WETLANDS AND WATERBIRDS PROGRAM

PROGRAM LEADER

J Lane

CURRENT RESOURCES

This program comprises 3.4 persons (1.7 Professional + 1.7 Technical). Its budget is $195 056 ($129 246 salaries, $65 810 other).

RESOURCES IN PREVIOUS YEAR

3.55 persons (1.7 Professional + 1.85 Technical); budget of $226 456 ($158 346 salaries, $68 110 other).

BACKGROUND

For historical reasons the Program was, until 1986, concerned primarily with the collection of data needed:

i) to identify the conservation value (principally as waterbird habitat) of specific wetlands and thereby to assist in the struggle to protect these habitats from degradation and inappropriate forms of development or use, and

ii) to facilitate responsible management of annual duck hunting seasons.

A number of small studies directed towards the resolution of specific management issues were also conducted. Program members were also much involved in wetland reservation, management, management planning, policy issues and resolution of conflicts.

With the formation of CALM and the structural separation of research, management, management planning and policy functions into different Divisions, the Program has attempted to increase its emphasis on research and to be less involved in other functions which are properly the responsibility of other branches.

AIM

To provide scientific information to ensure effective conservation and management of Western Australia's wetland ecosystems, including the maintenance of waterbird populations.

PRIMARY OBJECTIVES

Wetland Values

To identify conservation values of the wetlands and wetland systems of Western Australia, particularly with respect to reservation of a representative sample of wetland types, maintenance of species (flora and fauna) diversity and provision of habitat necessary for the maintenance of the State's waterbird populations.

Status of Waterbird Populations

To monitor and manage the State's 130 species of waterbirds, particularly those species of ducks which are harvested.

Wetland Ecosystem Dynamics

To develop an increased understanding of the functioning of wetland ecosystems, identify major degrading influences and provide management solutions.

Public Involvement

To foster a sympathetic public attitude to the conservation of waterbird populations and wetlands through direct involvement of the public in appropriate research projects and through open communication of research findings.

Communication

To communicate research results in the form of technical and scientific publications, educational literature, committee representation, and to provide advice and liaison with other CALM staff, other Departments, and the community at large by way of training courses and seminars.

20 YEAR GOALS (based on current resources and in priority order)

1. Establish an inventory of wetlands of the State and a reservation system that represents all types of wetlands, with emphasis on improved representation in areas outside the south west and along streams, rivers and tidal zones.***

2. Study factors affecting population dynamics, distribution and occurrence of waterbirds, especially game species of duck and migratory waders.**

3. Determine conservation status of wetland and stream invertebrates and native fish and examine factors affecting their occurrence.**

4. Examine the effects of environmental changes on the biota of wetlands and ways of ameliorating the effects of changes including salinization, Greenhouse effect and entrophication.**

5. Document habitat quality of wetlands, including rivers and streams, with emphasis on riparian vegetation and water quality.*

6. Study issues related to pest management, artificial creation of wetlands and other management matters to ensure that the actions undertaken are biologically sound.*

5 YEAR GOALS

1. Establish and maintain a volunteer-based program (500+ observers) for annual assessment of the abundance of waterfowl (particularly game species of ducks) and for identification of important waterbird sites in southwestern Australia.

2. Determine the conservation value (principally the level of usage by waterbirds) of remote wetlands (Lakes Gregory, Argyle, McLeod etc.) of probable international importance.

3. Assess seasonal usage by waterbirds of a number of important, poorly known, wetland sites in south-western Australia.

4. Monitor annually water levels and water quality of a sample of south-west wetlands. Use these data to determine duck shooting seasons and to monitor the condition of wet lands.

5. Analyse results of 1981-1985 RAOU Waterbird Survey project as first step in identifying the general environmental parameters within a wetland that affect its usage by waterbirds.

6. Assess the conservation status of the lentic invertebrate fauna in the south-west through wetland surveys and examine how various environmental parameters (eg. salinity, nutrients) affect the distribution of species.

7. Analyse and publish results of the Fisheries and Wildlife Department duck banding project (funded by ANPWS States Assistance Grant; $24 000).

