands bound by dry land or by any other hydrosystem, where attached/rooted vegetation is emergent (c.f. Riverine or Lacustrine) permanently or seasonally above freshwater (<0.5% salinity), non-tidal surface water or groundwater. Palustrine wetlands include marsh, bog, swamps, fens, bog, marshes, seeps, and flushes. Palustrine wetlands exclude wetlands influenced by saline water such as saltmarsh."

3. WETLAND MAPPING

Three GIS layers were prepared as a result of this study.

3.1 Wetland extent

Selected wetlands listed in the Bay of Plenty FWW database (March 2004 version) in the Rotorua Lakes ED were mapped to a scale of 1:5,000 using the Environment BOP RDAM03 ortho-photographs. The wetlands listed in the database had been previously identified from the following sources:

- Existing information, e.g. natural heritage reports, Protected Natural Area Programme (PNAP) reports, unpublished reports on individual wetlands within Rotorua Lakes ED.
- Personal knowledge of database compilers.

[1] Rotorua, Rotoiti, Rotoehu, Rotoma, Okataina, Tarawera, Okareka, Rerewhakaaitu, Rotomahana, Okaro, Tikitapu, Rotokakahi.

- Areas identified as freshwater wetlands on NZMS 260 Series topographic maps and then checked against aerial photographs) (field inspections of some of these sites were made, see Wildland Consultants Ltd 2003a&b).

The BOP FWW database lists 99 wetlands in the Rotorua Lakes Ecological District. Fifty-eight of these were mapped in the current project, including 20 wetlands within 500 m of Lakes Rotorua, Rotoiti, Rotoehu, Rotoma, Okataina, Tarawera, Okareka, Rerewhakaaitu, Rotomahana, Okaro, Tikitapu, and Rotokakahi. The remaining 33 wetlands listed in the FWW database (in the Rotorua Lakes Ecological) were mapped in the 2004 Rotorua Lakes Wetland Margin Survey.

Two wetlands described and mapped in existing literature (Waikaruru Stream Wetlands and Whakarewarewa Lagoon) (Beadel *et al*. 1998) were not listed in the March 2004 version of the BOP FWW database; these have been included in the GIS layer. These wetlands should be added to the BOP FWW database. The former of these wetlands is only partially in the Bay of Plenty Region.[1] This brings the total number of wetland sites mapped in the current project to 60.

Wetlands were mapped using a 'best conservative estimate' of wetland extent at a 1:5,000 scale. This involved determining wetland extent from data and maps contained in existing literature, however personal knowledge of the wetlands was also used. The main reference source for this work is Beadel *et al*. (1998) in which wetlands were mapped on 1:50,000 topographic maps using field data collected on 1:25,000 aerial photographs in 1996. Boundaries for 20 sites were field checked (see Appendix 2). Data for 17 of these sites is captured in the Rotorua Lakes ED 2004 wetland layer.

Wetland site boundaries for the sites not field checked during this project are indicative only (listed in Appendix 3). Field inspections would be required to determine the exact location and extent. It is likely that when field inspections are conducted at more sites that more accurate boundaries will be identified.

For each mapped wetland habitat, baseline information was captured in a GIS attribute table. Information recorded includes wetland area, base map used, degree of accuracy in boundary designation, and whether the wetland site was field checked. Descriptive information provided in the attribute table is listed and defined in Table 1.

[1] There have been several digital versions of the BOP region boundaries, which may be why this wetland was not included in the FWW database.

