Monitoring in the Department of Conservation and Land Management

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Summary

The primary objective of the project reported here was to conduct a preliminary survey of monitoring projects and related activities within the Department of Conservation and Land Management in Western Australia. The information collected during the survey was to develop a database of monitoring activities within the Department. The directory provides a brief summary of each project or activity including supervisor, project or activity name and location, and a grading referring to how the project fits into the monitoring strategy.

Three hundred and thirty-six projects and related activities were reported in response to the survey. Analysis of the projects and activities shows that 148 of these are considered to be highly relevant to the Departmental Monitoring Program and could be incorporated into a formal Program with very little additional effort. A further 43 are relevant but would require some modification to be consistent with the Policy objectives and to be incorporated into a formal Departmental Monitoring Program Each of these could be fitted into one of eleven general categories of monitoring-related activities.

This survey does not report details of a suite of projects and activities that are known to exist: for example, the reporting of mining and quarrying activities on CALM-managed land by private companies, and the work of other Government Departments on/in or adjacent to CALM-managed lands and waters.

Despite the identified gaps in the database, this project has shown that there is a considerable amount of work going on within the Department that is consistent with the Monitoring Policy. This work would provide a solid foundation for a formal Monitoring Program, should there be a decision to establish one.

1. Introduction

1.1 Project objectives

The primary objective of this project was to ascertain the range and scope of monitoring-related projects and activities currently underway within the Department of Conservation and Land Management, Western Australia. The results of the survey are intended to form the basis of a review of the Department's program of monitoring, established under its formal Policy *Reporting, Monitoring and Re-evaluation of Ecosystems and Ecosystem Management*. It is envisaged that the directory/database of monitoring projects and activities within the Department developed as a result of the survey will also be useful for developing priorities for research and management.

1.2 Background to the Departmental Monitoring Program

In September 1988 the Corporate Executive of the Department adopted a policy entitled: *Reporting, Monitoring and Re-evaluation of Ecosystems and Ecosystem Management* (Policy No 28). The covering memo from the Executive Director expressed the view that adoption of this policy represented a ..."milestone in CALM's development." The objectives of this Policy are:

- To study and record management decisions and their effects on CALM lands, and to incorporate the information so gained in subsequent development of policy and management plans.
- To maintain up-to-date records of distribution and status of the State's biota, and the management decisions that are made about that biota and about Departmental lands (and waters) and the consequences of those decisions.
- To provide a mechanism for systematically reviewing management policy and programs in the light of new information.
- To provide an on-going record system which will document changes in community species composition through natural ecological changes as well as management.

The policy acknowledges that present levels of knowledge about ecosystems and ecosystem processes are inadequate. It prescribes the establishment of a series of monitoring sites on Departmental lands (and waters) throughout the State and a program for systematic sampling of those sites. Management of Departmental lands will continue but the effects of management will be monitored. Results from the monitoring program will be assessed and used in making subsequent management decisions. In this way, the monitoring program will contribute to a gradual improvement in knowledge and in management.

Despite the widespread recognition of the need for monitoring and of the potential benefits of the monitoring program, the Monitoring Policy has not been implemented to any substantial degree: it was not implemented in the manner originally laid down in the Policy - with the appointment of dedicated staff and the establishment of pilot projects -and so much of the momentum has been lost.

In 1993/94, the Science and Information Division agreed to take the initiative and to begin to implement the Policy with a view to handing it over to a relevent

operational branch in the Department within three years (SPP Number: 93/0091). The survey reported here is a part of that initiative.

It is worth noting here that a revised monitoring policy has been drafted and considered by the Corporate Executive of the Department of Conservation and Land Management. The revised draft has yet to be adopted.

2. Methods

2.1 Data gathering

The process of surveying the projects and activities within the Department of Conservation and Land Management that could be relevant to the Department's Monitoring Policy had three main components:

a) Notification of personnel.
b) Database search.
c) Personal interviews and correspondence.

2.1.1 Notification of personnel.

All Departmental staff who may have had a relevant contribution to make to the survey were canvassed with the letter contained in Appendix 1, which outlined the purpose of the survey and introduced the nature of the material which would be required.

2.1.2 Database search.

A thorough search of the most immediately relevant databases was conducted for any material of relevance. The databases searched were WASSP and the SPP Summaries on the CALM Web. Other databases accessed were a directory of local projects for the Dwellingup District and a directory of projects from Environmental Protection Branch.

2.1.3 Personal interviews and correspondence.

Where possible, direct interviews with relevant staff were undertaken. Interviews were conducted by one of us (AD) using the standard interview form contained in Appendix 1 as the basis for the information collected. Interviews were conducted in offices at Albany, Bunbury, Busselton, Como, Crawley, Kelmscott, Manjimup, Pemberton, Wanneroo and Woodvale.

Where direct interviews were not possible, the standard interview form was used to gather the information by correspondence including facsimile and electronic mail.

2.2 Data management: compilation of a directory.

The survey responses were collated into hardcopy files organised primarily on the basis of the location from which the project or activity was organised ie the Departmental region, district, unit, division and so on. Within each of these categories, projects and activities were then grouped according to the name of the supervisor.

A Paradox 3.5 database was developed and results of the survey were entered. The database consists of three main tables:

MONI - contains general information about individual projects. The information in this table is found in the Project Information section of the main data entry form. MONI is the master table, and EVALUATE and PUBLICNS are the details tables.

EVALUATE - assesses the status of each project with respect to monitoring. The information in this table is found in the Assessment section of the main data entry form.

PUBLICNS - contains information about any publications relevant to each project. The information in this table is found in the Publications section of the main data entry form.

Details of the categories of information entered into each of the three tables can be found in Appendix 2. Included are scores for each project under the headings:

- Driver Class which is an assessment of the relevance of that project or activity to any formal Monitoring Program that might be established under the Department's Monitoring Policy;
- Time Scale which is an assessment of the term of that project or activity;
- Analysed? - whether or not the results have been analysed;
- Continuity - whether the that project or activity involves permanently marked plots and/or whether long-term observations are possible;
- Hypotheses - whether or not the aims of the project or activity are clearly stated or the hypotheses are clear;
- Evaluation - whether or not the project or activity includes a program for analyses and up-dating results, which may depend on there being an efficient record-keeping and data management system, and whether or not the aims of the project or activity appear integral to management decisions and operations within the Department, and whether or not the project or activity includes feedback to observors, managers and so on; and
- Methods - whether the project or activity incorporates standardised, simple, repeated observations of one or more elements, the methodology is accessible to a range of users and standardised to minimise observor error, the results are easily interpretable and appear relevant to the work of the Department.

There are also five look-up tables associated with the main tables. These are: **District, Status, Subject, DOMon** and **Analysed**. (see Appendix 2 for more information about these).

3. Results

Three hundred and thirty-six projects and related activities were reported in response to the survey. These are listed by project name in Table 1. A second table (Table 2) lists those same projects by title and attributes given to them under the headings listed above (Driver Class,Time Scale, Analysed, Continuity, Hypotheses, Evaluation, Methods).

Table 1. List of projects and activities being undertaken within the Department of Conservation and Land Management that fall within the scope of the Department's Monitoring Policy.

F#	Project Name	District	Region	Location	Status	Com'ced	Complete Date	SPP	File	SInit	SSurname	Subject	Keywords	DOMon	ProjTime
1	Effects of prescribed burning on invertebrate communities in Durokoppin and East Yorkrakine Nature Reserves	MER	WHE	Durokoppin and East Yorkrakine Nature Reserves	SUS	6/1/87	7/1/96	93/0072		B	Johnson	Invertebrates		Prescribed burning	
2	Effects of prescribed burning on small vertebrates in Tutanning Nature Reserve	NAR	WHE	Tutanning Nature Reserve	ONG	6/1/86	12/1/96	93/0074		G	Friend	Small/medium vertebrates		Prescribed burning	
3	Monitoring salinity and its effects on the biota in the agricultural zone of south-western Australia.	NW		Agricultural zone of south-western Australia.	PLA	1/1/97	1/1/01			S	Halse	Biota	Water quality, agricultural zone, Salinity Action Plan	Wetlands Ecology	
4	Effects of three fire regimes on ground-dwelling invertebrates in jarrah forest.	MAN	SFR	Perup Nature Reserve	SUS	11/1/88	7/1/96	93/0073		B	Johnson	Invertebrates		Prescribed burning	
5	Effects of timber harvesting on small vertebrates in medium rainfall jarrah forest.	MAN	SFR	Kingston, Warrup and Winnejup Forest Blocks.	ONG	12/1/93	12/1/99	93/0115		G	Friend	Small/medium vertebrates		Timber Harvesting	
6	FRNP Mammal population responses to baiting.	ALB	SCR	Fitzgerald River National Park	ONG	7/1/91	7/1/96	93/0083		J	Kinnear	Mammals		Pest control and/or impact	
7	A conservation strategy for the Western Desert Rock-Wallaby	KAR	PIL	Calvert Ranges near L. Disappointment on Canning Stock Route	ONG	6/1/94	6/1/99	95/0005		J	Kinnear	Macropods		Pest control and/or impact	
8	1080 longevity in laid meat baits.	KAT	WHE	Katanning, Merredin and Narrogin.	ONG	7/1/95	6/1/97	95/0015		J	Kinnear			Pest control and/or impact	
9	Effect of feral cat control on the sex ratios of rock-wallaby populations.	MER	WHE		ONG	11/1/95	4/1/98	96/0005		J	Kinnear	Macropods		Pest control and/or impact	
10	Effects of timber harvesting on terrestrial invertebrates in medium rainfall jarrah forest.	MAN	SFR	Kingston, Warrup and Winnejup Forest Blocks.	ONG	12/1/94	12/1/97	94/0007		G	Friend	Invertebrates		Timber Harvesting	
11	The effects of logging and fire (Edge effects, habitat trees) on birds of the jarrah forest.	MAN	SFR	Kingston and Warrup Forest Blocks.	ONG	9/1/93	6/1/97	93/0155		G	Friend	Birds		Logging and Fire	
12	Prescribed burning and the conservation of invertebrate communities in the jarrah forest of Western Australia.	COL	CFR	Batalling forest block	ONG	11/1/92	12/1/97	93/0076		G	Friend	Invertebrates		Prescribed burning	
13	Effects of spring and autumn prescribed burns on small vertebrates in jarrah forest	COL	CFR	Batalling forest block	ONG	10/1/92	1/1/99	93/0075		G	Friend	Mammals		Prescribed burning	
14	Shark Bay Marine Reserves monitoring programme.	GER	MWT	Shark Bay Marine Park	ONG	1/1/96			041164F0914	J	Cary	Flora and Fauna		External users	
15	Weeds of Western Australia: Advice, Liason, Publicity and Documentation	WA	WA	All Districts, all Regions.	ONG	4/1/95	7/1/99			G	Keighery	Flora		Pest control and/or impact	
16	Systematics of selected taxa of	SW	SW	Central Forest and	EXP	8/1/94	7/1/96			G	Keighery	Flora		Taxonomy	

Table 1 continued

F#	Project Name	District	Region	Location	Status	Com'ced	Complete Date	SPP	File	SInit	SSurname	Subject	Keywords	DOMon	ProjTime
	conservation significance on the Swan Coastal plain			Swan regions										Clarification	
17	Re-survey and analysis of F. Podger's dieback sites at 30 year interval	PER	SWA	Coastal waters, Dwellingup, Hillarys, J'dale, Mundaring, Perth, Wanneroo	EXP	1/1/95	1/1/96			G	Keighery	Flora		Dieback	
18	Assessment of the faunal composition of long-unburnt and regularly burnt stands of jarrah forest	UNK	UNK							G	Friend	Flora and Fauna		Prescribed burning	
19	The effects of timber harvesting and associated activities on medium sized mammals in the jarrah forest	MAN	SFR		ONG	9/1/93	9/1/99	93/0109		K	Morris	Mammals		Timber Harvesting	
20	Recovery plan for the Chuditch (Dasyurus geoffroi)	WA	WA		ONG	2/1/92	2/1/01	93/0053		K	Morris	Mammals		Recovery Plan	
21	The conservation of the Thevenard Island Mouse Leggadina aff. lakedownensis	KAR	PIL	Thevenard Island	ONG	2/1/94	7/1/97	93/0052		K	Morris	Small/medium vertebrates		Recovery Plan	
22	Recovery Plan for the Shark Bay Mouse (Pseudomys fieldi)	NW	NW	Bernier Island, Doole Island, Shark Bay mainland-Gascoyne and Pilbara regions	ONG	3/1/92	3/1/99	93/0056		K	Morris	Small/medium vertebrates		Recovery Plan	
23	Reintroduction and monitoring of the Greater Stick-nest Rat on Salutation Island, Shark Bay	GER	MWT	Salutation Island	EXP	7/1/90	7/1/96	93/0055		K	Morris	Small/medium vertebrates		Recovery Plan	
24	Effects of timber harvesting on birds of the karri forest	MAN	SFR	Manjimup, Pemberton	COM	11/1/82	7/1/95	94/0008		G	Wardell-Johnson	Birds		Timber Harvesting	
25	Survey of vegetation communities of the Kent, Hay Bow and Denmark River Catchments	SW	SW	Albany and Walpole districts, South Coast and Southern regions.	COM	1/1/90	1/1/95	93/0039		G	Wardell-Johnson	Vegetation community		Inventory	
26	Conservation biology of locally endemic eucalypts	WA	WA		EXP	4/1/89	7/1/95	93/0089		G	Wardell-Johnson	Flora		Inventory	
27	Community conservation of the Walpole Nornalup National Park (part of 93/0088)	WAL	SFR	Walpole Nornalup National Park	ONG	1/1/85	1/1/98	93/0087		G	Wardell-Johnson	Flora and Fauna		Inventory	
28	Towards reconstruction and the sustainable utilisation of the Avon Catchment	NW	NW	Goldfields, Greenough, Swan and Wheatbelt regions		1/1/94				G	Wardell-Johnson	Waterways			
29	Conservation biology of vulnerable frogs	SW	SW	All regions and districts of the south west.	ONG	7/1/82	1/1/01	93/0093		G	Wardell-Johnson	Amphibians		Recovery Plan	
30	Biogeographic overview of the tropical savanna	EKI	KIM	East Kimberley, West Kimberley, Kununurra	ONG	8/1/95	8/1/02			G	Wardell-Johnson	Flora and Fauna		Inventory	
31	Conservation of riparian refugia of the tropical savanna	EKI	KIM	East Kimberley, West Kimberley, Kununurra	ONG	7/1/95	7/1/02			G	Wardell-Johnson	Flora and Fauna		Inventory	
32	Fire and savanna landscapes	EKI	KIM	East Kimberley, West Kimberley, Kununurra	ONG	2/1/96	7/1/02			G	Wardell-Johnson	Flora and Fauna		Prescribed burning	
33	Biogeography and habitat use by	EKI	KIM	East Kimberley, West	ONG	11/1/95	8/1/02			G	Wardell-	Birds		Land	

Table 1 continued

F#	Project Name	District	Region	Location	Status	Com'ced	Complete Date	SPP	File	SInit	SSurname	Subject	Keywords	DOMon	ProjTime
	granivorous birds			Kimberley, Kununurra							Johnson			disturbance	
34	Conservation of vulnerable communities (includes Walpole/Nornalup National Park and Lake Muir complex)	SW	SW	All regions in south west- includes Walpole/Nornalup NP and Lake Muir complex.	COM	9/1/93		93/0088		G	Wardell-Johnson	Vegetation community		Inventory	
35	Impact of buffel grass (Cenchrus ciliaris) on plant communities and fauna habitats on offshore islands near Onslow in Western Australia	NW	NW	Gascoyne, Midwest and Pilbara regions		7/1/95				A	Start	Flora		Pest control and/or impact	
36	Status and ecology of the Dibbler (Parantechinus apicalis) in Western Australia	WA	WA	Districts-Albany, Denham, Esperance, Exmouth, Moora. Regions-Midwest, Sth Coast.	ONG	2/1/95	2/1/98	95/0011		A	Start	Mammals		Recovery Plan	
37	Population size, habitat use and home range of the mainland Quokka (Setonix brachyurus), and the effect of 1080 baiting for fox control within the northern jarrah forest of southwest Western Australia	MUN	SWA	Districts- Dwellingup and Mundaring	ONG	9/1/93	7/1/98	93/0054		P	De Tores	Macropods		Pest control and/or impact	
38	Translocation of the western ringtail possum (Pseudocheirus occidentalis)	SW	SW	Leschenault Peninsula Cons. Pk., Yalgorup NP, Lane Poole Res., Keats forest blk.	ONG	9/1/91	7/1/97	93/0142		P	De Tores	Mammals		Pest control and/or impact	
39	Control and ecology of the red fox in Western Australia - Native fauna response to 1080 baiting over large areas at three baiting frequencies.	SW	SW	Northern jarrah forest-Central forest region, Mundaring and Dwellingup districts	TER	10/1/93	7/1/99	93/0157		P	De Tores	Mammals		Pest control and/or impact	
40	Fox and cat density estimates, survivorship and home range estimates in the presence of 1080 baiting within the northern jarrah forest of southwest Western Australia - a pilot study	SW	SW	Central and Swan regions	EXP	6/1/96	12/1/96			P	De Tores	Mammals		Pest control and/or impact	
41	Floristic survey of the Goldfield woodlands	NW	NW	Goldfields, Midwest and Wheatbelt regions. Merredin district.	ONG	4/1/94	12/1/97	93/0166		N	Gibson	Vegetation community		Inventory	
42	Monitoring of the effects of the Dawesville Channel on the vegetation of the Peel Harvey Estuary	DWE	SWA	Peel Harvey Estuary	ONG	7/1/94	7/1/99	94/0013		N	Gibson	Vegetation community		Land disturbance	
43	Floristic survey of the Darling Scarp	SW	SW	Central and Swan regions. Dwellingup, Harvey, J'dale, Perth Wanneroo districts	ONG	8/1/96	10/1/97			N	Gibson	Vegetation community		Inventory	
44	Floristic survey of the coastal communities of the Warren botanical	SW	SW	Cape Naturaliste to Two Peoples Bay.	EXP	11/1/89	1/1/97	93/0037		N	Gibson	Vegetation community		Inventory	