8. Assess the conservation values of different habitats in Leschenault Inlet and the effect of mosquito control on those values for waterbirds and invertebrates.

9. Study the effect of salinity on usage of wetlands by ducks for both breeding and as drought-refuges as an indication of the impact of increased salinization in the south-west on waterbirds.

10. Examine food selection in waterbirds in relation to the invertebrate prey available to gain some understanding of how changes in invertebrate species composition that result from salinization affect waterbird distribution.

11. Determine the breeding status (number of breeding colonies, locations and size) of the Great Egret *Egretta alba* in Western Australia.

12. In collaboration with other State and Local Government authorities, develop more effective and environmentally acceptable methods of midge (chironomid) nuisance control.

13. Examine pesticide levels in Herdsman Lake and animals therein in relation to both spraying for Argentine ants and other uses of insecticide within the catchment.

14. Gain a preliminary indication of the level of threat to native avifauna and wetland ecosystems posed by continued use of lead shot for waterfowl hunting in the south-west of W.A.

PROJECTS TO BE COMPLETED FROM JULY 1988 TO JUNE 1993
(numbers refer to the Table following)

1-4,8,9,11-16,18

PROPOSED NEW PROJECTS - with existing resources (in priority order)

1. Annual assessment of waterfowl abundance. Joint CALM/RAOU-volunteers project with counts each November and March. This is an expansion of the Great Duck Count.

PROPOSED NEW PROJECTS - with additional resources (in priority order)

1. Waterbird usage of wetlands of Swan Coastal Plain. Joint CALM/WAWA project using RAOU volunteers to assess the significance of different types of wetland for waterbirds to assist in planning the exploitation of Perth's groundwater resources.

2. State of the Wetlands. Develop procedures for periodic assessment of the rate of loss (or gain) of wetland types. This information would be used to counteract the current piecemeal loss of wetland resources and to enable policy development, protective legislation, acquisition, management etc. to be targetted on areas of greatest need.

PUBLICATIONS* AND REPORTS 1987/88

*BARTLE, J., GRAHAM, G., LANE, J.A.K. & MOORE, S.A. (1987). Forrestdale Lake nature reserve management plan. CALM Management Plan No. 3 (122 pp)

*HALSE, S. (1987). Probable effect of salinity on the waterbirds of Lake Toolibin. CALM Tech. Report No. 15. (31 pp.)

*HALSE, S.A. (1988). The last lake. *Landscope* 3:17-22.

*HALSE, S.A. & HALSE, N.J. (1988). Seabirds and shorebirds at Ningaloo in winter, with comments on Hutton's Shearwater. W. Aust. Nat. 17:97-106.

HALSE, S.A. & WARD, D. (1987). Assessing conservation value of wetlands. Abstracts of 26th Congress, Australian Society for Limonology. Aust. Soc. Limnology Newsletter 25:36

*WATKINS, D.W., CLARKE, J., LANE, J.A.K. & MOORE, S.A. (1987). Benger Swamp nature reserve mgmt plan. CALM Management Plan No. 7 (92 pp.)

