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# KERANG LAKES IRRIGATION AREA

# AGRICULTURAL SECTOR STRUCTURE

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All non-urban blocks of land (Registers and Dryland Blocks) within the Kerang Lakes Management Area were classified as forming part of either a recreational, residential or farm enterprise. Farm enterprises were then subdivided on the criteria of their primary activity, the owners' dependence upon the enterprise determined from their expected agricultural income and the nature of any off-farm employment.

The study found that 1406 Registers and 98 Dryland Blocks comprises 1180 enterprises of which 28% were non-agricultural, 20% were partly dependent and 52% dependent upon the farm enterprise for income. The majority of enterprises commanded relatively small land and irrigation water resources. However, the top 10% of enterprises control approximately 50% of the total land area and 40% of the water right.

The author wishes to acknowledge (without implication):

(i) The Kerang Lakes Area Working Group, who are responsible for directing the development of the Kerang Lakes Area Management Plan; and

(ii) The Victorian Government, who are funding the project as part of Salt Action : Joint Action which is part of the overall strategy for salinity management in Victoria.

# KERANG LAKES AREA MANAGEMENT PROJECT

# AGRICULTURAL SECTOR STRUCTURE

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# KERANG LAKES AREA MANAGEMENT PROJECT

## AGRICULTURAL SECTOR STRUCTURE

## 1. OBJECTIVES

The stated objective of the Kerang Lakes Management Plan (Rural Water Commission of Victoria, 1987) is:

> "Having regard to agricultural production, water quality and quantity (including flood mitigation), conservation, heritage and habitat values, recreational and tourism potential, social justice and equity issues, local community needs, and any external constraints, such as effects on down-basin water users, to develop a land and water management plan for the Project Area, such that the greatest nett benefit is gained by the Area's inhabitants and the people of Victoria."

The development of an integrated land and water management plan, for any region, requires the construction of a model relating the rural, urban and recreational sectors of the areas economy. The model is utilised to quantify the magnitude and distribution of nett benefits accruing to the community from the adoption of a particular management strategy.

In order to assess the impact of an extensive, invasive environmental constraint, such as salinity, on a rural based regional economy, it is imperative that the relative importance of agriculture within that economy be determined.

A data base relating land ownership to agricultural production within the Kerang Lakes Area was developed with the objectives of defining the agricultural sector structure and collating data for subsequent use within a regional economic model. This paper reports the results of the first of these objectives, namely the agricultural sector structure analysis.

## 2. SOURCES OF DATA

To accurately determine the structure of an agricultural sector in any location is complex. For an area as geographically and agriculturally diverse as the Kerang Lakes region, the task becomes demanding.

To be tenable, development of a structural model requires precise knowledge of the ownership, use and income sources for each distinguishable block of agricultural land within the region. This information is not currently

available (from published sources) for the Kerang Lakes Area in the required detail.

Assistance was sought from the Rural Water Commission of Victoria Water Bailiffs located at Swan Hill, Kerang and Cohuna. Bailiffs were informed of the research objectives, then interviewed to acquire the necessary data from their detailed knowledge of individual landholders within a respective Bailiff Sector (Figure 1). Assistance was also sought from local officers of the Victorian Department of Agriculture and Rural Affairs to provide similar data for dryland landholders.

In conjunction with the existing Register of Lands (Rural Water Commission of Victoria, 1989) and irrigated culture records, this information enabled classification of every block within the Study Area into the defined Agricultural Sector Structure (Figure 2).

## 3. DEFINITIONS

### 3.1 REGISTER NUMBER

A Register Number is the Rural Water Commission's entry number associated with a specific block of land, with a particular water right, within a given Bailiff Section.

### 3.2 DRYLAND BLOCK

A Dryland Block is a specific land area without a current water right. Such blocks may be managed independently or in conjunction with Register Numbers.

### 3.3 ENTERPRISE

To facilitate subsequent analysis, the Australian Standard Industrial Classification (Australian Bureau of Statistics 1984) enterprise definition is utilised. Within the context of this study, therefore, an Enterprise is a set of owned Register Numbers and/or Dryland Blocks (from 1 to n) that are operated as a single legal entity. For interpretational purposes, an Enterprise can be considered approximately equivalent to a household. Three types of enterprise are defined:

> Farm Enterprise: A Register Number or Dryland Block forms part (or all) of a Farm enterprise if it is used principally to produce agricultural products for sale. Enterprises within this category are further classified on the basis of their dependence upon agriculture for income.