Table 1 continued

F#	Project Name	District	Region	Location	Status	Com'ced	Complete Date	SPP	File	SInit	SSurname	Subject	Keywords	DOMon	ProjTime
	subdistrict			Central, South Coast and Southern Regions.											
45	Floristic survey of the remnant heaths and woodlands of the Swan Coastal Plain	SW	SW	From Moore River to Busselton	COM	6/1/91	7/1/96	93/0038		N	Gibson	Vegetation community		Inventory	
46	Carnarvon Basin survey	GER	MWT		EXP	1/1/94	1/1/96			N	Gibson	Flora and Fauna		Inventory	
47	Utilising GIS and BIOCLIM to examine species richness patterns of Western Australia's native biota	WA	WA		EXP	12/1/95	7/1/96	96/0007		P	Gioia	Amphibians		CALM estate	
48	The CALM Web and Corporate Data Dictionary - a peak tool for accessing corporate data				EXP	12/1/95	12/1/96			P	Gioia			Inventory	
49	Preliminary survey of the biological and cultural resources of the ranges of the Western Desert (externally funded)	KAL	GFR		EXP	12/1/93	1/1/97	93/0032		D	Pearson	Flora and Fauna		External users	
50	Fire effects on desert vertebrates - Influence of fire season	KAL	GFR	Queen Victoria Spring Nature Reserve	ONG	3/1/87	3/1/98	93/0092		D	Pearson	Small/medium vertebrates		Prescribed burning	
51	Ecology and conservation of Western Australian pythons	NW	NW	Midwest, Swan and Wheatbelt regions	ONG	8/1/93	1/1/99	93/0159		D	Pearson	Reptiles		Ecological study	
52	Experimental management and monitoring of Desert Rock-Wallaby populations	KAL	GFR	Townsend Ridges, Cavenagh Range	ONG	8/1/94	6/1/97	95/0016		D	Pearson	Macropods		Pest control and/or impact	
53	Biology, conservation and management of the Lancelin Island Skink (Ctenotus lancelini)	MOO	MWT							D	Pearson	Reptiles		Ecological study	
54	Fox population dynamics	GAS	MWT	Carnarvon	EXP	6/1/95	1/1/97	96/0001		N	Marlow	Mammals		Pest control and/or impact	
55	Control and ecology of the red fox in Western Australia: Fox work (1993/94 Scope Items 1-5 of ANCA FPP Proposal)	WA	WA	Central, Swan and Wheatbelt regions	TER	9/1/93	6/1/98	93/0057		N	Marlow	Mammals		Pest control and/or impact	
56	Control and ecology of the red fox in Western Australia: Fox work (1993/94 Scope Items 1-5 of ANCA FPP Proposal)	SW	SW	Central, Swan and Wheatbelt regions	ONG	9/1/93	6/1/98	93/0057		N	Marlow	Mammals		Pest control and/or impact	
57	The development of microsatellite probes to investigate the social organisation of foxes				COM	10/1/92	8/1/94	94/0009		N	Marlow	Mammals		Pest control and/or impact	
58	An evaluation of the efficacy of remote sensing and GIS technologies for dieback mapping and monitoring	WA	WA	Two Peoples Bay N.R. and regions on sth coast of WA, Cobiac hardwood block	EXP	1/1/93	12/1/95	94/0005		J	Armstrong	Flora		Dieback	
59	Control of insect pests in young plantations of Eucalyptus globulus:	SW	SW	Collie, Dwellingup and Kirup districts.	EXP	7/1/93	9/1/95	93/0153		I	Abbott	Invertebrates		Pest control and/or impact	

Table 1 continued

F#	Project Name	District	Region	Location	Status	Com'ced	Complete Date	SPP	File	SInit	SSurname	Subject	Keywords	DOMon	ProjTime
	Early indicators of pest insect outbreaks and the beneficial impact of spiders and parasitoids														
60	Control of Jarrah Leaf Miner (JLM): Selective retention of JLM resistant trees and ground coppice in a demonstration forest plot	COL	CFR	Bristol forest block	EXP	10/1/93		93/0097		I	Abbott	Flora		Pest control and/or impact	
61	Control of Jarrah Leaf Miner:1)Performance and reinfestation of JLM in ground coppice after crown scorch by a moderate intensity prescribed spring burn. 2)Performance and reinfestation of JLM in ground coppice after crown scorch by autumn prescribed burn	COL	CFR	Fleays, Leach, Shotts and Bowelling forest blocks	EXP			93/0096		I	Abbott	Invertebrates		Prescribed burning	
62	Invertebrate conservation in an urbanized landscape: The native earthworm fauna of the metropolitan sector of the Swan Coastal Plain and its representation in the conservation estate	PER	SWA	Jarrahdale and Perth districts, from Yanchep to Rockingham.	EXP	6/1/94	7/1/96	93/0021		I	Abbott	Invertebrates		CALM estate	
63	IPPS Bio-Control Study			Areas where outbreak occurred	COM	1/1/91				I	Abbott	Invertebrates		Pest control and/or impact	
64	SIREX - Trap Tree Monitoring			Locations vulnerable to infestation eg. Southern Highway, Ports	SUS					I	Abbott	Invertebrates		Pest control and/or impact	
65	Establishment of jarrah (Eucalyptus marginata) in shelterwood logged areas and on dieback 'graveyard' sites	SW	SW	Forest Blocks in Dwellingup, Jarrahdale, Manjimup and Walpole districts.	SUS	1/1/94	12/1/97	93/0094		G	Stoneman	Flora		Timber Harvesting	
66	Characteristics of hollow-bearing jarrah and marri trees and coarse woody debris, their use by selected species of fauna, and the effect of logging-and-burning jarrah forest on them.	SW	SW	Dwellingup, Harvey, Manjimup, Pemberton districts.	ONG	1/1/94	12/1/97	93/0095		G	Stoneman	Small/medium vertebrates		Logging and Fire	
67	Water Authority Broad scale monitoring of hydrology patterns in relation to forest management and land management in agricultural areas	MAN	SFR	5 catchments in Southern Forest region, in intermediate rainfall zone.	ONG					G	Stoneman	Biota		Agricultural land use	
68	Northern Jarrah forest catchment studies			Northern jarrah forest.						G	Stoneman	Waterways		External users	
69	Quantitative field assessment of nutrient inputs by surface runoff into Lake Clifton (Yalgorup National Park), an internationally significant wetland	HAR	CFR	Lake Clifton	EXP	5/1/93	2/1/95	93/0058		J	Lane	Waterways	Water quality, nutrients, conservation, buffer zones	Wetlands Ecology	

Table 1 continued

F#	Project Name	District	Region	Location	Status	Com'ced	Complete Date	SPP	File	SInit	SSurname	Subject	Keywords	DOMon	ProjTime
70	Management of the Busselton Wetlands: control of water levels and other perturbations and their impacts upon breeding of the Black Swan (Cygnus atratus)	BUS	CFR	Vasse and Wonnerup estuaries and adjacent wetlands	EXP	6/1/93	5/1/95	93/0062		J	Lane	Waterways	Black Swan, nesting activity, water levels	Wetlands Ecology	
71	Assessment of the role and importance of the Vasse-Wonnerup floodplain in the maintenance of waterbird populations	BUS	CFR	Vasse and Wonnerup wetlands.	EXP	1/1/94	4/1/95	93/0061		J	Lane	Waterways		Timber Harvesting	
72	Monitoring of wetlands in nature reserves and national parks of south western Australia	SW	SW	Mid west, Swan, Central forest, Southern forest, South Coast, Wheatbelt regions.	ONG	11/1/79		93/0060	031466F0905	J	Lane	Waterways	Water quality, water levels, conservation value	Wetlands Ecology	
73	Development of guidelines for monitoring of Australia's wetlands of international importance (Ramsar Convention) EXTERNALLY FUNDED	WA	WA	Central, Kimberley, South Coast, Swan, Wheatbelt regions	EXP	10/1/94	6/1/95	93/0059		J	Lane	Waterways	Monitoring, management guidelines	Wetlands Ecology	
74	Breeding ecology and conservation of the Banded Stilt	KAL	GFR		EXP	3/1/95	3/1/96			J	Lane	Birds		Ecological study	
75	Directory of important wetlands in Australia: preparation of the 2nd edition (EXTERNALLY FUNDED)	WA	WA	All regions, all districts.	EXP	7/1/95	1/1/96			J	Lane	Waterways	Directory	Wetlands Ecology	
76	Assessment of waterbird use of wetland nature reserves of south-western Australia	WA	WA	Midwest, Swan, Central Forest, Southern Forest, South Coast, Wheatbelt regions.	COM	1/1/81	1/1/85			J	Lane	Waterways	Waterbirds use, breeding activity, distribution	Wetlands Ecology	
77	Monitoring of impacts of Dawesville Channel on nature conservation values of Peel-Harvey estuary: Waterbirds	DWE	SWA	Peel-Harvey estuary	ONG	1/1/94	1/1/00			J	Lane	Waterways	Waterbirds use	Wetlands Ecology	
78	Taxonomy of new, rare and priority plant species of the southern forests	MAN	SFR	Manjimup, Pemberton, Walpole.	ONG	7/1/94	7/1/97			T	Macfarlane	Flora		Taxonomy	
79	Taxonomic database of WA plant genera	WA	WA	All districts, all regions.	ONG	7/1/94	6/1/97	95/0009		T	Macfarlane	Flora		Taxonomy	
80	Taxonomy and inventory of WA flora: legumes, grasses and lillies	WA	WA	All districts and regions.	ONG			93/0008		T	Macfarlane	Flora		Taxonomy	
81	Fire-induced mosaics in semi-arid shrubland and woodland communities	ALB	SCR	Albany, Esperance				93/0086		L	McCaw	Vegetation community		Fire Protection	
82	Post-fire response to mallee-heath shrubland at Stirling Range National Park	ALB	SCR	Stirling Range N.P.				93/0085		L	McCaw	Vegetation community		Fire Protection	
83	Prescribed burning of thinning slash in young karri stands	PEM	SFR	Boorara 2.	COM	8/1/92	7/1/95	93/0108		L	McCaw	Flora		Prescribed burning	
84	Establishment and growth of karri stands in relation to soil characteristics. Part 1. Measurement of	MAN	SFR	Manjimup, Pemberton, Walpole.	EXP	9/1/94	12/1/95	95/0002		L	McCaw	Soils		Timber Harvesting	

Table 1 continued

F#	Project Name	District	Region	Location	Status	Com'ced	Complete Date	SPP	File	SInit	SSurname	Subject	Keywords	DOMon	ProjTime
	soil characteristics.														
85	Management of Banksia coccinea stands affected by canker fungi (ANCA-funded project)	ALB	SCR		EXP	11/1/95	11/1/96	96/0002		L	McCaw	Flora		Prescribed burning	
86	Karri regrowth operational burning	MAN	SFR	Warren, Crowea, Boorara. Manjimup and Pemberton districts.	COM	1/1/85				L	McCaw	Flora		Prescribed burning	
87	Fuel modification by chaining at Kalbarri National Park.	GER	MWT	Kalbarri National Park	COM	7/1/87	7/1/92			L	McCaw	Flora		Fire Protection	
88	Distribution of Gum-leaf skeletonizer in the Central and Southern Forest regions	SW	SW	All districts in Central and Southern Forest regions.	ONG	9/1/87		93/0104		J	Farr	Invertebrates		Pest control and/or impact	
89	Quantitative population monitoring of Gum-leaf skeletonizer Uraba lugens and impact assessment on Jarrah crowns	MAN	SFR		ONG	1/1/86		93/0103		J	Farr	Invertebrates		Pest control and/or impact	
90	Cardiaspina jerramungae populations and impact on Eucalyptus occidentalis in the Lower Great Southern	SW	SW	Includes flat topped yate swamps near Cranbrook, Tambellup, Ongerup, Welstead, Jerramungup, Quaalup, Fitzgerald River N.P., Stirling range N.P.	TER	1/1/89				J	Farr	Invertebrates		Pest control and/or impact	
91	Water relations and growth of jarrah on high, moderate and low impact dieback (Phytophthora cinnamomi) sites	DWE	SWA	Dwellingup, Jarrahdale and Mundaring	COM	1/1/87	1/1/94	93/0102		S	Crombie	Flora		Dieback	
92	Preliminary survey of the effectiveness of B. grandis removal in reducing potential Phytophthora cinnamomi host material in the northern jarrah forest in the medium term	DWE	SWA	Dwellingup, Mundaring and Jarrahdale	COM	1/1/93	6/1/95	93/0101		S	Crombie	Flora		Dieback	
93	Genetic variation in quantitative trials of exotic and endemic plantation and rehabilitation species	SW	SW	Dwellingup, Jarrahdale and Harvey ALCOA minesites, Collie, Katanning, Manjimup and Moora districts.	ONG	1/1/83	1/1/20			R	Mazanec	Flora		Land Rehabilitation	
94	Edaphic, climatic and floristic patterns associated with the distribution of three species of forest eucalypts restricted to the Walpole area of SW Australia	SW	SW	Southern Forest, Central Forest and South Coast Region.	COM	1/1/86	1/1/93			I	Wheeler	Flora		Inventory	
95	Effects of fire on bird species density and diversity in Karri and Jarrah Forest (Grey 6)	MAN	SFR	Throughout Southern Forest region.	SUS	1/1/82	1/1/89			G	Lidlow	Birds		Prescribed burning	

Table 1 continued

F#	Project Name	District	Region	Location	Status	Com'ced	Complete Date	SPP	File	SInit	SSurname	Subject	Keywords	DOMon	ProjTime
96	Long term monitoring of selected mammal species in Perup Nature Reserve	MAN	SFR	Perup Nature Reserve	SUS					G	Lidlow	Mammals		Inventory	
97	Effects of feral predator control on small vertebrates in Gibson Desert Nature Reserve	KAL	GFR	Gibson Desert Nature Reserve	ONG	1/1/90				G	Lidlow	Small/medium vertebrates		Pest control and/or impact	
98	Monitoring populations of the Dalgyte in the Gibson Desert	KAL	GFR	Gibson Desert	ONG	1/1/88				G	Lidlow	Small/medium vertebrates		Pest control and/or impact	
99	Environmental survey, Tutanning Nature Reserve	NAR	WHE	Tutanning Nature Reserve		1/1/76				A	Hopkins	Habitat		Ecological study	
100	Auditing of timber harvesting plans and operations	SW	SW	Forest regions	ONG					B	Towie	Flora		Timber Harvesting	
101	Utilisation monitoring plots	SW	SW	Forest regions.						G	Strelein	Flora			
102	Dieback mapping program	SW	SW	All forest regions, including Bunbury, Kelmscott and Manjimup.	ONG					P	Stirling	Flora		Dieback	
103	SILREL	SW	SW	All forest regions.	ONG	1/1/94				P	Stirling	Flora		Timber Harvesting	
104	Hardwood Integrated Planning System (HIPS)	SW	SW	Forest regions	ONG					P	Stirling	Flora		Timber Harvesting	
105	EFMIS (Forest Management Information System)									P	Stirling	Flora			
106	1981 agroforestry trial- Wellington catchment	COL	CFR	Location 4229 Paddock 12 (previously owned by Robinson) Bowelling.	ONG	1/1/81	1/1/12			R	Hingston	Flora		Agricultural land use	
107	A comparison of silvicultural regimes for sunkland P. radiata	BUS	CFR	Vasse plantation, Compt. 1	ONG	1/1/82	1/1/12			R	Hingston	Flora		Timber Harvesting	
108	Alternative silvicultural regimes for fuel reduced buffers (F.R.B.s)	KIR	CFR	Balingup plantation Compt. 7 (P. 80)	ONG	1/1/82	1/1/12			R	Hingston	Flora		Timber Harvesting	
109	Timber and agricultural production from 3 stand densities of pine agroforestry in the Manjimup area.	PEM	SFR	Old ag. research station, Middlesex.	ONG	1/1/86	1/1/16			R	Hingston	Flora		Timber Harvesting	
110	Agroforestry trials with numerous tree densities looking at tree volume and agricultural production.	SW	SW	Busselton, Kirrup and Nannup districts.	ONG					R	Hingston	Flora		Agricultural land use	
111	Agroforestry species trial	BUS	CFR	Vasse plantation.	ONG	1/1/81	1/1/16			R	Hingston	Flora		Agricultural land use	
112	Integration of trees with pasture	MUN	SWA	Flynn's property.		1/1/78				R	Hingston	Flora		Agricultural land use	
113	An agroforestry system combining grazing and cropping with growing eucalypts	SW	SW	Pemberton, Busselton and Boyup Brook districts.	ONG	1/1/86	1/1/07			R	Hingston	Flora		Agricultural land use	
114	Seasonal variation in parrot damage to	SW	SW	Katanning and Kirup	EXP	11/1/93	11/1/95	93/0164		J	Bartle	Flora		Timber	