Primary Objectives	5 Year Goals		Projects (RPP No.)	Tasks completed 1987-8	Targets 1988-9
Wetland Values	Remote wetlands	1	Kimberley surveys	Fitzroy River, lower Ord R. & Lake Argyle surveys	No further research planned
	Seasonal usage	2	South west surveys	Wonnerup, Vasse monitored	New project : Prepare RPP
		3	Waterbird use of Wetland Nature Reserves	Final draft prepared	Publish
		4	Waterbird use of wetlands of Swan Coastal Plain	Project outline prepared (joint project with WAWA)	New project: Obtain funding commitment & prepare RPP
	Invertebrate conservation status	5	Ostracod taxonomy	Descriptions of 1 new genus, 3 new spp prepared for publication	Describe new spp as found
		6	South-west surveys	34 wetlands sampled, 1 two-monthly, some analysis	Do limited no. of surveys, continue analysis
Status of Waterbird Populations	Annual abundance	7	March counts	March '88 count conducted	New project : Prepare RPP
	Duck banding	8	Analysis of historical data	Analysis completed	Prepare for publication.
	Egret colonies	9	Location, size & numbers	Colonies monitored	Prepare for publication.
Wetland Ecosystem Dynamics	Wetland monitoring	10	Sept & Nov surveys	Sept & Nov 1987 surveys undertaken	Do Sept & Nov 1988 surveys
	Environmental parameters	11	RAOU waterbird survey analysis	Vegetation data collected	Finish analysis & prepare for publication.
	Impact of Mosquito Control	12	Leschenault Inlet	Invertebrate analysis completed, most bird fieldwork finished	Finish fieldwork, analyse & prepare for publication.
	Ducks & salinity	13	Breeding success in SW	None	Do fieldwork at 2 sites
	Food selection	14	Diet in fresh water	30 birds collected & invertebrates sampled	Continue fieldwork
	Midge nuisance control	15	Midge Research Steering Committee	Funding obtained, short term control options evaluated	Evaluate long term control options
	Herdsman pesticides	16	Organochlorines in swamphens	Fieldwork & analysis completed	Prepare for publication.
	Wetland Vegetation	17	Longterm monitoring	Fieldwork, mapping & vegn structure completed	Finish identifications & prepare for publication
	Lead shot	18	Gizzard contents analysis	Analysis	Prepare for publication.

RPP No.	TITLE	PRINCIPAL INVESTIGATOR
20/76	Early fertilization of P. pinaster on marginal sites.	T. Butcher
21/76	Fertilization of adolescent P. pinaster on yellow sands.	T. Butcher
23/76	Fertilization of adolescent P. pinaster on grey sands.	T. Butcher
2/78	Agroforestry trial at Wonnerup.	R. Moore
20/78	Agroforestry regimes with P. radiata.	R. Moore
29/78	P. radiata provenance trial at Busselton [RX. 6(1979)].	T. Butcher
30/78	P. radiata genetic variation in dieback resistance.	T. Butcher/ M. Stukely
25/79	Provenance trials of P. taeda and P. serotina in sunkland.	T. Butcher/ M. Stukely
4/80	Agroforestry trial jarrahwood.	R. Moore
7/80	Strip planting of pines for agroforestry.	R. Moore
26/80	P. pinaster high pruning trial.	T. Butcher
2/81	Timing of fertiliser for maximum response in P. pinaster.	T. Butcher
4/81	Agroforestry trial in Wellington Catchment.	R. Moore
10/81	Agroforestry species trial Vasse 2.	R. Moore
2/82	Silviculture alternatives for fuel reduced buffers.	R. Moore
5/82	Comparison of silvicultural regimes for Sunkland P. radiata.	R. Moore
7/82	Pinus pinaster second rotation studies.	T. Butcher
9/82	Forms of nitrogen nutrition for P. radiata.	J. McGrath
19/82	Phosphorus regimes for pastured pine.	J. McGrath
21/82	Pine progeny trials in the Wellington catchment.	T. Butcher
33/82	Pine cuttings for agroforestry.	R. Moore
42/82	Agroforestry trials at Esperance.	R. Moore
44/82	Phase 3 pine species trial for Sunkland (4 species).	R. Moore
45/82	Effect of pruning on wide spaced P. radiata.	R. Moore
3/83	Comparison of form and set lift pruning in P. radiata.	R. Moore
6/83	Effect of P. radiata thinning on wind stability.	R. Moore
7/83	Early thinning of P. radiata on clover in Sunklands.	R. Moore
15/83	Combination of Alnus sp. and P. radiata	J. McGrath
25/83	Adjacent 1R/2R pinaster on good/marginal sands at Yanchep.	T. Butcher
29/83	Cultivation and fertilisation of marginal P. pinaster sites at Pinjar.	T. Butcher
28/83	Effect of initial stocking on future growth of P. radiata crop trees.	R. Moore
30/83	P. radiata non commercial thinning.	R. Moore
39/83	Screening established P. radiata for dieback resistance.	M. Stukely
14/84	Sunkland site trial P. radiata Phase III.	P. Jenkins
1/85	Nitrogen source distribution and effect on P. radiata growth	J. McGrath
8/85	P. radiata response to N and P after thinning on red loams.	J. McGrath
17/85	Phosphorus supply and concentration in P. radiata needles.	J. McGrath
1/86	Form and growth rate of selected cuttings of routine seedlings of P. radiata in agroforestry.	R. Moore
2/86	Timber and agricultural production from two stand densities of pine agroforestry in the Manjimup area.	R. Moore
9/87	Timing of fertilization in thinned P. radiata.	J. McGrath
10/87	Frequency of fertilization in thinned P. radiata.	J. McGrath
11/87	The effect of thinning and fertilization on growth of P. radiata.	J. McGrath
33/87	Initial Fertilizer requirements for P. radiata on the South-Coast.	J. McGrath
18/88	Initial weed control and fertilization of P. radiata on the South Coast.	J. McGrath