Table 1: Attribute fields and definitions for GIS data layer - Rot_Lakes_ED_ wetlands_2004_excludes_all_wetlands_within_500m_of_Rot_Lakes_ except_20_large_wetlands

Site_Name	The specific name of the wetland site.
Dbase_ID	The number assigned to the wetland site in the Environment BOP Freshwater Wetlands Database.
Area_Ha	The area of the wetland site as determined from Environment BOP Regional Digital Aerial Mosaic (RDAM) (2003) orthophotographs (wetland boundaries determined either from field check or existing information, at a scale of 1:5,000).
Field_Chk	Whether or not the wetland site was field checked as part of this project.
Base_map	The base map onto which the wetland boundaries have been drawn, e.g. Environment BOP Regional Digital Aerial Mosaic (RDAM) (2003) orthophotographs.
Lvl_conf	The degree of accuracy regarding the estimations of wetland boundaries (e.g. high, medium, low, or very low). Degree of accuracy was applied to digital wetland boundaries based on the approximate distances. The four levels of confidence accuracy are: High = an accuracy of 0-15 m; Medium = 15-40 m; Low = 40-100 m; and Very Low = 100+ m. Accuracy was assigned based on the majority of the boundary – if there was a lower level of accuracy in a small part of the boundary then this is detailed in the comments section.
Reference	The reference document(s) containing a map of the wetland from which the wetland boundary has been determined in conjunction with inspecting the 2003 RDAM.
Comments	Comments. Includes information on accuracy of site boundaries.

The BOP FWW database contains grid references of the approximate central point for each wetland site. It was noted that for some of the wetlands these were incorrect. Correct grid references for these are provided in Appendix 4, based on the GIS layer, and the database should be updated accordingly. Central grid references for other sites in the FWW database should also be updated to correspond to the GIS layer.

One site recorded in the BOP FWW database was identified which does not meet the definition for inclusion as a wetland in the database and this site should be deleted from the database (listed in Appendix 5). This site was not mapped.

3.2 Wetland vegetation types/habitat area

Field work was undertaken at 20 sites to map the extent of the wetland and identify and map vegetation and habitat types present. Sites which were field checked are listed in Appendix 2. The data from the field survey was entered into the GIS attribute table. Attribute table fields include wetland name, database number, wetlands vegetation unit, hydroclass, vegetation structure, character, dynamics, vegetation habitat, and notes. These are listed and defined in Table 2.

One site was identified which did not meet the definition for inclusion as a wetland in the database (see Appendix 5). For four wetlands field survey was completed as part of the Rotorua Lakes Margin Survey and data is stored with that project.

Table 2: Attribute fields and definitions for GIS data layer: Rot_Lakes_ED_ wetland_vegetation_types_for_14_wetlands_surveyed_in_2004

Site_Name	The specific name of the wetland site.
Dbase_ID	The number assigned to the wetland site in the Environment BOP Freshwater Wetlands Database.
Veg_Unit	The specific number assigned to each vegetation unit within each wetland site.
H_Class	The hydroclass of the wetland vegetation unit.
Structure	The structural class of the wetland vegetation unit (see Beadel 2005 for definitions; from Johnson & Gerbeaux 2004).
Character	The character of the wetland vegetation unit; Indigenous = >50% of the plant species in the canopy are indigenous. Exotic = >50% of the plant species in the canopy are exotic. (from Wildland Consultants 1999)
Dynamics	The dynamics of the wetland vegetation unit: Primary = Forest or scrub which has never been logged or cleared in any part. Applied to scrub and forest only. Modified = Primary forest or scrub in which the structure or composition of the vegetation has been changed by human activities. Applied to scrub and forest only Secondary = A stage of vegetation succession characterised by the disruption (clearance) of previously existing forest or scrub leading to a marked change in the composition of the vegetation (Allaby 1994). This term was only applied to scrub and forest. N/A = Not applied – all vegetation structural classes other than scrub and forest. (from Wildland Consultants 1999)
Veg_Hab	Vegetation type/habitat name (without structural class).
Notes	Notes on other plant species present and features.