Table 1 continued

F#	Project Name	District	Region	Location	Status	Com'ced	Complete Date	SPP	File	SInit	SSurname	Subject	Keywords	DOMon	ProjTime
	Bluegums			districts										Harvesting	
115	Monitor and evaluate oil mallee plantings	WA	WA	Canna, Kalannie, Narembeen, Wickepin/Toolibin, Woodanilling and Esperance.	ONG	1/1/96	1/1/99			J	Bartle	Flora		Agricultural land use	
116	Permanent growth plots				ONG					P	Biggs	Flora		Timber Harvesting	
117	Growth measurement plots in fuel reduced buffers									P	Biggs	Flora		Timber Harvesting	
118	Silvicultural guideline revision plots for pine forest				ONG	1/1/74				P	Biggs	Flora		Timber Harvesting	
119	Early growth monitoring plots				ONG					P	Biggs	Flora		Timber Harvesting	
120	Forest Health - operation monitoring	SW	SW	Forest regions						P	Biggs	Flora		Dieback	
121	Testing bipinnate acacias for a tree crop in Western Australia (Externally funded)	SW	SW	Busselton, Collie, Walpole, and Wanneroo districts.						L	Barbour	Flora		Timber Harvesting	
122	Early growth monitoring of plantations - softwoods and eucalypts	SW	SW	Albany, Bunbury, Manjimup, Wanneroo districts. All forest estate. Mostly softwood estate.								Flora		Timber Harvesting	
123	Bunbury Treefarms Project Agreement and Collie Hardwood Plantation Agreement	COL	CFR	Within a 200km radius of Bunbury.	ONG					D	Nile	Flora		Timber Harvesting	
124	Monitoring of fox and Rosthchilde's Rock Wallaby on the Burrup Peninsula and islands of the Dampier Archipelago	KAR	PIL	Burrup Peninsula (Dampier), Dolphin Island (Dampier Archipelago)	ONG	1/1/90				F	Stanley	Mammals		Pest control and/or impact	
125	Threatened Ecological Communities Project (TEC Project)	SW	SW	South West botanical province.	EXP	1/1/94	1/1/96		037514F2112	J	Blyth	Vegetation community		Inventory	
126	Seabird breeding islands database	WA	WA	Central, Greenough, Kimberley, Midwest, Pilbara, South Coast, Southern and Swan regions.	ONG	1/1/71		93/0018		A	Burbidge	Birds		Inventory	
127	Western Swamp Tortoise Recovery Plan	PER	SWA	Ellen Brook Nature Reserve, Twin Swamps Nature Reserve.	ONG	7/1/91		93/0063		A	Burbidge	Reptiles		Recovery Plan	
128	Database of mammal records from Australian Islands	WA	WA	Australia-wide. Central, Kimberley, Midwest, Pilbara, South Coast, Southern and Swan regions in WA.	ONG	4/1/87	6/1/02	93/0017		A	Burbidge	Mammals		Inventory	

Table 1 continued

F#	Project Name	District	Region	Location	Status	Com'ced	Complete Date	SPP	File	SInit	SSurname	Subject	Keywords	DOMon	ProjTime
129	Monitoring the total numbers of the Lesser Noddy (Anous tenuirostris melanops) in Australia and the numbers of some other seabirds breeding on Pelsaert Island	GER	MWT	Pelsaert Island, in Houtman Abrolhos.	ONG	1/1/86	1/1/02	93/0071		A	Burbidge	Birds		Inventory	
130	Montebello Islands fauna rehabilitation project - rat and cat eradication phase'	KAR	PIL	Montebello Islands	EXP	4/1/95	9/1/96			A	Burbidge	Mammals		Pest control and/or impact	
131	Barrow Island - spotlighting transects	KAR	PIL	Barrow Island Nature Reserve.	ONG	1/1/71				A	Burbidge	Mammals		Inventory	
132	Monitoring of declared rare and priority flora populations	WA	WA	All of state.	ONG	1/1/85				K	Atkins	Flora		Inventory	
133	Roadside Survey Project	SW	SW	Throughout the south west land division.	ONG	1/1/90				D	Lamont	Flora and Fauna		External users	
134	Dryandra formosa monitoring project	SW	SW	Table Hill Block- Walpole district. Mount Martin Reserve- Albany district. Black Point Block- Busselton district.	ONG	8/1/95				R	Smith	Flora		External users	
135	Kangaroo Management Plan	WA	WA	Statewide.	ONG					P	Mawson	Macropods		External users	
136	Crocodile Management Programme	EKI	KIM	Three licensed commercial crocodile farms in East and West Kimberley areas.	ONG					P	Mawson	Reptiles		External users	
137	Western Corella monitoring									P	Mawson	Birds		Inventory	
138	Confined kangaroo populations at Twin Swamps Nature Reserve	PER	SWA	Twin Swamps N.R.	ONG					P	Mawson	Macropods		Inventory	
139	Threatened Fauna Database	PER	SWA	Wildlife Branch, CALM, Como.	ONG							Threatened fauna and/or flora		Inventory	
140	Temporal changes in the Eucalyptus loxophleba (York gum) - Acacia acuminata (Jam) communities on selected reserves in the Western Australian wheatbelt, 1984 - 1995			Wheatbelt region	EXP	1/1/84	1/1/95			A	Hopkins	Flora		Inventory	
141	Shark Bay Marine Reserves Monitoring Program	GER	MWT	Shark Bay Marine Park	ONG	8/1/96				G	Pobar	Flora and Fauna		External users	
142	VISTAT	ALB	SCR							K	Gillen			External users	
143	Rare flora monitoring program	ALB	SCR		ONG					K	Gillen	Threatened fauna and/or flora			
144	Path Management Plan	ALB	SCR	Mountains of south western Australia.	ONG	1/1/90				J	Watson	Flora		External users	
145	Visitor log book	SW	SW	Ellen Peak, Bald Head, Mt. Ragged, Nuytes Wilderness-	ONG					J	Watson			External users	

Table 1 continued

F#	Project Name	District	Region	Location	Status	Com'ced	Complete Date	SPP	File	SInit	SSurname	Subject	Keywords	DOMon	ProjTime
				Walpole.											
146	Leaf-litter invertebrate abundance	SW	SW	Two People's Bay NR (TPBNR), Mt Taylor (Gull Rock NP) - Albany. Mt Frankland, Nuyts, Mt. Lindesay - Walpole.	ONG	1/1/94				A	Danks	Invertebrates		Inventory	
147	Aerial photography mapping of dieback disease, utilising 1:4500 scale photography	ALB	SCR	Bell Track, Fitzgerald River National Park. Moates Lake - Two People's Bay NR.	ONG	1/1/89				M	Grant	Flora		Dieback	
148	Monitoring of hygiene success post roading operation.	ALB	SCR	Pt. Anne Rd - Colletts Track Gravel Pit.	ONG	1/1/95				M	Grant	Flora		Dieback	
149	Field mapping of Phytophthora species, broadscale maps level 3 standard	ALB	SCR	Albany and Esperance districts- national parks and nature reserves.	ONG	1/1/90				M	Grant	Flora		Dieback	
150	Phosphorate application onto native vegetation	ALB	SCR		ONG	1/1/91				M	Grant	Flora		Dieback	
151	Dieback disease rate of spread trials	ALB	SCR	Gull Rock NP, Two People's Bay NR, Fitzgerald River NP.	ONG	1/1/91				M	Grant	Flora		Dieback	
152	Rainforest (effect of cattle and fire)	EKI	KIM	East and West Kimberley, Mitchell Plateau, Point Spring Nature Reserve, Long Swamp.	EXP	1/1/91	1/1/95			G	Graham	Flora and Fauna		External users	
153	Damplands	EKI	KIM	East and West Kimberley, Mount Elizabeth, Drysdale and Theda stations.	ONG					G	Graham	Flora and Fauna		External users	
154	Degraded area condition - Purnululu National Park	EKI	KIM	Purnululu National Park	ONG					G	Graham	Flora		Land Rehabilitation	
155	Rare flora population monitoring	PER	SWA	All of Swan region.	ONG					L	Robson	Threatened fauna and/or flora		Inventory	
156	Monitoring of declared rare flora - fire research plots	PER	SWA	All of Swan Region.	ONG	10/1/92				L	Robson	Threatened fauna and/or flora		Prescribed burning	
157	Conservation value of Fitzgerald River Biosphere Reserve Buffer/Transition Zone - Phase V	ALB	SCR	Fitzgerald River Biosphere Reserve	ONG	1/1/86				A	Sanders	Flora and Fauna		CALM estate	
158	Weed control program	MUN	SWA							J	Carter	Flora		Pest control and/or impact	
159	Nature reserve health monitoring	MUN	SWA							J	Carter	Flora and Fauna		CALM estate	
160	Bird survey of nature reserves	MUN	SWA							J	Carter	Birds		Inventory	

Table 1 continued

F#	Project Name	District	Region	Location	Status	Com'ced	Complete Date	SPP	File	SInit	SSurname	Subject	Keywords	DOMon	ProjTime
161	Rare flora species lists for Monadnock Conservation Park	DWE	SWA	Monadnock Conservation Park	COM	9/1/96				J	Carter	Threatened fauna and/or flora		Inventory	
162	Chittering Lake Nature Reserve - water monitoring project	MUN	SWA	Chittering Lake Nature Reserve	EXP	1/1/93	1/1/96			J	Carter	Waterways	Wetlands, Water quality, nature reserves	Wetlands Ecology	
163	Toodyay Nature Reserves flora survey	MUN	SWA	Toodyay Nature Reserves	ONG	1/1/96				J	Carter	Flora		Inventory	
164	Avon Valley National Park biological survey	MUN	SWA	Avon Valley National Park	EXP	1/1/94	1/1/96			J	Carter	Flora and Fauna		Inventory	
165	Morangup Nature Reserves biological survey	MUN	SWA	Morangup nature reserves	COM	1/1/93	12/1/93			J	Carter	Flora and Fauna		Inventory	
166	Operation foxglove	MUN	SWA	Hills forest	ONG					J	Carter	Fauna		Pest control and/or impact	
167	Hills forest biological survey	MUN	SWA	Hills Forest	COM	1/1/92	1/1/94			J	Carter	Flora and Fauna		Inventory	
168	John Forrest National Park biological survey	MUN	SWA	John Forrest National Park	ONG					J	Carter	Flora and Fauna		Inventory	
169	Chuditch trapping and monitoring program	DWE	SWA	Yalgorup National Park.	ONG	1/1/94				M	Love	Mammals		Inventory	
170	Peel biophysical trapping surveys	DWE	SWA	Peel Nature Reserves	ONG	11/1/95				M	Love	Fauna		Inventory	
171	DRF and priority flora	DWE	SWA		ONG					M	Love	Threatened fauna and/or flora		Inventory	
172	Nature reserve health monitoring	DWE	SWA							M	Love	Flora and Fauna		CALM estate	
173	Licensing of wildflower picking industry	DWE	SWA		ONG					M	Love	Flora		External users	
174	Rare fauna recovery plans	PER	SWA	Kelmscott district						D	Mitchell	Fauna		Recovery Plan	
175	DRF and Priority flora	PER	SWA	Kelmscott district.						D	Mitchell	Threatened fauna and/or flora		Inventory	
176	Nature reserve inspections	PER	SWA							L	Mutter	Flora and Fauna		CALM estate	
177	DRF and priority flora	PER	SWA		ONG					L	Mutter	Flora		Inventory	
178	Dieback survey of reserve system	DWE	SWA		ONG					L	Mutter	Flora		Dieback	
179	Yanchep National Park vegetation survey	MUN	SWA	Yanchep National Park.	SUS	1/1/90				L	Mutter	Flora		Prescribed burning	
180	Forrestdale Lake Nature Reserve mosquito control program	PER	SWA	Forrestdale Lake Nature Reserve	ONG					L	Mutter	Invertebrates		Pest control and/or impact	
181	Forrestdale Lake Management Plan	PER	SWA	Forrestdale Lake.	ONG					L	Mutter	Waterways	Wetlands, Water quality, groundwater	Wetlands Ecology	
182	Forrestdale Lake Nature Reserve weed	PER	SWA	Forrestdale Lake	ONG	1/1/95				L	Mutter	Flora		Pest control	

Table 1 continued

F#	Project Name	District	Region	Location	Status	Com'ced	Complete Date	SPP	File	SInit	SSurname	Subject	Keywords	DOMon	ProjTime
	survey			Nature Reserve.										and/or impact	
183	Aerial survey of kangaroo numbers in Twin Swamps and Thompson's Lake Nature Reserves	PER	SWA	Twin Swamps and Thompson's Lake Nature Reserves.	ONG					L	Mutter	Macropods		Inventory	
184	Western Swamp Tortoise Protection - UWA									L	Mutter	Reptiles		Recovery Plan	
185	Monitoring the impact of mining operations in state forest			eg. ROCLA sand mining in Banksia woodland at Nangara						L	Mutter	Flora and Fauna		External users	
186	Bridal Creeper control program	PER	SWA	Woodman Point and Yanchep.						L	Mutter	Flora		Pest control and/or impact	
187	Hydrology monitoring - Thompson's Lake	PER	SWA	Thompson's Lake						L	Mutter	Waterways		External users	
188	Feral baiting program in nature reserves	PER	SWA	Ellen Brook, Thompson's Lake, Twin Swamps. In future- Port Kennedy, Woodman Point.	ONG					L	Mutter	Mammals		Pest control and/or impact	
189	Control of mosquito population at Pelican Point Nature Reserve	PER	SWA	Pelican Point Nature Reserve						L	Mutter	Invertebrates		Pest control and/or impact	
190	Fire regime effects on the structure and floristics of jarrah forests	SW	SW	Manjimup and Nannup districts- Yackelup, Lindsay and McCorkhill forest blocks.	EXP	1/1/92	1/1/95	93/0099		N	Burrows	Flora		Prescribed burning	
191	Effects of timber harvesting operations (fire and logging) on the floristics, structure and some habitat characteristics of intermediate rainfall jarrah forest	MAN	SFR	Kingston and Warrup State Forests	ONG	8/1/94	8/1/99	93/0098		N	Burrows	Flora		Logging and Fire	
192	Using prescribed fire to rehabilitate landscapes disturbed by mining exploration in the arid zone	KAR	PIL	An area south of Camp Tracy and north of the Rudall River.	EXP	8/1/92	8/1/95	93/0160		N	Burrows	Flora		Land Rehabilitation	
193	Fire history and the impact of Phytophthora cinnamomi in jarrah forests	WA	WA	All districts		1/1/95				N	Burrows	Flora		Prescribed burning	
194	Assessment (in a regional context) of conservation values of vacant Crown land (VCL) near Coolcalalaya	GAS	MWT	Denham	EXP	7/1/93	1/1/97	93/0036		A	Burbidge	Flora and Fauna		CALM estate	
195	Biological survey of the southern Carnarvon and northern Irwin Phytogeographic Districts, WA	GER	MWT	Geraldton and Shark Bay districts, Greenough and Midwest regions.	EXP	3/1/94	3/1/97	93/0035		A	Burbidge	Flora and Fauna		CALM estate	
196	A biological survey of Cape Arid National Park	ESP	SCR	Cape Arid NP				93/0034		A	Burbidge	Vegetation community		Inventory	
197	A biological survey of the Boonanarring Nature Reserve and adjacent bushland	PER	SWA	Boonanarring Nature Reserve.	EXP		7/1/94	93/0033		A	Burbidge	Vegetation community		Inventory	