WETLANDS AND WATERBIRDS

*	Analysis of data from the 1981/85 Waterbird Survey project and data on physical characteristics of wetlands to determine how physical parameters affect waterbird usage of wetlands and to define the ecological preferences of individual waterbird species.	S. Halse
*	Surveys of aquatic invertebrates in the South west to gain a preliminary idea of the conservation status of different groups and species and to develop an understanding of how the physical characteristics of a wetland affect its species richness and composition.	S. Halse
*	Measurement of pesticide levels in the environment and biota of Herdsman Lake and other metropolitan lakes. Joint project with Dr J. Davis (Murdoch University) and Mr. G. Ebell (Chemistry Centre W.A.).	S. Halse
*	Study of dietary selection in waterfowl in relation to availability of potential foods.	S. Halse
*	Ostracod taconomy.	S. Halse
*	Description of vegetation of wetlands of South west to provide data for long-term monitoring. Joint project with Dr. P. Wilson (Herbarium).	S. Halse
*	Publication of results of the 1981-85 RAOU Survey of Waterbird Usage of the Wetland Nature Reserves of south-western Australia. (RAOU).	J. Lane
*		
*	Publication of results of the 1988 joint CALM-RAOU assessment of waterfowl abundance in south-western Australia. (RAOU).	J. Lane
*	Publication of results of the 1986-88 joint CALM-RAOU surveys of remote wetlands of probable international importance. (RAOU).	J. Lane
*	Completion of surveys and publication of results of 1986-88 survey of egret breeding colonies in Western Australia. (RAOU).	J. Lane
*	Completion of surveys and publication of results of Lake Muir wetlands and Australasian Bittern surveys. (RAOU).	J. Lane
*	Examination of levels of exposure of native waterfowl to lead shot. Incidence of ingested lead pellets and lead levels in wing bones is being studied.	J. Lane
*	Annual monitoring of water levels and water quality of a sample of south-west wetlands as a basis for determination of duck shooting seasons and as a part of CALM's broader program of monitoring of the condition of the conservation estate.	J. Lane

PART 1 INTRODUCTION

SCOPE

This research plan relates to the work carried out by the Department's Division of Research and does not include research conducted in other Divisions. It is a rolling plan and will be revised each year in July, before the annual financial year estimates are required.

Production of a rolling five-year plan is considered the best way of clearly describing the what, why, where, who, when and how of research.

CALM's Corporate Plan requires that each functional group within the Department prepare its own Strategic Plan. This Five Year Plan fulfils this requirement for the Division of Research. The information in this plan is correct to 30 June 1988.

HISTORICAL OVERVIEW

The Research Division of the Department of Conservation and Land Management (CALM) was formed in 1985 through the amalgamation of research branches from the Forests Department and the wildlife section of the Department of Fisheries and Wildlife. The Division was further expanded in July 1988 when the Western Australian Herbarium was transferred from the Department of Agriculture to CALM under the control of the Divisional Manager, Research. The following is an overview of research in these organizations through to 1988. This overview is specifically related to broad research topics and staff growth as opposed to scientific and technical detail.