3.3 Potential wetlands

The Regional Digital Aerial Mosaic 2003 (RDAM03) ortho-photographs of the Rotorua Lakes Ecological District were inspected "onscreen" for the presence of wetlands not listed in the FWW database (as at March 2004) or identified during the 2004 Rotorua Lakes Margin Survey at a scale of 1:5,000. One hundred and sixty-six potential wetland sites additional to those in the Environment Bay of Plenty Freshwater Wetlands Database were identified. Identification of potential sites was restricted to areas that contained features (e.g. small ponds, similar vegetation cover) that were similar to known wetlands. Each site identified was assigned a level of confidence in the existence of a wetland. Polygons have been used in the GIS to indicate the general location of potential sites, however these do not necessarily indicate the extent of the potential wetland site. Sites which probably contain wetlands, e.g. features visible on the aerial photographs indicate the probable presence of a wetland, were assigned a medium level of confidence. Sites with a low possibility, e.g. small ponds within pasture or low-lying areas adjacent to streams with a tree cover that may support wetland vegetation, were assigned a low level of confidence[1].

[1] The level of confidence relates to the probability of a wetland being present, not the accuracy of the boundary.

The presence of wetlands on these sites could be confirmed by an aerial flight (could confirm most sites) and/or a detailed field-based study of the entire ecological district. All potential sites will require field survey to confirm presence and extent.

Attribute table fields are listed and defined in Table 3.

Table 3: Attribute fields and definitions for GIS data layer: Rot_Lakes_ED_ potential_wetlands

PPW_No	Probable/possible wetland site number. Number assigned to site for identification purposes.
Lvl_conf	The level of confidence held about the existence of the wetland (medium or low), where medium was assigned to sites where the features indicate the probable presence of a wetland, and low was assigned to sites where features present only indicate the possible presence of a wetland.
Comments	Comments, including whether or not a field check is required.

4. SUMMARY

Sixty wetland sites in the Rotorua Lakes Ecological District were mapped to a scale of 1:5,000 using the RDAM03 ortho-photographs (listed in Appendix 4). These 60 sites include 20 wetland sites on the margins of the Rotorua Lakes included prior to the 2004 Rotorua Lakes Wetland Survey commencing. The 2004 Rotorua Lakes Wetland Survey was a separate project undertaken for Environment BOP which identified a further 78 wetlands. This brings the total number of wetland sites mapped in the Rotorua Lakes Ecological District to 138. Field work was conducted in 20 sites and wetland vegetation and habitat types are mapped for 14 wetland sites. A further 166 areas were identified as potential wetlands.

The boundaries of wetlands which were not field checked as part of this study are indicative only and field inspections will be required to determine the exact location and extent. It is likely that when field inspections are carried out some wetland sites may be found to be more extensive and others will include dryland areas.

ACKNOWLEDGMENTS

Joh Taylor (Environmental Investigations, Environment Bay of Plenty) initiated and provided logistical support for this project, as well as providing useful comments on a draft of this report.

REFERENCES

Beadel S.M., Shaw W.B., and Nicholls J.L. 1998: Rotorua Lakes Ecological District Natural Area Survey. *Wildland Consultants Contract Report No. 175*. 551 pp.

Wildland Consultants Ltd 2000: Indigenous biodiversity of Tauranga District – State of the environment report. *Wildland Consultants Ltd Contract Report No. 309*. 191 pp.

Wildland Consultants 2003a: Environment BOP Freshwater Wetland Database – revision and expansion. *Wildland Consultants Contract Report No.* 647. 29 pp.

Wildland Consultants 2003b: Field inspections of selected wetlands in the Bay of Plenty Region. *Wildland Consultants Contract Report No.* 539. 16 pp.

APPENDIX 1

DEFINITION FOR WETLANDS PROVIDED IN THE ENVIRONMENT BAY OF PLENTY PROPOSED REGIONAL WATER AND LAND PLAN (2004)

"**Wetlands -** Includes permanently or intermittently wet areas, shallow water, and land water margins that support a natural ecosystem of plants and animals that are adapted to wet conditions.