Table 1 continued

F#	Project Name	District	Region	Location	Status	Com'ced	Complete Date	SPP	File	SInit	SSurname	Subject	Keywords	DOMon	ProjTime
198	Radio-tracking translocated Noisy Scrub-birds	ALB	SCR		ONG	7/1/92	7/1/98	93/0066		A	Burbidge	Birds		Recovery Plan	
199	Conservation of the Western Bristlebird	ALB	SCR		ONG	6/1/93	1/1/02	93/0065		A	Burbidge	Birds		Ecological study	
200	Conservation status of the Nullarbor Quail-thrush	ESP	SCR	Kalgoorlie and Esperance districts, Goldfields and South Coast regions.	EXP		7/1/95	93/0064		A	Burbidge	Birds		Ecological study	
201	Western Ground Parrot Interim Recovery Plan 1996-1998	ESP	SCR	Fitzgerald River National Park, Cape Arid National Park	ONG	1/1/96	1/1/98			A	Burbidge	Birds		Recovery Plan	
202	Ecological studies, Lesueur National Park (and adjacent areas)	MOO	MWT	Lesueur National Park	EXP	6/1/90	6/1/95	93/0165		A	Hopkins	Flora		Ecological study	
203	Regional assessment of the conservation status of vegetation units throughout Western Australia	WA	WA	All districts and regions.	EXP	6/1/94	6/1/95	94/0003		A	Hopkins	Flora		CALM estate	
204	Effects of fire on plant species and communities at Tutanning nature reserve (A25555)	NAR	WHE	Katanning, Merredin, Narrogin districts. South Coast, Swan and Wheatbelt regions.	ONG	1/1/81	1/1/01	93/0090		A	Hopkins	Flora		Prescribed burning	
205	Development of the Departmental Monitoring Program	WA	WA	All regions and districts.	EXP	6/1/93	7/1/96	93/0091		A	Hopkins			Policy implementation	
206	Survey of Magpie Geese and other waterbirds in Kimberley	EKI	KIM	East and West Kimberley	ONG			93/0023		S	Halse	Birds		Ecological study	
207	Giardia in Straw-necked Ibis	WA	WA	Busselton, Harvey and Moora districts, Central and Midwest regions.	ONG	7/1/91	12/1/94	93/0024		S	Halse	Birds		Ecological study	
208	Aquatic invertebrate surveys and atlas	WA	WA	All districts and regions.	ONG	1/1/87	1/1/98	93/0162		S	Halse	Invertebrates		Inventory	
209	Monitoring river health initiative - Western Australia	WA	WA	All districts and regions.	EXP	4/1/94	1/1/97	95/0006		S	Halse	Waterways	Conservation, disturbance, invertebrates	Wetlands Ecology	
210	Lake Gregory waterbird surveys	EKI	KIM	Lake Gregory	EXP	10/1/89	6/1/96	95/0013		S	Halse	Birds	Waterbird use, breeding activity, migratory waders	Wetlands Ecology	
211	Dugong Conservation - Northern Western Australia	NW	NW	East Kimberley, Exmouth, Pilbara, Shark Bay and West Kimberley districts.	EXP	6/1/78	6/1/94	93/0041		R	Prince	Mammals		Ecological study	
212	Conservation of Marine Turtles - Western Australian Region	NW	NW	Coastal Waters, East Kimberley, West Kimberley, Exmouth,	EXP	1/1/85	1/1/96	93/0040		R	Prince	Reptiles		Ecological study	

Table 1 continued

F#	Project Name	District	Region	Location	Status	Com'ced	Complete Date	SPP	File	SInit	SSurname	Subject	Keywords	DOMon	ProjTime
				Pilbara and Shark Bay districts.											
213	Relative acceptability of bait materials to feral cats (Externally funded)	WA	WA	Denham, Jarrahdale and Kalgoorlie districts.	EXP	9/1/93	3/1/94	93/0046		D	Algar	Mammals		Pest control and/or impact	
214	Measuring the effectiveness of 1080 baiting to control feral cats (Externally funded)	KAL	GFR		ONG	10/1/94	10/1/97	93/0047		D	Algar	Mammals		Pest control and/or impact	
215	Eastern Goldfields Survey	ESP	SCR	Goldfields and South Coast	EXP	1/1/80	7/1/96	93/0025		N	McKenzie	Flora and Fauna		Inventory	
216	Rainforest management and monitoring	EKI	KIM	East and West Kimberley	ONG	12/1/86	7/1/97	93/0026		N	McKenzie	Flora and Fauna		CALM estate	
217	Buccaneer Archipelago Survey	EKI	KIM	East and West Kimberley, Buccaneer Archipelago.	ONG	7/1/83	7/1/97	93/0027		N	McKenzie	Flora and Fauna		Inventory	
218	Mandora Palaeoriver / Radi Hills Survey	EKI	KIM	East and West Kimberley, on western edge of Great Sandy Desert.	ONG	8/1/93	7/1/98	93/0029		N	McKenzie	Flora and Fauna		Inventory	
219	Ecomorphological clues to community structure: Bat and Lizard Guild Studies. Bat echolocation	WA	WA	All districts within Central, Gascoyne, Goldfields, Greenough, Kimberley, Midwest, Pilbara, South Coast, Southern, Swan, Wheatbelt regions.	ONG	1/1/80	1/1/07	93/0028		N	McKenzie	Fauna		Ecological study	
220	Systematics, zoogeography and phylogeny of the terrestrial amphipods of Australia (ABRS funded)	SW	SW	Districts in Central, South Coast, Southern and Swan regions.	ONG	1/1/92	9/1/97	93/0015		J	Friend	Invertebrates		Inventory	
221	An assessment of the effect of fox control on Red-tailed Phascogale populations	KAT	WHE	Narrogin and Katanning	EXP	1/1/93	1/1/97	93/0149		J	Friend	Mammals		Pest control and/or impact	
222	Factors affecting establishment in the numbat reintroduction program	SW	SW	Wheatbelt-Narrogin, Merredin, Katanning districts. Swan-Mundaring district. Central Forest-Mornington district. Southern Forest-Manjimup district.	ONG	1/1/85	1/1/04	93/0145		J	Friend	Mammals		Recovery Plan	
223	Quenda translocation methods	SW	SW	Swan-Perth district. Wheatbelt-Narrogin district.	EXP	1/1/91	1/1/97	93/0144		J	Friend	Mammals		Species conservation	
224	Genetics and ecology of the Western Barred Bandicoot	GAS	MWT	Shark Bay	ONG	6/1/86		93/0163		J	Friend	Threatened fauna and/or flora		Ecological study	

Table 1 continued

F#	Project Name	District	Region	Location	Status	Com'ced	Complete Date	SPP	File	SInit	SSurname	Subject	Keywords	DOMon	ProjTime
225	An institutional database system for managing and presenting descriptive taxonomic information				ONG	12/1/95	7/1/97			M	Choo	Flora and Fauna		Taxonomy	
226	Monitoring wildfire and controlled burning regeneration	KAL	GFR	Burra Rock, Kurrawang Nature Reserve and Mt Elvire pastoral lease.	ONG	1/1/93				A	Chapman	Flora		Prescribed burning	
227	Monitoring of rabbit numbers	KAL	GFR	Wanjarri Nature Reserve, Jaurdi pastoral lease, Mt Elvire pastoral lease, Rowles Lagoon Conservation Park, Goongarrie pastoral lease.	ONG	1/1/88				A	Chapman	Mammals		Pest control and/or impact	
228	Wetland usage by waterfowl	KAL	GFR	23 wetlands.	COM					A	Chapman	Birds	Waterbird use	Wetlands Ecology	
229	Wetland parameters i.e. depth, salinity, turbidity, invertebrates and waterfowl use on one lake	KAL	GFR		COM					A	Chapman	Waterways	Waterbird use, water quality, invertebrates	Wetlands Ecology	
230	Rangeland Pastoral Regeneration	KAL	GFR	Mt Elvire pastoral lease	ONG					A	Chapman			Land Rehabilitation	
231	Rare flora - one population of Daviesia purpurascens and two populations of Gastrolobium graniticum DRF	KAL	GFR		ONG					A	Chapman	Threatened fauna and/or flora		Species conservation	
232	Conservation biology of Western Australia's rare and threatened flora	WA	WA	All districts and regions	ONG	9/1/93	1/1/97	93/0042		D	Coates	Threatened fauna and/or flora		Species conservation	
233	Population surveys, conservation status and area based wildlife management programs for rare and threatened flora	WA	WA	All regions and districts.	EXP	9/1/93	2/1/96	93/0045		S	Patrick	Threatened fauna and/or flora		Species conservation	
234	Development and coordination of a quadrat based monitoring system for endangered flora	WA	WA	Districts in the Central, Gascoyne, Goldfields, Greenough, Kimberley, Pilbara, South Coast, Southern, Swan and Wheatbelt regions.	EXP	2/1/94	7/1/95	93/0044		D	Coates	Threatened fauna and/or flora		Species conservation	
235	Seed biology, seed bank dynamics and long term germ plasm storage of Western Australian flora, particularly rare, threatened and commercially utilised taxa	WA	WA	All districts and regions.	ONG	10/1/93	6/1/97	93/0043		D	Coates	Flora		Inventory	
236	Weed threats and control in	SW	SW	South Coast region -	EXP	9/1/93	7/1/95	93/0048		J	Pigott	Flora		Pest control	

Table 1 continued

F#	Project Name	District	Region	Location	Status	Com'ced	Complete Date	SPP	File	SInit	SSurname	Subject	Keywords	DOMon	ProjTime
	populations of Western Australia's rare and threatened flora			Albany district. Wheatbelt region - Merredin district.										and/or impact	
237	Ecology of understorey communities and soil seed-bank of remnant salmon gum (Eucalyptus salmonophloia F. Muell) woodland near Lake Taarblin, W.A.	NAR	WHE	Lake Taarblin.	EXP	9/1/89	7/1/96	93/0078		J	Pigott	Vegetation community		Land Rehabilitation	
238	Bridal creeper (Myrsiphyllum asparagoides) control and ecology in Western Australia	WA	WA	All districts in Central, Midwest, South Coast, Southern, Swan and Wheatbelt regions.	EXP	4/1/93	7/1/96	93/0077		J	Pigott	Flora		Pest control and/or impact	
239	Identification of remnants of native vegetation with high nature conservation value on private land	NAR	WHE	Katanning, Merredin and Narrogin districts.	EXP	1/1/95	7/1/95			J	Pigott	Flora		Species conservation	
240	GENDATA (A generic flora and descriptive database) (Project terminated, superseded by 95/0009)	WA	WA	All districts and regions.	TER	3/1/93	3/1/94	93/0012		J	Wheeler	Flora		Inventory	
241	Flora of the lower south west	SW	SW	Albany, Busselton, Kirup, Majimup, Margaret River, Nannup, Pemberton and Walpole districts.	ONG	9/1/93	12/1/97	93/0013		J	Wheeler	Flora		Taxonomy	
242	Systematics and conservation status of Western Australian taxa of the genus Tetratheca (Tremandraceae) (project postponed)	SW	SW	Albany, Bunbury, Busselton, Esperance and Walpole districts.	SUS		1/1/97	93/0007		B	Maslin	Flora		Taxonomy	
243	Biological database (project postponed)				SUS	9/1/93	7/1/94	93/0002		B	Maslin			Inventory	
244	Flora of Australia treatment of Acacia	WA	WA	All districts and regions.	EXP	1/1/80	7/1/96	95/0010		B	Maslin	Flora		Taxonomy	
245	Use of external taxonomic expertise	WA	WA	All districts and regions.	ONG	4/1/94		93/0004		B	Maslin	Flora		Taxonomy	
246	Systematics of Western Australian species of Acacia	ALB	SCR	Esperance and Albany.	EXP		7/1/96	93/0001		B	Maslin	Flora		Taxonomy	
247	Taxonomic studies of species on the Declared Rare and Priority Flora List	WA	WA	All districts and regions.	ONG	1/1/94	12/1/98	93/0011		B	Rye	Threatened fauna and/or flora		Taxonomy	
248	Taxonomic review and conservation status of Western Australian plant groups.	WA	WA	All districts and regions.	ONG	3/1/91	6/1/94	93/0010		B	Rye	Flora		Taxonomy	
249	Taxonomic studies in the Asteraceae, tribe Asterineae	WA	WA	All districts and regions.	EXP	12/1/94	12/1/96	93/0006		N	Lander	Flora		Taxonomy	
250	WA flora descriptive database research and pilot development. Subproject 1:Descriptive database design, issues, technology awareness.	WA	WA	All districts and regions.	EXP	9/1/93	9/1/96	93/0005		N	Lander	Flora		Inventory	

Table 1 continued

F#	Project Name	District	Region	Location	Status	Com'ced	Complete Date	SPP	File	SInit	SSurname	Subject	Keywords	DOMon	ProjTime
	Subproject 2:Rare and endangered and priority flora descriptive database														
251	Databasing (WACENSUS) and publication of the Census of Western Australian Plants	WA	WA	All districts and regions.	ONG	3/1/93	7/1/95	93/0014		A	Chapman	Flora		Inventory	
252	Botanical survey of Central Pilbara Uplands within the Karijini National Park	EXM	PIL	Hamersley Range in Karijini National Park.	ONG	1/1/95	1/1/98	93/0031		S	Van Leeuwen	Flora		Inventory	
253	Biological survey of the Barlee Range Nature Reserve	EXM	PIL	Barlee Range Nature Reserve.	EXP	1/1/91	1/1/96	93/0030		S	Van Leeuwen	Biota		Inventory	
254	Fire-Mulga Study - Burn and post-fire monitoring	KAR	PIL	Hamersley range.	ONG	1/1/90	1/1/02	93/0141		S	Van Leeuwen	Flora		Fire Protection	
255	Biological survey of the Burrup Peninsula	KAR	PIL	Burrup Peninsula.	ONG	1/1/95	1/1/99			S	Van Leeuwen	Biota		Inventory	
256	Vegetation monitoring on Barrow Island	KAR	PIL	Barrow Island Nature Reserve.	ONG	1/1/91				S	Van Leeuwen	Flora		Inventory	
257	Biological survey of the Southern Little Sandy Desert	NW	NW	Pilbara and Goldfields regions.	ONG	1/1/95	1/1/98			S	Van Leeuwen	Biota		Inventory	
258	Biological survey of the Mt Windell / Marandoo Road	KAR	PIL	Mt Windell to Marandoo Road.	EXP	1/1/92	1/1/96			S	Van Leeuwen	Flora and Fauna		Inventory	
259	Development of GIS-based decision-support tools in the control of Phytophthora and the management of Phytophthora-sensitive taxa and communities (Externally funded)	WA	WA	Central, Midwest, South Coast and Swan regions.	EXP	1/1/93	1/1/95	93/0049		R	Wills	Flora		Dieback	
260	Basic information for the management of Brown Boronia in state forest			South-west forests.	SUS	1/1/94				D	Ward	Flora		Inventory	
261	Physical resource assessment team	SW	SW	Central, South Coast, Southern and Swan regions.				93/0158		R	Harper	Physical resources eg.soil		Timber Harvesting	
262	Site specific silviculture: making management decisions for Pinus radiata plantations on the basis of a site's water relations	SW	SW	All districts in Central, South Coast and Southern regions.	EXP	2/1/94	6/1/96	93/0151		R	Harper	Physical resources eg.soil		Timber Harvesting	
263	Performance of Eucalyptus globulus, planted on farms, in relation to soil and site attributes (Externally funded)	SW	SW	All districts in Central, South Coast, Southern and Swan regions.	ONG	10/1/93	6/1/97	93/0123		R	Harper	Physical resources eg.soil		Timber Harvesting	
264	Control and management of Phytophthora cinnamomi in native plant communities (externally funded by ANCA)	ALB	SCR		EXP	1/1/92	1/1/95	93/0081		B	Komorek	Flora		Dieback	
265	Microdistribution of Phosphonate in plant tissues of native plants	SW	SW	South Coast and Swan regions.	ONG	6/1/96	4/1/98			B	Komorek	Flora		Dieback	
266	Conservation status of butterflies in Western Australia	WA	WA	All regions in WA.	EXP	9/1/90	7/1/96	93/0022		M	Williams	Invertebrates		Inventory	
267	Dieback-resistant jarrah establishment in operational forest rehabilitation sites	SW	SW	Dwellingup, Harvey, Jarrahdale and	ONG	6/1/94		94/0006		M	Stukely	Flora		Dieback	

Table 1 continued

F#	Project Name	District	Region	Location	Status	Com'ced	Complete Date	SPP	File	SInit	SSurname	Subject	Keywords	DOMon	ProjTime
				Mundaring districts. Central and Swan regions.											
268	Selection, screening and field testing of jarrah resistant to Phytophthora cinnamomi	SW	SW	Jarrahdale and Dwellingup districts.	ONG	1/1/92		93/0112		M	Stukely	Flora		Dieback	
269	Field ecology of the Western Australian Sandalwood (Santalum spicatum (R.Br.) A.DC.) and the impact of land management activities on sandalwood regeneration	NW	NW	Goldfields and MidWest regions.	ONG	2/1/96		96/0006		J	Brand	Flora		Ecological study	
270	Biology and control of Phytophthora citricola in native plant communities affected by mining (Externally funded - Meriwa)	WA	WA	Dwellingup and Moora districts. Swan and Midwest regions.	COM	1/1/92	1/1/95	93/0082		F	Bunny	Flora		Pest control and/or impact	
271	Control and management of stands of Banksia coccinea infected with Diplodina sp. (Externally funded by ANCA)	ALB	SCR		EXP	1/1/92	1/1/95	93/0067		J	Bathgate	Flora		Pest control and/or impact	
272	The control and management of Phytophthora megasperma in the National Parks and Nature Reserves of WA (Externally funded - ANCA)	WA	WA	Albany and Moora districts. South Coast and Midwest regions.	TER	1/1/92	1/1/95	93/0079		S	Bellgard	Flora		Pest control and/or impact	
273	Phytophthora cinnamomi impact in the northern jarrah forest: A re-analysis.				ONG	1/1/93	1/1/98	93/0111		B	Shearer	Flora		Dieback	
274	Impact of Phytophthora cinnamomi - Northern jarrah forest			Northern jarrah forest.		1/1/81	1/1/83			B	Shearer	Flora		Dieback	
275	Impact of Phytophthora spp. Swan Coastal Plain	PER	SWA	Swan Coastal Plain.	COM	1/1/89	1/1/91			B	Shearer	Flora		Pest control and/or impact	
276	Control and management of Armillaria luteobubalina in native communities	SW	SW	Busselton and Dwellingup districts. Central and Swan Regions.	ONG	1/1/93	1/1/98	93/0070		B	Shearer	Flora		Pest control and/or impact	
277	The impact of Armillaria luteobubalina in wandoo forest	DWE	SWA	Wandoo forest south of Boddington.	COM	1/1/86	1/1/87			B	Shearer	Flora		Pest control and/or impact	
278	Impact of Armillaria on Coastal Plain	SW	SW	Cervantes? to Cape Arid.	COM	1/1/91	1/1/96			B	Shearer	Flora		Pest control and/or impact	
279	Use of phosphonate to determine the effect of Phytophthora cinnamomi infection on growth of Eucalyptus marginata	DWE	SWA		ONG	1/1/93	1/1/98	93/0110		B	Shearer	Flora		Dieback	
280	Use of debilitating factors and host resistance to control Diplodina canker in Banksia coccinea communities	SW	SW	Albany and Dwellingup districts. South Coast and Swan regions.	ONG	1/1/93	1/1/98	93/0069		B	Shearer	Flora		Pest control and/or impact	
281	Integrating strategies for control of Phytophthora cinnamomi with	WA	WA	Albany, Dwellingup and Moora districts.	ONG	1/1/93	1/1/98	93/0068		B	Shearer	Flora		Timber Harvesting	