Forests Department

From the establishment of the Swan River settlement in 1829 until 1896 all forest related activities in the State were administered by the Lands Department. In 1896 a Woods and Forests section was created within the Lands Department with Mr J Ednie-Brown as Conservator. Mr Brown was succeeded by Mr C G Richardson in 1899. It was not until 1916 and the appointment of Mr C E Lane-Poole as Conservator that scientific principles in management and silviculture were brought into practice. The formation of the Department dates from the passing of the Forests Act in 1918 - the first permanent State Forests were dedicated, the first working plans for management were drawn up and regeneration measures in the cutover jarrah forest were initiated.

Fire control was commenced and a Forests Products Laboratory was set up at Crawley in 1921 to study problems of utilization. Unfortunately this laboratory lasted only a few years before it was transferred to Melbourne. The laboratory had, however, made headway in the growth of research into problems of utilization, seasoning, kiln drying, manufacture of paper pulp and tannin extract, establishment of specifications and grading rules and cooperation with Commonwealth authorities. In 1933 a second side of research, that of inquiry into problems of management, silviculture and nutrition in indigenous forest and plantations of exotics came into prominence. A comprehensive program of investigations entailing extensive field trials with statistical analyses of results was begun. Substantial research into fire weather forecasting and fire hazards commenced at Dwellingup in the mid 1930s. The outbreak of war in 1939 halted any continued active development. For many years after the war shortage of staff prevented the appointment of Research Officers and consequently work was limited to those studies made by officers in the course of their ordinary duties.

The main fields covered by investigation during the later years of the 1940's were various phases of pine afforestation and the growth of jarrah utilization. Experiments were conducted with nursery sterilization and combinations of fertilizers. A research station was set up at Dwellingup in 1948 for the study of jarrah growth. This was staffed by workers from the Forests Department and the Commonwealth Forestry Bureau. 1953 saw the establishment of the Pine Research Centre at Gnangara. Fundamental studies were also commenced on the effects of fire on growth.

By 1955 two senior and three junior officers were engaged almost wholly on research. The Perth section of the Research Branch, which for some years had operated from the then Native Affairs

Department in Wellington Street, moved to the Treasury Buildings.

The Perth office of the Research Branch functioned mainly as an extension unit in 1956 giving advice on tree planting, aspects of tree disorders, utilization, forest resources and forestry education. A Research Working Plan register was commenced to facilitate field working and office administration. 1957 saw the first figures indicating the effect of thinning in jarrah regrowth placed on record.

In 1958 research activities were expanded by the appointment of officers to study Jarrah silviculture, and the dry area aboreta. Four full-time and two part-time officers were employed wholly on research related activities. The decade spanning the 1960's saw a major surge of research activity occurring in the southern forest region. A new research laboratory was completed in Manjimup in 1968 and was staffed with three professional officers and ten technical assistants. In 1964 a silviculturist with two assistants operated from Collie investigating Radiata Pine plantation practice. Silviculture and pathology research continued to expand at Dwellingup.

In 1965 a new building was completed in Como. This became the headquarters for research, being titled the Institute for Forest Research and Protection. The nutrition section which originated at Dwellingup in 1948 was then transferred to Como. Chemical and biological laboratories, glasshouses and a seed handling unit were all included in the Como centre. General administration and supervision of the Wanneroo outstation all emanated from the Como laboratory. At this time Como had a staff of five professional officers, eight assistants and a further six assistants stationed at Wanneroo. The number of professional officers engaged wholly in research throughout the Department was twelve. In the late 1970s research into fauna and jarrah dieback increased dramatically. Technical staff grew steadily in number to approximately 40 by 1980.

The first Chief of Research Division, Mr G E Brockway, was appointed in 1964. He was followed by Mr W H Eastman in 1966. Dr E R Hopkins was appointed to the position of Chief of Division in 1972. He remained in this office until 1978 when Mr J J Havel was appointed to the position. Mr Havel was in charge in 1985 when the Forests Department amalgamated with the wildlife section of the Department of Fisheries and Wildlife and the National Parks Authority. The growth in numbers of staff involved in forestry research until 1985 is summarized in Figure 1a.