For the purposes of this regional plan, 'wetland' excludes:

(a) Wetted pasture and pasture with patches of rushes.
(b) Oxidation ponds.
(c) Artificial wetlands used for wastewater or stormwater treatment. This includes wetlands that have been developed primarily for effluent or stormwater treatment or disposal, but are managed to appear 'natural'.
(d) Artificial farm dams and detention dams.
(e) Land drainage canals and drains.
(f) Artificial reservoirs for firefighting, domestic or municipal water supply.
(g) Temporary ponded rainfall over areas that would not otherwise be considered a wetland.

The edge of a wetland (i.e. where a wetland becomes land) should be determined by a person with appropriate expertise.

(See also Figure 5 and photos in the plan to assist in interpretation.)"

WETLANDS FOR WHICH FIELD INSPECTIONS WERE UNDERTAKEN IN 2004

Wetland Name	Database Record Number	Comments
Lake Rotongata Wetlands[1,2]	156	
Five Mile Gate Swamp[1,2]	158	
Millar Road Pond Wetland[1,2]	159	
Lake Rotoatua Wetlands[1,2]	167	
Te Ngae Recreation Reserve Wetland[1,2]	195	Only the parts of this wetland visible from a road were surveyed. Data stored with 2004 Rotorua Lakes margin wetland survey.
Te Ngae Kahikatea Wetlands[1,2]	359	Only the parts of this wetland visible from a road were surveyed. Data stored with 2004 Rotorua Lakes margin wetland survey.
Ohineuia Stream Wetland A[1,2]	447	
Corner of 8 Mile and Poplar Roads Wetlands[1,2]	448	
Boyds Bay Wetland (Lake Okareka)	457	Only the parts of this wetland visible from a road were surveyed. GIS data and other site data stored with 2004 Rotorua Lakes margin wetland survey.
Sulphur Bay Wetlands[1,2]	496	
Waipa Wetland[1,2]	510	
Poplar Avenue Wetland B[1,2]	512	
Long Drive Wetland A[1]	513	Wetland boundary mapped. Vegetation and habitat types were not mapped as the project was halted at this point by the client.
Long Drive Wetland B[1,2]	514	
Whangaroa Bay Wetlands, Lake Rotoma	515	Part only surveyed. GIS data and other site data stored with 2004 Rotorua Lakes margin wetland survey.
Te Whaariki Toetoe Pond[1,2]	521	
Urupa Lagoon[1,2]	522	
Ohineuia Stream Wetland B[1,2]	524	
Highlands Road Wetland[1,2]	525	
Haumingi Bay Wetland	555	Site did not meet the definition for inclusion in the BOP FWW database. Not mapped (also see Appendix 5).

Key: 1. Site extent mapped. Data stored in a GIS data file: Rot_Lakes_ED_wetlands_2004_ excludes_all_wetlands_ within_500m_of_Rot_Lakes_except_20_large_wetlands
2. Vegetation and habitat types identified and mapped. Data stored in a GIS data file: Rot_ Lakes_ED_wetland_ vegetation_types_for_14_wetlands_from_2004_field_surveys

APPENDIX 3

WETLANDS MAPPED FROM BEST CONSERVATIVE ESTIMATE OF WETLAND EXTENT BASED ON REGIONAL DIGITAL AERIAL MOSAIC 2003

Wetland Name	Database Record Number
Waiowhiro Flat Wetland (Parawai Road Swamp)	3
Ngapuna Wetlands	4
Waiiti Stream Wetlands	9
Hinehopu Mire	10
Waitangi Soda Springs Mire	13
Tumutara Road Wetland	36
Waiaute Stream Wetlands	37
Kawerau Pond	38
Mangate Stream Wetlands	39
Te Whekau Lagoon	160
Lake Rotokawa Wetlands	165
Matahi Lagoon	170
Otauira (Hannahs Bay) Wetland	174
Awahou Wetland	189
Lake Rotomahana Wetlands	219
Rotomahana Protective Covenant Wetland	221
Nursery Road Wetland A	320
Reservoir Road Wetland	324
Poplar Avenue Wetland A	325
Carter Holt Harvey Wetlands, Kawerau	361
Rotoiti Forest Wetlands	366
Te Ti Bay Wetlands	369
Waterfall Road Wetland	371
Pohaturoa Road Wetland	445
Pohaturoa and Bakers Hollow Road Wetland	446
Waipa Mill Wetland	449
Copella Road Wetands	450
Playne Wetland	458
Hamurana Springs Recreation Reserve Wetland	474
Lake Tarawera Outlet Wetland	475
Waimangu Scenic Reserve Wetland	477
Rotomahana Ponds	488
Parimahana Extension Wetland	489
Rotoehu Wetland	493