Table 1 continued

F#	Project Name	District	Region	Location	Status	Com'ced	Complete Date	SPP	File	SInit	SSurname	Subject	Keywords	DOMon	ProjTime
	phosphorous acid			South Coast, Swan and Midwest regions.											
282	Susceptibility of the major soil types of the Fitzgerald River National Park and region to infestation by P. megasperma and P. cinnamomi (Externally funded)	ALB	SCR	Fitzgerald River National Park and region. Esperance and Albany districts.	ONG	6/1/96	4/1/98			B	Shearer	Soils		Dieback	
283	Vegetation Health Service (VHS)	PER	SWA	Como Research Centre.	ONG					F	Tay	Flora		Pest control and/or impact	
284	Recreation use and characteristics of overnight visitors to the Shannon camping area WA during September 21-27 1988.	PEM	SFR	Shannon camping area.	COM	9/1/88	10/1/98			J	Kimpton			External users	
285	Woylie survey - Shannon National Park	PEM	SFR	Shannon National Park	COM					J	Kimpton	Mammals			
286	Declared Rare and Priority Flora	MAN	SFR		ONG					I	Wilson	Threatened fauna and/or flora		Inventory	
287	Rare and threatened fauna monitoring	MAN	SFR	Particularly Kingston Forest.	ONG					I	Wilson	Threatened fauna and/or flora		Recovery Plan	
288	Fauna management plan for birds in Manjimup district	MAN	SFR		ONG					I	Wilson	Birds		Inventory	
289	Nature reserve inspection	MAN	SFR	About 30 sites.	ONG					I	Wilson	Habitat		External users	
290	Weed control program	MAN	SFR		ONG					I	Wilson	Flora		Pest control and/or impact	
291	Rare flora monitoring	MAN	SFR	Districts within Southern Forest region.	ONG					R	Hearn	Threatened fauna and/or flora		Recovery Plan	
292	Monitoring impacts of harvesting operations on fauna	MAN	SFR	Kingston Forest Area.						R	Hearn	Fauna		Agricultural land use	
293	Licensing of wildflower picking industry	MAN	SFR	Districts within Southern Forest Region.	ONG					R	Hearn	Flora		External users	
294	Maintenance of firebreaks with herbicides	KAT	WHE	Lake Magenta Nature Reserve No. 25113	COM	1/1/89	1/1/92			M	Graham	Flora		Fire Protection	
295	Post fire floristics; succession and fuel accumulation in a range of wheatbelt vegetation types.	KAT	WHE	Nature Reserves 8617, 17759, 1931, 25113.	ONG	1/1/86	1/1/07			M	Graham	Flora		Prescribed burning	
296	Fauna survey - monitor small vertebrate fauna on selected nature reserves	KAT	WHE	Nature Reserves 24599, 19091, 19085, 20069, 20070.	SUS	1/1/86				M	Graham	Small/medium vertebrates		Inventory	
297	Sucker regrowth on access tracks, control using "Spatter-Gun" method	KAT	WHE	Nature Reserve No. 24589.	COM	1/1/87	1/1/88			M	Graham	Flora		Pest control and/or impact	
298	Monitor spread of Tree Lucerne (Cytisus proliferus) along road verge	KAT	WHE	Old Kojonup Road.	SUS	1/1/86				M	Graham	Flora		Pest control and/or impact	
299	Determine chemical application rates	KAT	WHE	Dongolocking Nature	COM	1/1/85	1/1/87			M	Graham	Flora		Pest control	

Table 1 continued

F#	Project Name	District	Region	Location	Status	Com'ced	Complete Date	SPP	File	SInit	SSurname	Subject	Keywords	DOMon	ProjTime
	(Glyphosphate) for sucker regrowth control on a range of mallee Eucalyptus species			Reserve 19082 and nature reserve No. 24589.										and/or impact	
300	Control of Veldt Grass on fire access track	KAT	WHE	Dongolocking Nature Reserve No. 19082.	SUS	1/1/86	1/1/87			M	Graham	Flora		Pest control and/or impact	
301	Monitor rehabilitation of saline area	KAT	WHE	Nature Reserve 8617.	ONG	1/1/85				M	Graham	Habitat		Land Rehabilitation	
302	Monitor regeneration in Sheoak-Jam Woodland after removal of grazing pressure (sheep)	KAT	WHE	Peringillup Nature Reserve No. 36324.	ONG	1/1/85				M	Graham	Flora		Land Rehabilitation	
303	Fauna surveys (spotlighting) by volunteers	KAT	WHE	Laloran Reserves No.19117 and 14459, Dongolocking Reserves No. 19082, 19083 and 19096.	ONG	1/1/94				M	Graham	Fauna		Inventory	
304	Lake Magenta; Survey and monitor vertebrate fauna pre and post feral animal control	KAT	WHE	Lake Magenta Nature Reserve No. 25113	ONG	1/1/94	1/1/01			M	Graham	Fauna		Pest control and/or impact	
305	Human usage of Nature Reserves in the Katanning District	KAT	WHE	About 190 Nature Reserves.	COM	1/1/86	1/1/93			M	Graham	Habitat		External users	
306	Management of declared rare and poorly known flora in the Moora district	MOO	MWT		ONG	7/1/96	7/1/97			R	Wolstenholme	Threatened fauna and/or flora		Species conservation	
307	Merredin threatened flora management program	MER	WHE		ONG	1/1/93				M	Fitzgerald	Threatened fauna and/or flora		Species conservation	
308	Toolibin Lake Recovery Project - groundwater depth-observation bore monitoring	NAR	WHE	Toolibin Lake Reserve 24556, surrounding catchment, nearby reserves and private property.	ONG					T	Bowra	Waterways		Recovery Plan	
309	Toolibin Lake Recovery Project - groundwater depth-alley farm trial monitoring	NAR	WHE	Privately owned property in the Toolibin Catchment within the vicinity of Toolibin Lake.	ONG	1/1/95	1/1/05			T	Bowra	Waterways		Recovery Plan	
310	Toolibin Lake Recovery Project - water quality monitoring	NAR	WHE	Toolibin Lake Reserve 24556.	ONG	1/1/95	1/1/05			T	Bowra	Waterways		Recovery Plan	
311	Monitoring of walk trails in Dryandra Woodland	NAR	WHE	Dryandra Woodland						T	Bowra	Habitat		Land disturbance	
312	Permanent quadrat marking	MOO	MWT	Lesueur National Park	ONG	1/1/92				B	Evans	Habitat			
313	Declared Rare Flora post burn monitoring	MOO	MWT	Lesueur National Park.	ONG	1/1/93				B	Evans	Threatened fauna and/or flora		Prescribed burning	
314	Project Eden - Mallee Fowls (Gascoyne District)	GAS	MWT	Shark Bay.	ONG	1/1/96				B	Barton	Birds		Species conservation	
315	Monkey Mia Dolphins	GAS	MWT	Monkey Mia Reserve.	ONG					B	Barton	Mammals		Ecological study	

Table 1 continued

F#	Project Name	District	Region	Location	Status	Com'ced	Complete Date	SPP	File	SInit	SSurname	Subject	Keywords	DOMon	ProjTime
316	Shark Bay Marine Park Monitoring Programme	GAS	MWT	Shark Bay Marine Park.	ONG	1/1/96				B	Barton	Habitat		External users	
317	Project Eden - vegetation monitoring plots	GAS	MWT	Francois Peron National Park.	ONG	1/1/96				B	Barton	Flora		Pest control and/or impact	
318	VISTAT	MOO	MWT	Nambung National Park and Lesueur National Park.	ONG	1/1/88				K	Hockey	Habitat		External users	
319	Touch The Wild Tours - impact monitoring	GER	MWT		ONG	8/1/96				M	Meinema	Habitat		External users	
320	Monitoring of wildflower picking industry - preliminary stage	HAR	CFR	Bunbury region.						K	Williams	Flora		External users	
321	Declared rare flora monitoring	HAR	CFR	Bunbury region.						K	Williams	Flora		Inventory	
322	Critically endangered flora monitoring	WA	WA	All districts and regions.						K	Williams	Flora and Fauna		Inventory	
323	Threatened fauna recovery plans (5 species)	HAR	CFR	Districts within Central Forest region.	ONG					K	Williams	Threatened fauna and/or flora		Recovery Plan	
324	Monitoring of sea bird and fur seal populations on offshore islands	HAR	CFR	Districts within Central Forest region.						K	Williams	Fauna		Inventory	
325	Monitoring of Tropic bird populations in breeding season (Summer).	HAR	CFR	Districts within Central Forest region.						K	Williams	Birds		Inventory	
326	Community monitoring within Nature Reserves / National Parks etc.	HAR	CFR	Districts within Central Forest region.	ONG					K	Williams	Fauna		Inventory	
327	Nature Reserve general health monitoring	HAR	CFR	Districts within Central Forest region.						K	Williams	Habitat		Inventory	
328	Monitoring fox baiting in the tuart forest and Vasse Wonnerup Nature Reserve	BUS	CFR	South West Capes district. Ludlow/Busselton.	ONG	10/1/95	1/1/00			R	Banks	Mammals		Pest control and/or impact	
329	Monitoring of flora / community revegetation following Hamelin Bay fire	BUS	CFR	Hamelin Bay - South West Capes district.		1/1/94				R	Banks	Flora		Fire Protection	
330	Monitoring of Honey Possums in Scott River National Park	BUS	CFR	Scott River Road, South West Capes District.	ONG	1/1/87				R	Banks	Mammals		Species conservation	
331	Voluntary maintaining of Feral Pig Numbers / Rare Frog Recovery Plan	BUS	CFR	South West Capes district.	ONG	1/1/94				R	Banks	Amphibians		Pest control and/or impact	
332	Rare Frog Recovery Plan - Geocrinia alba, vitilina	BUS	CFR	South West Capes District.		1/1/90				R	Banks	Amphibians		Recovery Plan	
333	Annual monitoring of Declared Rare Flora. Critically endangered Species	BUS	CFR	South West Capes district.						R	Banks	Threatened fauna and/or flora		Species conservation	
334	Ringtailed Possum recovery team	BUS	CFR	Tuart Forest near Abba River, South West Capes district.	ONG					R	Banks	Mammals		Recovery Plan	
335	Visitor Statistics / Monitoring - Monkey Mia and Fancois Peron National Park	GAS	MWT	Monkey Mia and Francois Peron National Park	ONG					B	Barton	Biota	Tourism, conservation reserves	External users	

Table 1 continued

F#	Project Name	District	Region	Location	Status	Com'ced	Complete Date	SPP	File	SInit	SSurname	Subject	Keywords	DOMon	ProjTime
336	Noisy Scrub-Bird population monitoring	ALB	SCR	Two Peoples Bay	ONG	1/1/70				A	Danks	Threatened fauna and/or flora	Birds, Inventory	Recovery Plan	

Table 2. Status and technical details of monitoring related projects being undertaken within the Department of Conservation and Land Management. Driver scale 1-6 where projects scoring 1 are regarded as most relevant to the Departments Monitoring Policy, those scoring 6 are least relevant. Time scale of the projects shows st = short term, mt = medium term, lt = long term, ct = continuing, blank = difficult to define time-scale.

F#	Driver class	Time scale	Monitoring Frequency	Data kept	Analy -sed?	Conti -nuity 1	Conti -nuity 2	Hypo- theses 1	Meth- ods 1	Eval- uation 1	Eval- uatio 2
1	1	mt	Spring and Autumn, 2 samples per season in 1987-92, Twice in spring 94, twice in autumn 95.		P	3	3	3	3	0	
2	1	mt	Regular sampling from 1986 to May 1992, sampled once in spring 1993 and one in autumn 94		P	3	3	3	3	2	
3			Each Aug., Oct. and Mar.- waterbirds, salinity, depth. Each Oct.-aqu. inverts., Every 3rd yr-veg.	Annual summary of results.	U	3	3	2	3	3	
4	1	mt	Sampling in spring and autumn each year		U	3	3	3	3	0	
5	1	mt	5 to 6 sampling trips per year from 1994 to 1998 in spring to autumn period.		U						
6	1	st			U	0		2	2	0	
7	2	st	Initial census-1994, then 4-5 yrs after baiting. Monitor fox popn. on Depuch I. 1-4 times per year.		U	0	2	1	2	0	
8	5		Winter and summer trials.		U						
9	2	st	Popn. monitored 2.5yrs after baiting.		N						
10	6		Sampling - 6 times each year (every 2nd mnth) from 1995 to 98.		N	3	3	3	2	2	
11	2	st	20-30 minutes at least 3 times in each season(ie 180 counts/season), 1993/94 until at least mid 1998		U	3	2	3	2	3	
12	1	st	Samples taken 6 times per year from 1994 to 1996.		U	3	3	3	2	0	
13	1	mt	Sampling 6 times per year from 1993 to 1997		N	3	3	3	2	0	
14			Annually (depending on funding)	Fremantle Marine Conservation Branch (HI-8 tapes)	U	3	3	2	2	0	
15	6				U	0	3	3	0	0	
16	6				A	0	3	3	2	0	
17	6		Spring 1995		U	3	3	3	2	3	
18					U						
19	2	mt			U	0	3	3	0	0	

Table 2 continued

F#	Driver class	Time scale	Monitoring Frequency	Data kept	Analy -sed?	Conti -nuity 1	Conti -nuity 2	Hypo- theses 1	Meth- ods 1	Eval- uation 1	Eval- uatio 2
20	1	mt			U	3	3	3	0	0	
21	2	st			U	3	2	3	0	0	
22	1	mt			U	3		3	2	0	
23	1	mt	Trapping four nights, once a year, plus additional trapping at other sites on island.		U	3	3	3	3	0	
24	2	ct	7 years of census field work completed		U	3		3	0	0	
25	6				Y	3	3	3	2	0	
26	6				Y	3		3	2	0	
27	1	lt	Fauna-seasonal surveys for 1 yr. Vascular plants-spring, autumn and check annuals.		U	3	3	3	2	0	
28	4				U						
29	1	lt			P	0	3	3	0	0	
30	6			WA Herbarium	U	2	3	3	2	0	
31	1	mt		WA Herbarium	U	0	3	3	0	0	
32	1	mt		WA Herbarium	U	0	0	3	0	0	
33	6			Plant specimens-WA Herbarium	U	0		3	0	0	
34	6		Usually 3 visits to each quadrat		U	3	3	3	2	3	
35	1	st			U	3	3	3	2	3	
36	1	st			U	0	3	3	2	0	
37	1	st	Trapping, Scat counts-annually from '95. 1080 Baiting-monthly from '96. Radio-telemetry-fortnightly.	CALM Woodvale and Curtin University	U	3		3	3	2	
38	1	mt	Fortnightly radio-telem., twice yearly spotlighting-Leschenault, Monthly radio-telem.-Yalgorup, twice weekly radio-telem.-Lane Poole and Keats	CALM Woodvale and Curtin University	U						
39	1	st	Twice yearly trapping and spotlighting, once yearly sandplotting, daily radio-telem. of woylies, once off veg. survey.	CALM Woodvale	U	3	3	3	2	0	