Wildlife Research

Research into wildlife dates back to 1964 when a fauna research unit was set up within the Fisheries Department. A graduate from the University of Montana USA - T L Riggert - was the first Research Officer appointed. Research at this stage was primarily focused on a study of the wetlands of the coastal plain between Perth and Bunbury to determine their value to wild duck populations and to ascertain their role in maintaining those populations. Other research projects being pursued externally included the study of fauna reserves for the purpose of introducing proper management measures; the short-necked tortoise the habitat of which was restricted to a few areas in the Bullsbrook area; and the almost extinct Noisy Scrub Bird. Research on kangaroos commenced in 1967 with the appointment of a graduate cadet research officer and research on habitat management commenced in 1968.

In order to assist the administration of fauna conservation the State was divided into thirteen fauna districts in 1965. As funds became available wardens were stationed in each of the districts.

Staff numbers in research increased in 1968 when another Research Officer (Andrew Burbidge) was appointed along with two more technical officers. By the mid seventies seven full time Research Officers and ten technical staff were engaged wholly on wildlife research. At that time research in the Department was divided into biological survey work, macropods, estuarine wildlife, pesticides, wildlife, and waterfowl research and game management.

By 1971/72 it was realized that accommodation was inadequate and generally unsuitable for the specialized needs of the fauna research branch. The waterfowl research office was located at the Fisheries offices in Ellam Street, Victoria Park and the Reserve Management and Macropod research units were housed in temporary premises at 266 Hay Street, East Perth. As a result of this overcrowding 39 ha at Wanneroo, near Lake Joondalup, were acquired for the

establishment of a new research station to accommodate all areas of fauna research.

The Wildlife Research Centre was completed in August 1973 and officially opened on 6 March 1974 by His Royal Highness, Prince Phillip, Duke of Edinburgh. The Research Centre is situated in a nature reserve, but includes access roads and animal pens. The major part of the reserve is Banksia/Tuart woodland, which is of value to conservation as a sample of the vegetation that grows on the yellow sands towards the western side of the coastal plain.

In 1975 a two year study of the birdlife of the Peel Harvey estuaries was initiated and preliminary studies were carried out to provide background information for a long term fire ecology study.

Dr Riggert, whose work was mainly concentrated on waterfowl and wetland management, resigned during 1977. Work on waterfowl was subsequently taken over by Mr J A K Lane. The position of Research Officer (Flora) to assist in the management of flora in WA was established in 1977. 1976 saw the first of a planned series of plots for a detailed study of post-fire regeneration of vegetation establishment at Two People's Bay Nature Reserve. A preliminary survey of crocodiles in some rivers of the north-west Kimberley was set up during 1977-78. Observational data on Dugongs were also collected during 1977.

1978 saw the number of professional officers engaged in research increase from eight to ten. This was accompanied by an increase in technical staff from 11 to 13. In November 1980 a pilot project - "Atlas of the Western Australian Flora" was launched. Staff numbers declined in 1981 to eight professional and ten technical officers all based at the Wildlife Research Centre, Woodvale. This decline was primarily due to financial constraints

By the 1980s research had been systematically divided into the following sections - Biological Survey, Animal Ecology, Plant Ecology, and Flora Conservation. Staff numbers remained static until 1984 when two new positions - a Computer Systems Officer and a Computer Programmer were created. The growth in numbers of staff involved in fauna (wildlife) research until 1985 is summarized in Figure 1b.

Western Australian Herbarium

Western Australian plant collections dating from the 1890's were originally housed in herbaria within the WA Museum and Department of Agriculture. By 1916 the Forests Department had established a forest herbarium. In 1928 it was decided these three herbaria should be amalgamated to form a single State Herbarium within the Department of Agriculture. This was finally implemented in 1959 and the name changed to the Western Australian Herbarium in 1970. 1928 also saw the appointment of Mr C A Gardner to the position of Government Botanist and Curator of the State Herbarium.

Most of the early herbarium collection was housed in the Old Observatory Building. The collection was moved in 1959 to the Department of Agriculture's main office in South Perth. At this time Bob Royce took over the role of Curator. Royce remained in office until his retirement in 1974. John Green was subsequently appointed Curator in 1975 until his retirement at the end of 1987. In 1970 a specifically designed building was completed on land adjacent to the Department of Agriculture. The growth in numbers of staff at the WA Herbarium until 1988 is summarized in Figure 1c.