Wetland Name	Database Record Number
Lake Te Rotoroniu Wetlands	498
Makatiti Wetland	499
East Valley Wetlands	501
Hogg Road Wetland B	509
Long Drive Wetland A	513
Tarawera River Wetlands C	527
Te Wairoa Bay Wetlands (Lake Rotoehu)	532
Mangorewa/Kaharoa Z Block Wetland	561
Whakarewarewa Lagoon	N/A
Waikaruru Stream Wetlands	N/A

APPENDIX 4

ALTERATIONS/ADDITIONS TO BE MADE TO GRID REFERENCES (CENTREPOINTS) IN THE BOP FWW DATABASE (AS PER MARCH 2004 VERSION OF BOP FWW DATABASE)

Wetland Name	Database Record Number	Previous Centrepoint(s)	New Centrepoint(s)
Waiiti Stream Wetlands	9	E2815142 N6344056	E2815172 N6343998
Hinehopu Mire	10	E2816400 N6346000	E2816399 N6346092
Lake Rotokawa Wetlands	165	E2801100 N6338237	E2801129 N6338248
Lake Rotoatua Wetlands	167	E2811107 N6341936	E2810927 N6341789
Otauira (Hannahs Bay) Wetland	174	E2800387 N6338041	E2800454 N6337812
Awahou Wetland	189	E2792900 N6345300	E2792852 N6345441
Nursery Road Wetland A	320	E2796875 N6331062	E2796849 N6331066
Reservoir Road Wetland	324	E2797789 N6329672 E2797818 N6329898 E2798007 N6329906 E2798089 N6329733	E2797777 N6329632 E2797798 N6329876 E2797978 N6329867 E2798168 N6329699
Poplar Avenue Wetland A	325	E2797198 N6329388 E2796984 N6329549	E2797163 N6329434 E2797008 N6329525
Rotoiti Forest Wetlands	366	E2815805 N6339299 E2817607 N6341558 E2819185 N6340877	E2815789 N6339347 E2817640 N6341511 E2819161 N6340883
Te Ti Bay Wetlands (Lake Rotoiti)	369	E2806224 N6347809	E2806202 N6347815
Waterfall Road Wetland	371	E2820700 N6334200	E2820731 N6334158
Pohaturoa Road Wetland	445	E2795330 N6331518	E2795311 N6331506
Waipa Mill Wetland	449	E2795934 N6330914	E2795923 N6330916
Hamurana Springs Recreation Reserve Wetland	474	E2796024 N6347264	E2796156 N6347255
Lake Tarawera Outlet Wetland	475	E2817030 N6329753	E2817062 N6329762
Rotoehu Wetland	493	E2820350 N6345900	E2820389 N6345968 E2819286 N6346030
Makatiti Wetland	499	E2812858 N6333114	E2812838 N6333091
Tarawera River Wetlands C	527	E2818592 N6332798 E2819411 N6333476	E2818598 N6332678 E2819523 N6333552
Mangorewa/Kaharoa Z Block Wetland	561	E2792413 N6344655	E2792140 N6344747
Whakarewarewa Lagoon	N/A		E2825988 N6344747
Waikaruru Stream Wetlands	N/A		E2794665 N6326934

APPENDIX 5

WETLAND TO BE DELETED FROM BOP FWW DATABASE

Wetland Name	Database Record Number	Comments
Haumingi Bay Wetland	555	Delete from database. No wetland present as per definition for sites to be included in the Bay of Plenty FWW database.