Table 2 continued

F#	Driver class	Time scale	Monitoring Frequency	Data kept	Analy -sed?	Conti -nuity 1	Conti -nuity 2	Hypo- theses 1	Meth- ods 1	Eval- uation 1	Eval- uatio 2
40	6		Daily radio-telem. for one week after each 1080 baiting session, and then at weekly intervals.		U						
41	6		Two surveys of each plot.		U	3	3	3	2	0	
42	1	st	Yearly monitoring for five years, then reassess.		U	3	3	2	2	2	
43	6		At least two visits to each of 150 sites.	WA Herbarium	U	3	3	3	2	3	
44	6		At least two visits to each of 300 quadrats.	WA Herbarium	Y	3	3	3	2	3	
45			Two visits to each of 520 sites.		Y	3	3	2	2	0	
46	6		Field component completed.		Y	3	3	2	2	0	
47	6				U						
48	5		n/a		U						
49	6		Three field trips annually.		U	3	2	3	2	0	
50	1	lt	Initially -trapping 3 times a year, now once or twice per year		P						
51	2	st			U	0	3	3	3	0	
52	1	st			U	0	2	3	2	0	
53					U	0	0	0	0	0	
54	6		Radio-telem. of collared foxes		U	2	0	3	2	2	
55	1	st			U						
56	2				U						
57	6				U						
58	6				U						
59	4		10 samples from plantations at three sites.		U						
60	5		Dependent on initial results		U						
61	1	st	Monitoring after each burn, 1994-96?		U	1	1	3	3	2	
62	6		Sampling-Sep '93, Jun to Oct '94, Jun to Oct '95.		U	2	3	3	3	2	
63	2	st			U						
64	1	st	Annual.		U	0	3	2	0	0	
65	2	st	Nine experiments/surveys to be monitored within this project.		U						

Table 2 continued

F#	Driver class	Time scale	Monitoring Frequency	Data kept	Analy -sed?	Conti -nuity 1	Conti -nuity 2	Hypo- theses 1	Meth- ods 1	Eval- uation 1	Eval- uatio 2
66	3	st			U	0	2	2	2	0	
67	1	lt	From early 1980s.	Water and Rivers Commission, Crawley.	Y	0	3	2	0	0	
68	1	lt			U	0	3	2	0	0	
69	3	st	Eight sampling trips		U	2	3	3	3	0	
70	2	st			U	2	3	3	2	2	
71	2	st			U	0	3	3	2	2	
72	1	lt	September and November each year since 1985, intensively from 1981-85	Busselton (CALM), PC database, printouts, original	U	3	3	2	3	0	
73	6				U						
74		st		Specimens at WA Museum.	U						
75	6		n/a		U		3	0	2		
76	6		At two month intervals.	Busselton CALM, RAOU office Perth.PC database, printouts, original survey forms.	Y	2	3	2	2	2	
77	1		Some fortnightly, some monthly, some at 2 and 3 month intervals.	Woodvale and Busselton, files and PC database.	U	2	3	3	2	0	
78	5			Specimens - WA Herbarium labelled (with accompanying disk in HERBIE) & unmounted	U	0	2	3	0	0	
79	5			Database - suitable progs. incl. INTKEY and published form.	U						
80	5				U						
81	6	st			U	2	3	3	2	2	
82	3	mt	Quadrats visited 4 times prior to burning (once each season), then 6 weekly intervals after burn		U	3	3	3	2	2	
83	1	st	Monitoring during each burn (yearly?)		Y	1	3	3	2	2	
84	4		Spring '94, Summer '94/'95.		U						
85	3	st			U	3			2	3	
86		st	Annually 1985-90.	RPP 15/85. SID Manjimup, Files and PC database.	Y	3	1	2	3	0	

Table 2 continued

F#	Driver class	Time scale	Monitoring Frequency	Data kept	Analy -sed?	Conti -nuity 1	Conti -nuity 2	Hypo- theses 1	Meth- ods 1	Eval- uation 1	Eval- uatio 2
87		st	Annual.	RWP 51/87. SID Manjimup, Hard copy on file, PC disc database.	Y	3	2	3	3		
88	1	ct	A minimum of two obs per forest block between Aug and Feb each year.		Y	0	3	2	2	2	
89	1	ct	Annually until 1992, nothing in 1993, proposed to continue bienially from 1994.	Manjimup SID, PC database, photographs.	U	3	3	2	2	0	
90	2	mt	Twice yearly	Manjimup SID, PC database, photographs.	U						
91	5		Monthly		U						
92	6				U	0	0	3	2	3	
93	3	lt	Intermittent - varies with funding, until 2020 or ongoing depending on how many new trials go in.	Manjimup, hard copy field sheets and PC database (dbase IV)	U	0	3	2	2	0	
94		mt	660 sites established and assessed twice.	Manjimup, files and PC database.	Y	3	0	3	2	0	
95	2	mt		Manjimup, hard copy and PC database, RPP 22-82?	U	0	0	2	0	0	
96	1	lt	2 x yr proposed. Initial work - early 1970s, formal work dropped early 1980s, Ad hoc since. Proposed to restart depending on funding.	Manjimup, Hard copy and PC database, RPP 4-78/2-83?	U	2	3	3	0		
97	1	mt	Annual, ongoing.	Manjimup, hard copy, RPP 60-90?	U	2	3	2	2	0	
98	1	mt	Annually? Ongoing.	Manjimup, hardcopy, RPP 38-88?	U	2	3	2	2	0	
99			20 year. Completion subject to results after next sampling	Woodvale Lab. 4, Files, some on PC.	U	3	3	3	0	0	
100	1	lt	Annual.	Dwellingup and Como, hardcopy.	U	1	3	3	3	3	
101	2	lt			U	0	3	2	2	0	
102	2	lt	Since early 1970s.	GIS database, film storage.	U	0	3	2	2	0	
103	3	lt	Every 6 months.	GIS database, reports.	U	0	2	3	2	0	
104	3	lt		GIS (MAPINFO)	U	2	3	2	0	2	
105	4				U	2	2	0	0	0	
106	1	lt	4 yearly.	Busselton, file # 264.712 and PC database, RPP 4/81	N	3	3	3	2	3	

Table 2 continued

F#	Driver class	Time scale	Monitoring Frequency	Data kept	Analy -sed?	Conti -nuity 1	Conti -nuity 2	Hypo- theses 1	Meth- ods 1	Eval- uation 1	Eval- uatio 2
107	1	lt	Diameter - Annual. Height - 4 yearly.	Busselton, file # 221.11 and PC database.	U						
108	1	lt	Biennial	Busselton, file # 221.12 and PC databse. RPP 32/82	N						
109	1	lt	Two yearly	Busselton, File # 264.23, PC database	U						
110	1	lt	5 to 10 yearly (1975 to 1983?)	Busselton, file #s 264.31;264.32;264.43;264.41;264.441;264.443;264.48; PC db.	U						
111	1	lt	2 yearly	Busselton, file # 264.241, and PC database.	U	3	3	2	2	3	
112	1	lt	3 yearly	Busselton, file # 264.54, and PC database.	U	3	3	3	2	3	
113	1	lt	2 yearly	Busselton, file # 264.91 and PC database.	U	3	3	3	2	3	
114	5				U						
115	1	st	monthly/annually	CALM Narrogin, PC database, Oil Mallee Association database	U	2		2	2	0	
116	1	lt	Karri- approx. every 2 years (since 1981?). Jarrah - 10 year cycle (1960s/70s/80s).	Corporate database	U	3	3	2	0	0	
117	1	lt	Since late 1980s		U	3	2	2	0	0	
118	1	lt	Annual.			3	2	2	0	0	
119	1	lt	Annually for first 3 years.		U	0	3	2	0	0	
120	1	lt				0	3	2	2	0	
121	5				U						
122	1	lt	Bi-annual.	Manjimup FMB. Files, database.	U	3	3	3	0	0	
123	2	mt	Weekly (Sep to Feb) then quarterly. Runs from first year of establishment to harvest time (normally year 10).	Property files and PC database.	U	0	3	3	2	0	
124	1	lt	Three times a year.	Karratha - File Karratha 2409 Vertebrate Pest Control	U	2	3	2	3	0	
125	1	mt	Annually	WATSCU, Woodvale Research Centre. TEC database (paradox), data forms and maps.	U	3	3	3	2	3	

Table 2 continued

F#	Driver class	Time scale	Monitoring Frequency	Data kept	Analy -sed?	Conti -nuity 1	Conti -nuity 2	Hypo- theses 1	Meth- ods 1	Eval- uation 1	Eval- uatio 2
126		lt	Ad hoc.	PC database (dBASE III PLUS and PARADOX software)	U	0	3	2	2	0	
127	1	lt	Annual. 1963-popn. estimates. 1972-water analyses. Ongoing until objectives satisfied.	Woodvale Research Centre. CALM files, PC database.	U	2	2	3	2	0	
128		lt	Ad hoc. Ongoing, indefinite completion date.	PC database	Y	2	3	3	2	2	
129	1	lt	Every two years.		U	3	3	3	3	2	
130	6				U						
131	1	lt	2 yearly, indefinite completion date.	PC database	N	2	3	2	2	0	
132	1	lt	Variable. Project ongoing while the need remains.	Local CALM office, original forms- CALM's State Operations Headquarters, W.B.	P	3	3	3	3	0	
133	1	mt	Observations are one off, taken during survey, project ongoing, indefinite.	Data forms, ASCII file-processed by Main Roads, Mapping and Survey Branch.	Y	0	3	3	2	2	
134	1	st	1/11/95, 23/1/96, 30/4/96 - ongoing?	Locatn. info.-CALM Manjimup & Wildlife Protection Branch. EXCEL-CALM Bunbury.	Y	2	3	3	3	2	
135	1	lt	Pop. surveys- 3 areas, 1 area surveyed per year. Commercial Harvest survey- regularly.	Wildlife Branch, Como- on disk. Commercial Harvest mngmnt. - ORACLE database.	P		3	3	3	3	
136	1	lt	Annual or bi-annual.	Wildlife Branch, Como - EXCEL database.	P	3	3	3	3	3	
137	1		Bi-annual		U	3	3	3	3	0	
138	6		One survey so far.		U	2	3	3	2	0	
139	6			Wildlife Branch, Como - ORACLE database.	U		3	3	2	1	
140	1				U						
141	1	lt	2-5 yearly. So far - Aug '96 and March-April '97.	Marine conservation Branch, Fremantle. File # MW/SB/MRMP0496, Video tape, PC db.	U						
142	1				U	0	3		2	0	
143	1	lt			U	0	0	0	0	0	
144	1				U	3	3	3	3	3	
145	3	lt			U	3	3	2	3	0	

Table 2 continued

F#	Driver class	Time scale	Monitoring Frequency	Data kept	Analy -sed?	Conti -nuity 1	Conti -nuity 2	Hypo- theses 1	Meth- ods 1	Eval- uation 1	Eval- uatio 2
146	1	mt	TPBNR - 4 times/year, complete 1998. Mt Taylor - annual, others- 5 to 10 yearly, indefinite completion date.	Two People's Bay, PC database; PARADOX for DOS.	U	3	3	3	2	0	
147	2	lt	Bell Track- 2 yearly. Moates Lake- irregular.	Albany district office, CALM, on aerial photographs - aerial photography cabinet	U	3	3	2	2	0	
148	1	lt	Annual.	Albany, Local File 17:1 and 31737:71.	U	2	3	3	2	0	
149	2	lt	Annual	Albany and Esperance CALM offices in map hanging cabinets.	P	2	3	3	2	0	
150	2	lt	Trunk injection sites - 2 yearly. Low vol. site - 6 monthly. Ultra low vol. site - 6 weekly. Indefinite completion date.	Albany CALM - files, paper copy.	U	3	3	2	2	0	
151	2	lt	Infrequent, 2 yearly, indefinite completion date.	Albany CALM District Office, in "Rate of Spread Plot Location" file.	U	3	3	3	0	0	
152	1	st		Rough data at Kununurra and Woodvale.	N						
153	3		Occassional.		U						
154	2	st	Three occassions in last 5 years (i.e. 1991 - 1996)		U						
155			All popns. monitored at least every 5 years, frequency varies depending on sp.	Raw data- region & head office files, region file 51/02/XX, CALM rare flora db.	U	3	3	3	3	3	
156			Twice annually, indefinite completion date.	Raw data- region and head office files, regional files-	U	3	3	3	3	3	
157	1	lt	Probably 10 yearly	Albany.	U	3	3	3	0	0	
158	2	lt	Annual		U	0	0	2	0	0	
159	3	lt	Ad hoc.		U	0	3	2	0	0	
160	6				U	0	3	2	0	0	
161	6		One-off observation.		U	0	0	2	0	0	
162	1	st	Monthly		U	0	3	2	2	0	
163	1	lt			U	2	3	2	0	0	
164	1	st	Fauna- bi-annual. Flora- 3-4 times/year.		U	3	3	2	2	0	
165	6		4 times during 1993.		U	2	0	2	2	0	

Table 2 continued

F#	Driver class	Time scale	Monitoring Frequency	Data kept	Analy -sed?	Conti -nuity 1	Conti -nuity 2	Hypo- theses 1	Meth- ods 1	Eval- uation 1	Eval- uatio 2
166	1	mt	Bi-annual		U	3	3	3	2	0	
167	1	st	Bi-annual		U	0	3	2	0	0	
168	1	lt		Hardcopy	U	3	3	2	0	0	
169	1	lt	Bi-annual	Dwellingup and YNP, Hardcopy and PC database.	U	3	3	2	3	0	
170	1	lt	Bi-annual, completion date not yet determined.	Dwellingup, hardcopy, planned to install onto The Fauna File.	U	3	3	2	2	0	
171	1	lt	Annual	Dwellingup DRF register, Kelmscott DRF register.	U	0	3	3	0	0	
172	3	lt	Ad hoc.		U	0	3	2	0	0	
173	2	lt	With each operation during season.		U	0	3	2	0	0	
174	1	lt			U	0	0	0	0	0	
175	1	lt			U	0	0	0	0	0	
176	3	lt	Observations as convenient.		U	0	0	2	0	0	
177	2	lt	At least every 5 years.		U	0	0	2	0	0	
178	6		Survey 1-2 reserves per year. Re-survey after 5 years.		U	2	2	2	2	0	
179	2	mt			U	3	2	3	0	0	
180	1				U	2	3	2	2	0	
181	2				U	0	0	0	2	0	
182	1	lt	Annual		U	0	3	2	0	0	
183	6		Annual		U						
184	1				U	0	0	0	0	0	
185					U	0	0	2	0	0	
186	1	lt			U	0	0	2	0	0	
187	1	lt			U	0	0	3	2	0	
188	2				U	2	0	2	0	0	
189	2				U	0	0	3	0	0	
190	2	lt	Monthly		U						

Table 2 continued

F#	Driver class	Time scale	Monitoring Frequency	Data kept	Analy -sed?	Conti -nuity 1	Conti -nuity 2	Hypo- theses 1	Meth- ods 1	Eval- uation 1	Eval- uatio 2
191	3	st	Yearly after treatments for at least 5 years.		U	3	2	3	0	0	
192	4				U						
193	4				U	2	3	3	2	0	
194	6				Y	3	3	3	0	0	
195	6				U	3	3	3	2	0	
196	6				U	3	3	3	0	0	
197	6				U	3	3	3	0	0	
198	2	mt			U	0	2	3	2	0	
199	2	mt	See research plan (Cale and Burbidge 1993).		U	0	0	3	0	0	
200	3				Y	0	0	3	0	2	
201				Floristic/veg. data - Hard copy, SEDIT database. Birds - hard copy, database	U	0	0	0	0	0	
202		st			U	3	2	3	0	0	
203	6				U	0	3	3	0	0	
204	1	lt	Years 0,1,2,3,5,7,10.		P						
205	1	lt		Background document and handbook.	U						
206	2				U						
207	6				U						
208	6				U						
209	6				U						
210	2	mt	October each year?		U						
211	1	lt	Initial survey, repeat surveys optimum at 5 year intervals.		U						
212	2	lt	Varies for different species.	Project newsletter to participants.	U						
213	4				U						
214	4				U						
215	1	lt		Collections at WA Herbarium and WA Museum. CALM Woodvale - database.	Y						

Table 2 continued

F#	Driver class	Time scale	Monitoring Frequency	Data kept	Analy -sed?	Conti -nuity 1	Conti -nuity 2	Hypo- theses 1	Meth- ods 1	Eval- uation 1	Eval- uatio 2
216	1	lt	Annual.	Collections at the Chicago Field Museum and WA Museum. Data at CALM Woodvale.	U						
217	6		13 islands each surveyed once.		P						
218	6				N						
219	6		Data accumulated gradually over years of fieldwork for other SPPs.		U						
220	5		Variable depending on area.		U						
221	2	st	4 times per year.	Woodvale - PC database.	U						
222	1	lt	Mostly annual.	Woodvale - PC database.	U						
223	1	mt	Initially 2 monthly for year 1, then six monthly to year 5, then yearly.	Woodvale and D.O., trapping data-PC database, listed on Corporate data directory	U						
224	3	lt	Annual.		U						
225	5				U						
226	1		Annual		U						
227	1		Opportunistically, but usually 2-3 times per year at each site.		U						
228	1	st	Monitored during 1992.		U						
229	1	st	Monitored weekly during 1995.		U						
230	2	mt			U						
231	1	lt			U						
232	5				U						
233	6				U						
234	1	lt			U						
235	5				U						
236	6				U						
237	1	mt			U						
238	6				N						
239	6				U						
240	5				U						