The Amalgamation

The Department of Conservation and Land Management was officially created on 22 March 1985 through the amalgamation of the Forests Department, National Parks Authority and the wildlife component of the Department of Fisheries and Wildlife. The amalgamation saw the creation of the Research and Planning Division as part of the Policy Directorate of CALM. An internal reorganization in 1986 led to the formation of a new Division placed within the Operations part of the Department. Research was at this stage divided into two branches - Production and Protection Research and Wildlife Research. Mr Joe Havel was the the first Director of Research and Planning.

On amalgamation the combined staff numbers of the newly formed Research Division were:

	Professional	Technical
Wildlife Research	14	13
Production & Protection Research	22	40
TOTAL	**36**	**53**

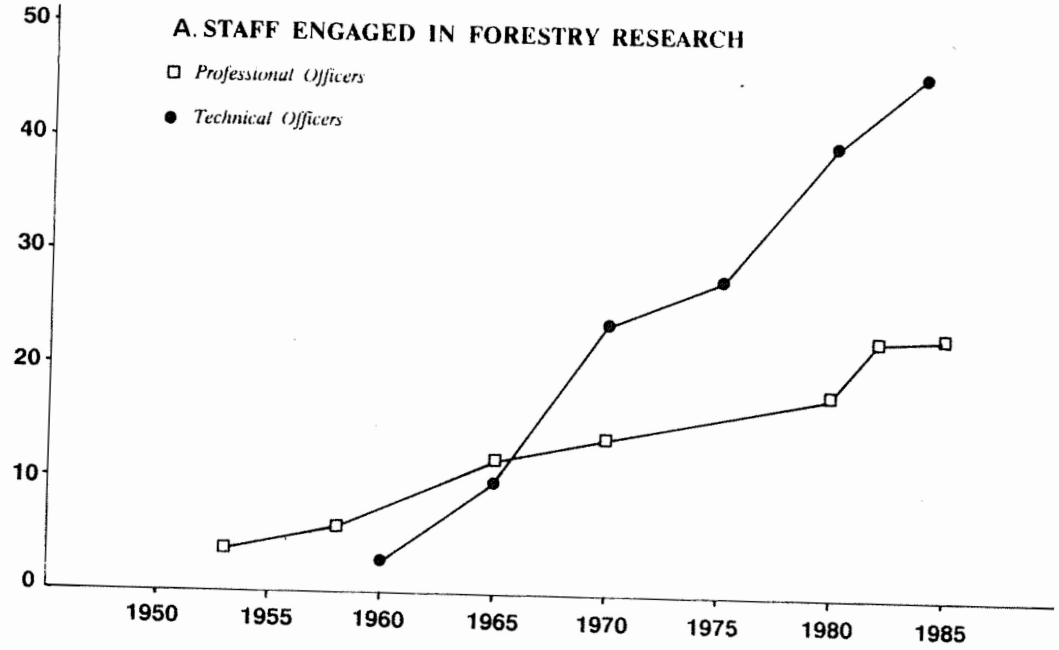
This new unit saw research staff located at five centres - Como, Woodvale, Dwellingup, Busselton and Manjimup. Research Scientists were also located in regional offices at Kalgoorlie and Karratha, and also in CALM offices at Narrogin, Bunbury and Wanneroo.