Table 2 continued

F#	Driver class	Time scale	Monitoring Frequency	Data kept	Analy -sed?	Conti -nuity 1	Conti -nuity 2	Hypo- theses 1	Meth- ods 1	Eval- uation 1	Eval- uatio 2
241	5			DELTA within the Corporate descriptive database of the WA Herbarium.	U						
242	5			Corporate database	U						
243	5				U						
244	5				U						
245	5			WAHERB and WACENSUS at WA Herbarium.	U						
246	5			DELTA database at WA Herbarium. Proposed publications.	U						
247	5			Proposed updates to WAHERB database at WA Herbarium. Proposed publications.	U						
248	5			Proposed publications and distribution maps.	U						
249	5			Specimens and "DELTA" database at WA Herbarium. Proposed publications.	U						
250	5				U						
251	5			WACENSUS database, proposed publication of the Census of Western Aust. Plants.	U						
252	6		Twice, hopefully.	Karratha - PC database (PARADOX).	U						
253	1	st	Annual	Karratha - PC database (PARADOX & ACCESS). Proposed publication.	U						
254	1	lt	Annual for most sites.	Karratha/Woodvale - PC database (PARADOX). Proposed publication.	U						
255	1	st	Biannual.	Karratha - PC database (PARADOX).	U						
256	1	lt	Every 4 years.	Karratha - PC database (PARADOX), proposed publication.							
257	6		Biannual.	Karratha/Woodvale - PC database. Proposed publication.	U						
258	6		Unknown, have been sampled twice.	Karratha - PC database	U						
259	5				U						

Table 2 continued

F#	Driver class	Time scale	Monitoring Frequency	Data kept	Analy -sed?	Conti -nuity 1	Conti -nuity 2	Hypo- theses 1	Meth- ods 1	Eval- uation 1	Eval- uatio 2
260	2	lt	Annual	Minitab spreadsheet.	U						
261	6				U						
262	6				U						
263	4				U						
264	3	st			U						
265	6			Proposed publications.	U						
266	6				U						
267	1	lt	Annual. Long term monitoring planned after c.2000.	SID Como in files.	U						
268	1	ct	c. 5 yearly.	SID Como, in files	U						
269	1	ct	6 monthly, indefinite completion date.	SID Como - files, PC database.	U						
270	5				U						
271	4				U						
272	4				U						
273	6				P						
274			One observation.	Dwellingup and Como - PC database.	U						
275	6		One observation.	Como - PC database	U						
276	4				U						
277	6		One observation period.	Como - PC database.	Y						
278	6		One observation period.	Como - PC database.	Y						
279	3	st	Monitored during years 2-4 of project.		U						
280	4				U						
281	3	st	Monitoring during years 1-5.		U						
282	6				U						
283	6		Sampling all year round, but less in summer months.	Vegetation Health Service Laboratory, district offices and U:drive (Herbarium).	U						
284	5	st	From 21-27 Sept. 1988.	Pemberton district - Visitor survey questionnaire.	Y						
285	2	st	One off survey in 1991.	Murray Carter (District manager Katanning).	U						

Table 2 continued

F#	Driver class	Time scale	Monitoring Frequency	Data kept	Analy -sed?	Conti -nuity 1	Conti -nuity 2	Hypo- theses 1	Meth- ods 1	Eval- uation 1	Eval- uatio 2
286	1	lt	During flowering season (Aug-Sept).	Manjimup district office, some in Perth - mostly hardcopy.	U						
287	1	lt	Previously ad hoc., 2 times per year from 1996.		U						
288	1	lt	2 times per year - Autumn and Spring.	Manjimup CALM office	U						
289	3	lt	Annual, though not total coverage each year.	Manjimup CALM office, in files.	U						
290	1	lt	Annual	Manjimup CALM office, in files.	U						
291	2				U						
292	1				U						
293	1	lt			U						
294	1	st	2 times per year.	Katanning, District file No. 25113/MR-H.	U						
295	1	lt	Pre-fire; post-fire; annual, then 3-4 yearly.	Katanning, in District sub-file 'MR', section in District Herbarium.	U						
296	1	lt	5 yearly (proposed but not done, project suspended due to lack of resources)	Katanning-District sub-files 'BP' or 'MR' of individual reserve file.	U						
297	5		1987 only.	Katanning-District file 24589/MR	Y						
298	1	lt	2-yearly (not done since 1989).	Katanning District file K20/06-75.	N						
299	6		One-off.	Katanning District files 19082/MR and 24589/MR.	Y						
300	6		Twice per annum during growth cycle, recommence as required.	Katanning District file 19082/MR and District slide collection.	Y						
301	1	lt	2 times per year (Dec and June), indefinite completion date.	CALM Katanning-District files K20/02 and 8617/MR, Slide collection.	U						
302	1	lt	Annual.	CALM Katanning District slide collection, K20/02.	U						
303	1	lt	4 times per year, indefinitely.	CALM Katanning District file K20/05-1.	U						
304	1	mt	4 times per year.	CALM Katanning District file 25113/BP and PC database.	U						
305	1	mt	Twice yearly 1986-87; Annual 1988-1993.	CALM Katanning, forms on reserve files sub-section (HU); summaries on K21/07.	Y						

Table 2 continued

F#	Driver class	Time scale	Monitoring Frequency	Data kept	Analy -sed?	Conti -nuity 1	Conti -nuity 2	Hypo- theses 1	Meth- ods 1	Eval- uation 1	Eval- uatio 2
306	1	st	Depends on species status.	Merredin - On file, PC database being developed, field herbarium.	U						
307	1	lt	Three yearly.	CALM Merredin-PC database (ACCESS), departmental database.	P						
308	1	mt	Monthly.	Data sheets, database in conjunction with WA Ag Dept.	U						
309	1	mt	Monthly for first 12 months and then twice yearly.	Hard copy.	U						
310	1	lt	Quarterly when the lake has water on it.	CALM Narrogin, hard copy.	U						
311					U						
312	6	st	No monitoring planned.	Cervantes office - MS EXCEL file C:\msoffice\EXCEL\files\MAPINFO\QUADRAT.XLS							
313			Annual, ongoing as new populations burnt.	CALM Cervantes and Wildlife Protection Branch Como, Hard copy of report/photos.	U						
314	1	lt		Denham District office - hardcopy.	U						
315	1	lt	Daily	Monkey Mia and Denham District Office, hardcopy.	U						
316	1	lt	Annual, indefinitely.	Marine Branch, PC database and files.	U						
317	1	lt	Annual.	Gascoyne CALM, hardcopy.	U						
318	1	lt	Lesueur - Weekly since 1992. Nambung - daily since 1988.	Como - PC database, Park Office, Cervantes - hardcopy.	P						
319	1	mt	Six monthly (possibly increasing to quarterly), ongoing until conclusion can be drawn.	Geraldton District Office (operations officer) hardcopy.	U						
320	2		July-Sept (1995?) and spot checks.								
321	2		Site inspection report- every 2-3 yrs.		U						
322	1	lt	Annual, multiple visits throughout flowering season.		U						
323	1				U						
324	1		Twice yearly.		U						
325	1		4 times/yr.		U						

Table 2 continued

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326	1	lt			U						
327	2	lt	Very informal, opportunistic, anecdotal.		U						
328	1	st	Monthly	South West Capes - file No. 38.00, PC database.	U						
329	1	lt	Annually.	Rebecca Woods (UWA - student project).	U						
330	1	lt	Bi-annual.	Professor D. Bradshaw (UWA). File No. 38.07.	U						
331	1		Monthly.	South West Capes District - PC database (Greg Voigt).	U						
332	1	mt	Annual	Regional database, File no. 38.07. UWA.	U						
333	1		D.R.F.-annual. C.E.S.-monthly.	District database (PC). File no. 37.05.	U						
334	1		Annual	Kim Williams, Bunbury - PC database, File no. 38.07.	U						
335	1	lt	visitor no. - daily. Other statistics - as required.	Denham CALM office, files and PC database and corporate database	U	0	3	3	3	0	
336	1	lt	Annual	CALM, Two Peoples Bay	P	2	3	3	3	3	

Analysis of the projects and activities shows that 148 of these are considered to be highly relevant to the Departmental Monitoring Program and could be incorporated into a formal Program with very little additional effort. A further 43 are relevant but would require some modification to be consistent with the Policy objectives and to be incorporated into a formal Departmental Monitoring Program (Table 3).

Table 3. Summary of numbers of projects and activities assigned to each Driver Class, derived from Table 2.

Driver Class	Number of Projects and Activities
1 (highly relevant to Program)	148
2	43
3	19
4	13
5	29
6 (require substantial modification)	64
No score given	20
Total	336

A list of publications arising from the projects and activities included in Table 1 is given in Appendix 2.

A variety of analyses of the data included in the database is possible. For the purposes of this report, however, the only analysis is that given in Table 3: further analyses can be undertaken in response to specific questions in due course.

4. Limitations of the results

The survey and the subsequent development of the database/directory were aimed to be comprehensive. However, there is a very real chance that important, relevant projects and activities are not included because information on those was not provided. The potential for gaps in the database limits the reliability of conclusions which can be drawn from the results.

This project should be considered as a first iteration in the process of developing the database: further development might include circulation of this report and follow-up discussions with research and operations staff.

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5. Discussion

A large number and a wide range of projects and activities currently being undertaken within the Department of Conservation and Land Management have been identified through this project as being relevant to the Department's Monitoring Policy. Many could be incorporated within a formal Departmental Monitoring Program established under that Policy with little additional sampling effort while some would need to be upgraded substantially to become part of such a Program.

Projects and activities that are largely consistent with the Departmental Policy can be grouped into eleven general categories:

- studies on effects of disturbance regimes, including fire and logging;
- actions under management or recovery plans for rare and/or threatened species;
- timber utilization, post-logging regrowth and inventory plots;
- agroforestry trials including regeneration of sandalwood;
- biological survey;
- wetland and stream monitoring;
- activities associated with the fox and feral cat control program;
- mapping of the extent of infection by *Phytophthora* species and other pathogens and monitoring outbreaks of insect pests;
- VISTAT, the program for collecting data on visitor use of CALM-managed lands and waters, and related human-use data-gathering;
- effects of particular management practises such as weed control, firebreak maintenance and rehabilitation;
- and special monitoring projects such as those associated with the Dawesville Channel.

This survey has not garnered details of a suite of projects and activities that are known to exist. For example, the Environmental Protection Branch oversees a wide range of mining and mine-related activities being undertaken on CALM-managed land by private companies. A requirement for approval for most of these activities is that the companies submit reports on their environmental management programs. These reports are generally consistent with requirements under the Department's Monitoring Policy. However, before they could be incorporated into any formal Monitoring Program, the Department would have to determine a policy position in relation to them and there would need to be some negotiation with each company on data access and related issues.

A second important example lies in the work that other Government Departments conduct or supervise activities on/in or adjacent to CALM-managed lands and waters and, in doing so, accumulate data that are consistent with the Monitoring Policy and would contribute usefully to any Departmental Monioring Program. For

example, the Waters and Rivers Commission collects data on stream flow in forested catchments and the Fisheries Department collects catch data from Shark Bay.

These gaps in the database not withstanding, this project has shown that there is a considerable amount of work going on within the Department that is consistent with the Monitoring Policy. This work would provide a solid foundation for a formal Monitoring Program, should there be a decision to establish one.

The need for a coherent and co-ordinated Monitoring Program is as great as, if not greater than, it was in 1988 when the Monitoring Policy was originally adopted. The Policy identified particularly the need to improve the system of recording observations on, and decisions relating to the management of, Departmental lands and the biota; and to improve knowledge and understanding and decision-making through a process incorporating experimental management, monitoring and a feedback loop. Since the Policy was adopted, other Departmental documents have highlighted the importance of monitoring. The draft Nature Conservation Strategy (CALM 1992) contains a chapter on Improvement of the Knowledge Base: Inventory, Research and Monitoring which begins with the statement of principle:

> Effective management for conservation requires a sound knowledge of which plants and animals occur in an area, and why they occur where they do. Monitoring the results of any action is an integral part of management. Thus there should be a close relationship between inventory, research and monitoring.

This chapter expands on the particulars of monitoring in CALM with the further, more detailed statement of principle:

> Long-term monitoring of ecosystems, individual species, management regimes, and the result of individual management actions is necessary to ensure that conservation goals are being met. Monitoring is an integral part of management: it allows us to determine whether each action has been completed satisfactorily and whether the desired result has been achieved.

Actions outlined within the draft Strategy to achieve nature conservation objectives include a range of monitoring-related activities.

The Department has also produced a Management Plan for lands under the control of the Lands and Forests Commission (LFC 1994) which includes a chapter on monitoring. This chapter identifies three components of a comprehensive monitoring program:

(a) Monitoring the effectiveness of measures to protect the environment;

(b) Monitoring the impact of disturbance-causing activities; and

(c) Monitoring ecosystem change through periodic measurement of an extensive system of permanant plots and selected vertebrate and invertebrate species.

The Management Plan states that (a) is implemented, (b) is partly implemented and (c) is yet to be initiated, and that the monitoring program will be steadily upgraded through improvements to (b) and eventual implementation of (c).

Given the series of very clear commitments that have been made by the Department from the adoption of the Monitoring Policy in 1988 through to the Management

Plan of 1994, it would be appropriate for the Department to take the next step and establish a formal monitoring program, drawing together existing work and building on that to produce the kind of synergistic result originally envisaged.

It has been apparent from the time of development of the Department's Monitoring Policy that there is considerable confusion amongst Departmental staff (and amongst the scientific community and in the wider, public arena) about what constitutes monitoring. This confusion has tended to take one or other of two forms: inadequate discrimination between on-going sampling as a component of research and repeated sampling as a part of monitoring, and an apprehension amongst managers, particularly, that monitoring is so all-embracing that it has the potential to become excessively time- and recource-consuming.

This survey revealed the confusion afresh. Two responses to the initial letter were common: "What do you mean by monitoring?" and when the concept was explained " Oh yes, well I know about the following...." or "Idon't do any monitoring!" but when pursued with an explanation (particularly in cases where the response was known to be incorrect) then "Oh you mean ....".

A substantial proportion of projects and activities which are referred to here as studies or trials, would be better described as medium- to long-term research. For example, studies were reported on effects of disturbance regimes, including fire and logging in forest areas (Kingston, Batalling, Perup), the wheatbelt (Tutanning), mulga lands, Kimberley landscapes and the Western Desert which are all covered by Science Project Plans and are, therefore, formally part of the Department's research effort. The sampling programs for these studies define them as research projects.

In contrast, many Departmental staff involved in programs of biological or environmental survey were disinclined to report their work in the belief that it was not relevant to the monitoring program, mainly because the sampling was one-off. Most of this survey work is site-based and designed to allow for resampling, albeit 10 or 15 years later. Most of these survey projects are consistent with the Monitoring Policy; indeed item 3.3 of the Policy committed the Department to "continue to establish and regularly resurvey a series of benchmark sites representative of all major biogeographic districts in the State".

This confusion must be addressed. Two suggestions have come from this review. The first is to find a different name, or invent a new name, to replace the word monitoring, since much of the confusion seems to arise from the ambiguity of the present name. The second is to reconsider the program of implementation that was laid out for the Monitoring Policy adopted in 1988:

- to run workshops to explain the concept of monitoring and to discuss approaches to adoption of the Policy;
- to appoint dedicated staff to support Regional and District staff in the design, implementation of monitoring projects (including production of a handbook), and in the management of the data; and
- to establish pilot projects in each Region and District.

Both suggestions have merit and warrant serious consideration if and when the Department decides to establish a formal monitoring program.

An important argument in support of the establishment of a formal Departmental Monitoring Program is that such a program would allow greater integration and utilisation of non-Departmental resources, namely public involvement in CALM projects, or projects of relevance to departmental strategies. The process of developing this potential resource is not as problematical as might initially be assumed. There is already a substantial volunteer program run within the Department which, in addition to providing an essential contribution to CALM's current work, readily provides the foundations of such an infrastructure.

The benefits arising from the proper utilisation of this resource are substantial, and excellent examples can be seen in the work of the Bureau of Meteorology and Sydney Streamwatch (Alexandra *et al.* 1996). The Bureau of Meteorology has had an active monitoring program since the beginning of this century involving more than 6000 volunteers reporting regularly on the weather from sites across Australia. This data is stored and analysed at the Bureau whereupon it is used to assist in the compilation of weather reports. This monitoring to management feature is also clearly evident in the work of Sydney Streamwatch. Data storage and transfer is computerised, enabling rapid and simple exchange between the volunteers and management. The data are examined by Sydney Water staff. As a consequence there have been a number of cases where Streamwatch data has enabled a rapid response to a contamination incident, as well as allowing general trends over time and seasons to be identified.

Analysis of these systems by Alexandra *et al.* (1996) has demonstrated that successful partnerships between community monitoring and management generally show the following characteristics:

- Information collected by volunteers is essential to management.
- The volunteers are strategically located to collect the information.
- There is mutual respect between the partners, avoiding simple exploitation by the manager.
- The operations have developed standardised methodology, enabling compatibility and accuracy of results.
- Regular communication between monitors and managers.
- There are regular opportunities for hearing and discussing the volunteer's input.
- Regular feedback to volunteers regarding the usefulness of their data.
- Volunteer training, liaison and feedback regarded as essential.
- The management agency adds value to the data through its ability to interpret and analyse the results.

Clearly the incorporation of community environmental monitoring organisation work into the development of the Departmental Monitoring Program has the potential to provide widespread and substantial benefits. Properly organised and professional community environmental monitoring has "the capacity to deliver dense information, rich in detail at the appropriate scale to assist and improve environmental management...Monitoring generates information, raises awareness, provides early warning of environmental problems and assists in trialing and tracking management methods" (Alexandra *et al.* 1996). Consequently, community

involvement can be used to help with the implementation of management programs, such as land and water care plans, conservation initiatives, and national policies like sustainable land-use and the conservation of biodiversity.

The inclusion and recognition of this resource in a Departmental Monitoring Policy would assist in providing CALM with a mechanism capable of providing:

- Rapid and large-scale insights into environmental condition.
- Observations regular enough to pinpoint the timing of significant changes.
- Detail, enabling dense sampling at high resolution.
- Observations specific to target areas.
- Comparable data.
- A cost-effective method of data collection.
- Records suitable for rapid analysis and decision making.
- Flexibility in relation to environmental events.
- A reliable guide to action.

As well as being relevant to the community interests involved.

Incorporation of community work into CALM's Monitoring Strategy could also be used as a vehicle through which standardisation of procedures for data collection can be achieved, thereby increasing the value of data collected by voluntary organisations by making those data compatible with other associated data. Reciprocally, the Department's extended involvement with community groups would assist in community environmental monitoring projects realising their full potential through (Alexandra *et al.* 1996):

- Establishing better links between monitors and managers.
- Initiating a participatory process to establish uniform data standards.
- Fostering increased community involvement in state of the environment reporting.
- Encouraging initiatives to integrate data at the regional level.
- Providing national leadership in data sharing.
- Building community capacity to interpret data.
- Promoting increased involvement in community environmental monitoring.

Furthering community involvement in the Department's operations can only serve to assist in gaining public awareness and acceptance of CALM's purpose, as well as facilitating an operational structure more amenable to the extremely valuable contribution which can be made by community and other non - government organisations.

6. Recommendations

NB's idea of calling together all the relevant persons and attempting to identify a source of support for progressing the Policy and development of a formal Monitoring Program.

It is important to identify a market: who will use the system if and when it is established? Who wants to know? Who wants to be able to take better-informed decisions? Does the Department want to develop its own community environmental monitoring program (and to acrue all the benefits that such a program could provide)?

If there is a decision to proceed, the database provides a valuable starting point for further work But it should be recognised that the database is incomplete.

And there is a decision to be made about the name (monitoring or something else) and the desirability of holding workshops, beginning pilot projects etc. And setting up systems for manageing the data and provideing the feedback loops.

7. Acknowledgements

8. References

Incomplete

Alexandra, J. Haffenden, S. and White, T. (eds) (1996) *Listening to the Land: A Directory of Community Environmental Monitoring Groups in Australia.* Australian Conservation Foundation, Fitzroy, Victoria.

Hopkins, A.J.M. (1995) *Monitoring: An Essential Component of Living Natural Resources Management.* CALM Science & Information Division, Woodvale, W.A.

Hopkins, A.J.M. (1995) *Monitoring: An Essential Component of Environmental Management.* CALM Science and Information Division, Woodvale, W.A.

Hopkins, A.J.M. (in press) *Establishment of a Departmental Monitoring Program.* CALMScience Supplement.

Hopkins, A.J.M. Brown, J.M. and Goodsell, J.T. (1987) *A monitoring system for use in natural areas in Western Australia.* In: Saunders, D.A. Arnold, G.W. Burbidge, A.A. and Hopkins A.J.M. (eds) (1987) *Nature Conservation: The Role of Remnants of Native Vegetation.* Surrey Beaty & Sons, Sydney. p. 337 - 339

Woodley, S. (1993) Monitoring and measuring ecosystem integrity in Canadian National Parks. pp 155 - 176 In *Ecological Integrity and the Management of Ecosystems* ed by S Woodley, U Kay and G Francis St Lucie Press, Ottawa.

As an immediate consequence of this survey a further database search is desirable. During the course of this preliminary survey it was not practically possible to search all potentially relevant databases. Examples of such databases include those concerned with forestry, Environmental Protection Branch and local District and Regional files, they may be digital, hardcopy or a combination of bôth. To conduct this task is obviously a substantial undertaking, but it would doubtless uncover substantial amounts of potentially important information, such as historical collections of baseline data and records of fire regimes.

Finally, other Government Departments conduct or supervise activities on/in or adjacent to CALM-managed lands and waters and, in doing so, accumulate data that are consistent with the Monitoring Policy and would contribute usefully to any Departmental Monioring Program. For example, the Waters and Rivers Commission collects data on stream flow in forested catchments and the Fisheries Department collects catch data from Shark Bay.

As noted above, this survey should be considered as a first iteration in the process of developing the database: further development might include circulation of this report and follow-up discussions with research and operations staff.

In addition,

Monitoring has been defined as "...the process of repetitive observations of one or more elements or indicators of the environment according to pre-arranged schedules in time and space in order to test postulates about man's impact on the environment..."(Bisset and Tomlinson 1981). This definition highlights two key features: repeated observations according to pre-arranged schedules and testing hypotheses about impacts. At the same time, the definition is excessively restrictive in that monitoring should be used to gather data on non-anthropogenic impacts particularly those associated with stochastic events such as drought, fire, flood and outbreaks of pests and diseases. Monitoring techniques can also be used to structure observations that are not immediately related to an hypothesis, including the collection of baseline data. It is worth noting that some very important insights into environmental processes have been gained from the analysis of sets of long-term data collected collected systematically but for other purposes: perhaps the best known example is the long-term atmosphere monitoring program at Cape Grim, the data from which are now used to show changes in atmospheric CO^2 levels.

Monitoring is not the same as long-term ecological research: the two activities are complementary but different. Monitoring need not be long-term - the time scale depends entirely on the hypothesis being tested. However, many monitoring projects will often be medium to long-term because of the very nature of the isssues being addressed. Monitoring as an activity is not necesarily confined to ecological issues although, in the context of this discussion, much of it will have an ecological orientation. A further important distinction is that monitoring often involves non-destructive sampling because of the need for continued sampling of the same place.

Long-term ecological research sites (LTERSs) are usually large and diverse whereas monitoring sites can be small but may be more numerous - there may be many (separate) monitoring sites at a single LTERS. LTER programs should include monitoring of a few key environmental parameters such as rainfall, water depth and quality, vegetation cover and so on, parameters that can be incorporated within the concept of a minimum standard installation. The other perspective is that the results

of LTER programs are often very important in providing the basis for interpreting the results of monitoring programs.

or that could be incorporated within a formal Departmental Monitoring Program established under that Policy with little additional effort is an indication of the extent to which the Policy has been adopted. Scrutiny of the inventory suggests that it is appropriate to organise this discussion into some key areas:

- Areas of progress and possible reasons for this.
- Areas of limited or no progress and possible reasons for this.
- Future direction - opportunities arising from current work
  measures to facilitate the development of such opportunities
  possible solutions to current difficulties
  prioritisation of progress

Increasing district and regional involvement and greater cooperation and liaison between research and operational staff.

4.2 Public Participation.

Progress in the development of a Departmental Monitoring Program would also allow greater integration and utilisation of non-Departmental resources, namely public involvement in CALM projects, or projects of relevance to departmental strategies. The process of developing this potential resource is not as problematical as might initially be assumed. There is already a substantial volunteer program run within the Department which, in addition to providing an essential contribution to CALM's current work, readily provides the foundations of such an infrastructure.

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The inclusion and recognition of this resource in a Departmental Monitoring Policy would assist in providing CALM with a mechanism capable of providing:

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- Comparable data.
- A cost-effective method of data collection.
- Records suitable for rapid analysis and decision making.
- Flexibility in relation to environmental events.
- A reliable guide to action.

As well as being relevant to the community interests involved.

Examples of community organisations around the Perth metropolitan area and Western Australia in general which could contribute to such a scheme include The West Australian Branch of the Australian Conservation Foundation, The Western Australian Forest Alliance, the Marine and Coastal Community Network, the Western Australia Wildflower Society, the Naturalists club and various "Friends Of" groups.

Incorporation of community work into CALM's Monitoring Strategy could also be used as a vehicle through which standardisation of procedures for data collection can be achieved. Thereby increasing the value of data collected by voluntary organisations by making it compatible with other associated data.

Reciprocally, the Departments extended involvement with community groups would assist in community environmental monitoring projects realising their full potential through (Alexandra *et al.* 1996):

- Establishing better links between monitors and managers.
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Furthering community involvement in the Department's operations can only serve to assist in gaining public awareness and acceptance of CALM's purpose, as well as facilitating an operational structure more amenable to the extremely valuable contribution which can be made by community and other non - government organisations.

OBSERVATIONS APPARENT UPON SCRUTINY OF THE DIRECTORY PERTAINING TO SUBJECT AREAS MENTIONED AT THE START OF THE DISCUSSION TO BE INCLUDED WHEN DIRECTORY PRODUCED. CONSIDERABLE INPUT TO RECOMMENDATIONS WILL ALSO BE ACHIEVED AT THIS POINT.

NOTE, IT WOULD BE VALUABLE TO TALLY AND AVERAGE THE GRADES WITHIN EACH UNIT, BRANCH, DISTRICT ETC. ENTRY TO PROVIDE A 'PERFORMANCE' GUIDE RELEVANT TO THAT SECTION OF THE DEPARTMENT.

WOULD ALSO BE HELPFUL TO ACCOMPANY / INCLUDE WITH THE REPORT AND DIRECTORY A COMPREHENSIVE REFERENCE LIST OF PUBLICATIONS WHICH DISCUSS MONITORING.

5. Recommendations

As an immediate consequence of this survey a further database search is desirable. During the course of this preliminary survey it was not practically possible to search all potentially relevant databases. Examples of such databases include those concerned with forestry, Environmental Protection Branch and local District and Regional files, they may be digital, hardcopy or a combination of both. To conduct this task is obviously a substantial undertaking, but it would doubtless uncover

substantial amounts of potentially important information, such as historical collections of baseline data and records of fire regimes.

TO CONTINUE WITH FINDINGS EVIDENT FROM DIRECTORY.

LIMITATIONS.

The survey and subsequent directory is aimed at being as comprehensive as this preliminary stage allows. However, the information gathering nature of the work ensures that the main limiting factor is the very availability of that information. Consequently, there are significant omissions from the directory and subsequent conclusions which can be drawn where information was unavailable, not forthcoming or where the processes necessary to gather that data were beyond the scope and resources of this project.

ACKNOWLEDGMENTS.

This project has only been possible due to the co-operation of relevant staff throughout the Department, their time spent in interviews and providing information was much appreciated. We are especially grateful to those who took on the responsibility of coordinating a regional, district or group response.

The contributions of Ms Judith Harvey, during the initial stages of the investigation, greatly eased the process of getting the investigative work underway.

It is also necessary to thank Mr Dallas Lynch, whose assistance with the compilation of the vast amount of data was invaluable in the latter stages of the survey.

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TO BE EXTENDED AS REPORT COMPLETED.
ANGAS, NOT SURE IF YOUR PAPERS ARE PUBLISHED OR NOT.

MONIEXPL.DOC

Angas Hopkins / Alex Driver

Survey of Monitoring projects in CALM.

Files worked on at Angas Hopkins machine c:\moni

Backed up to t:\public\monit

Database is Paradox 3.5 format designed by Margaret Langley and Ruth Morgan.

Data Entry by Ruth Morgan.

EXPLANATION OF MONI DATABASE - PARADOX 3.5

TABLES

The database consists of three main tables:

MONI - contains general information about individual projects. The information in this table is found in the Project Information section of the main data entry form.

EVALUATE - assesses the status of each project with respect to monitoring. The information in this table is found in the

Assessment section of the main data entry form.

PUBLICNS - contains information about any publications relevant to each project. The information in this table is found in the Publications section of the main data entry form.

There are also five lookup tables associated with the main tables. These are: **District, Status, Subject, Domon and Analysed** (see below for more information about these).

DATABASE STRUCTURE

MONI is the **master table**, and EVALUATE and PUBLICNS are the **details** tables. The data entry forms for EVALUATE and PUBLICNS are embedded on the data entry form for MONI (Referred to above as the **main data entry form**). This multi-table form can be accessed by viewing the MONI table and using F7 to toggle between form and table views. To edit the embedded forms, use F3, F4 to move back and forth between the three sections "Project Information", "Assessment" and "Publications".

The three sections of the multi-table form are **linked** by the **key field** "Form # " (see DATA below). This ensures that individual records in MONI are matched to their corresponding records in EVALUATE and PUBLICNS. Therefore, if the value in the "Form # " field of a record in MONI is changed, the value of "Form #" is automatically updated in EVALUATE and PUBLICNS to maintain the links between the tables. This method saves time and is particularly useful in cases where records are deleted from a table.

However, to maintain the links between the tables, it is best to make changes to the multi table form **only**, and **AVOID** editing tables individually in table view. The

value of the linked field (i.e. Form #) will **ONLY** change in the details tables (when changed in the master table) if changes are made in form view.
EVALUATE and PUBLICNS can be edited either individually in form view, or the embedded forms can be edited. It is best to edit the embedded forms so that records cannot be deleted accidentally.

DATA

Project Information

Moni	The record number
Form #	Corresponds to a survey form in the MONI files. The number is pencilled onto the top right corner of the survey forms.
SPP	Departmental Science Project Proposal number
Project name	Title or project name.
SInitial	First initial of the person that provided the information or the principle project supervisor.
SSurname	The surname of the person that provided the information or the principle project supervisor.
District	The value of this field is chosen from the lookup table "District". It refers to the CALM district that the field work is done in (if applicable/available), When more than one district within a region is involved, a choice is made to select the major district or use a category that indicates the main district the work is done in. Other districts are mentioned in the "Location" field where necessary. Codes are also provided for situations where more than one district

	AND more than one region is involved. Regions and/or districts may then be specified in the "Location" field.
Location	Location of work/field work and may include district references.
Status	The value of this field is chosen from the lookup table "Status" and refers to the stage that the project was in at time of survey, if discernable. Does not differentiate between a project which is continuing but will end and a project which is continuous without end. The DriverClass may do this better.
Commenced	Date project was planned to start.
Completed	Date project was planned to finish.
File	Departmental records file number
KeyWords	A list of words associated with the subject matter of the project.
DOMon	The value of this field is chosen from the lookup table "DOMon" and refers to the process influencing the subject, that is being investigated
Subject	The subject item of the project e.g. fauna, flora, habitat, Invertebrates, vegetation. The value of this field is chosen from the lookup table "Subject".
Project time	A field which is computable from the start and finish date. There is a script called "projtime" which will do the calculation and give the answer in nearest number of years.

Region — The appropriate region is automatically entered into this field when the "District" field is entered.

Assessment

DriverClass — In 2 parts, a number and an alphacode. These were determined and assessed by Alex Driver. In the database they are copied directly off the hardcopy survey forms.

Number: 1-5 regarding how strongly monitoring featured as a component for use in the overall Departmental Monitoring Strategy, 1 being the strongest relevance, 5 the least.

Alpha: Time scales:

ST - short term MT - medium term LT - long term CT - continual

BLANK - difficult to define timescale.

Analysed? — An indication of status of results analysis (ie. whether or not the results have been analysed). The value of this field is chosen from the lookup table "Analysed".

DataKept — Indications of where data is kept or who has data. What form the data is in.

MonFreq — An indication of the frequency of monitoring/sampling

The remaining fields on the Assessment form are criteria which must be filled in order for a project to meet the requirements of a monitoring programme. They are ranked according to the following scale:

0 - not enough information given to assess

1 - no, criterium not fulfilled

2 - some information given but needs attention

3 - yes, criterium fulfilled

An explanation of the criteria (taken partly from Hopkins, A.J.M. *Establisnment of a Departmental Monitoring Program*) follows:

Continuity - Permanently marked sites

Sampling occurs at permanently marked sites

- Long term obs. possible

Long term observations (30 years or more) are possible

Hypotheses - Hypotheses/objectives clearly stated

The aims of the project or the hypothesis are clear and informative

Evaluation - Scheduled analysis and review

The results are updated and analysed at specified intervals (This requires an efficient record-keeping system and data management)

- Integrated with management

The aims of the project are integral to management decisions and operations within CALM

There is regular feedback to observers, managers etc.

Methods - Standardised, simple, repetitive observations of one or more elements

The methodology is accessible to a range of users

The results are easily interpretable and relevant

The methods are standardised to minimise observer error

Publications

Publicns 1,2,3,4 Any publications relevant to the project

TO MAKE A MULTI-TABLE FORM

1) When designing details forms (i.e. those to be embedded) do not Place the key field (Form # in this case).

2) Choose Forms from the main menu and then Multi. Choose the form to be embedded, and then the field from the master table that is to be linked to the details table.

3) Embed the details table/s at the bottom of the master table form.

Editing linked tables

Restrictions - can't delete a master record that is linked to detail records in other tables. To delete a record from the master table, the linked detail records must be deleted first.