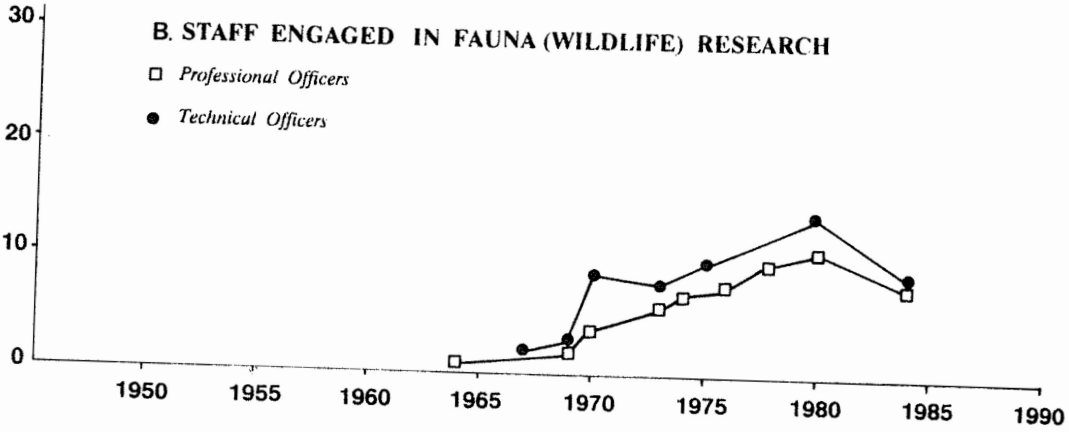
Dr Andrew Burbidge was appointed as Divisional Manager, Research in April 1987. At this time the Research Division was restructured and a 12 program structure was adopted consisting of Biogeography, Fauna Conservation, Fire, Flora Conservation, Jarrah Forest, Karri Forest, Pine, Plant Diseases and Pests, Rehabilitation, Wetlands and Waterbirds, Research Computing, and Executive and Administrative Support. This organization helped create better integration of the two research groups that came together with the formation of CALM.

The program structure was further reviewed in March 1988 (see Part 5) and in July 1988 the following final structure of research programs was adopted: Executive and Administrative Support, Biogeography, Entomology, Fauna Conservation, Fire, Flora Conservation, Plant Diseases, Rehabilitation, Research Computing, Research Methods, Silviculture, Wetlands and Waterbirds and Wood Utilization.

The Division was further expanded in July 1988 when the Western Australian Herbarium was incorporated into the Research Division of CALM. Before this the Herbarium came under the administration of the Department of Agriculture. The Herbarium has been incorporated as a program in itself within the Research Division. This integration added an additional twelve professional officers and five technical officers to the Division.

The growth in numbers of staff involved in forestry research, wildlife research, and WA Herbarium research over the past 20-30 years is summarized in Figure 2.





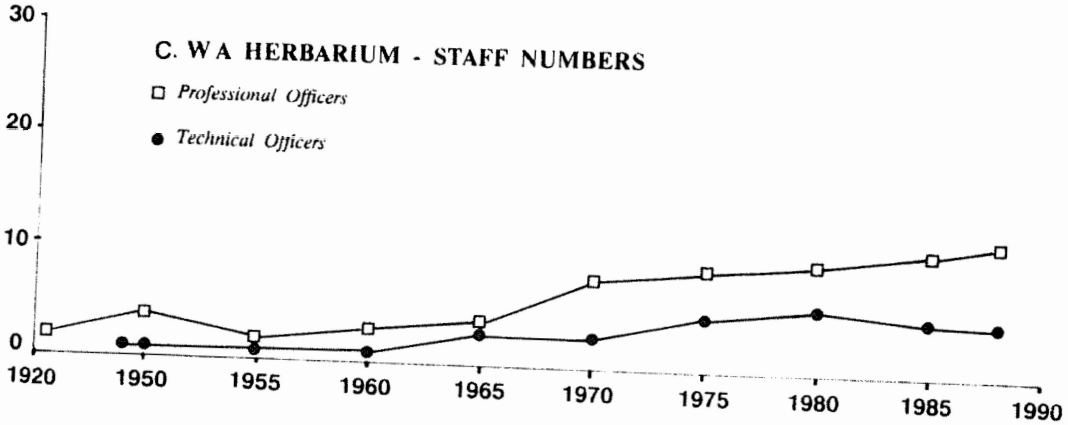


Figure 1
Staff engaged in Forestry Research, Fauna (wildlife) Research and at the WA Herbarium (based on all available information).

R·E·S·E·A·R·C·H D·I·V·I·S·I·O·N

5 YEAR PLAN

JULY 1988

JUNE 1993

Department of Conservation & Land Management