FIGURE 1

# KERANG LAKES AREA MANAGEMENT PROJECT

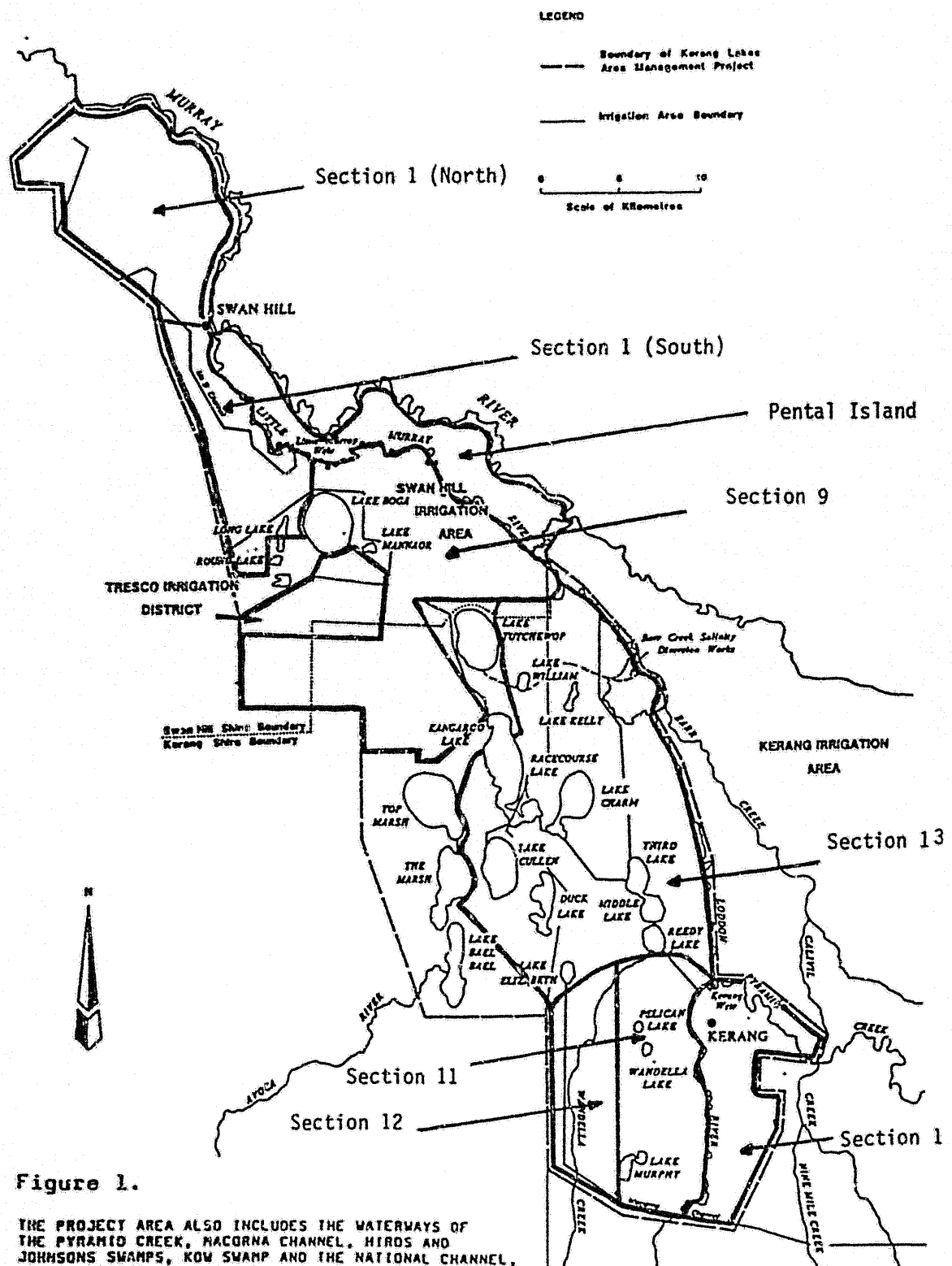
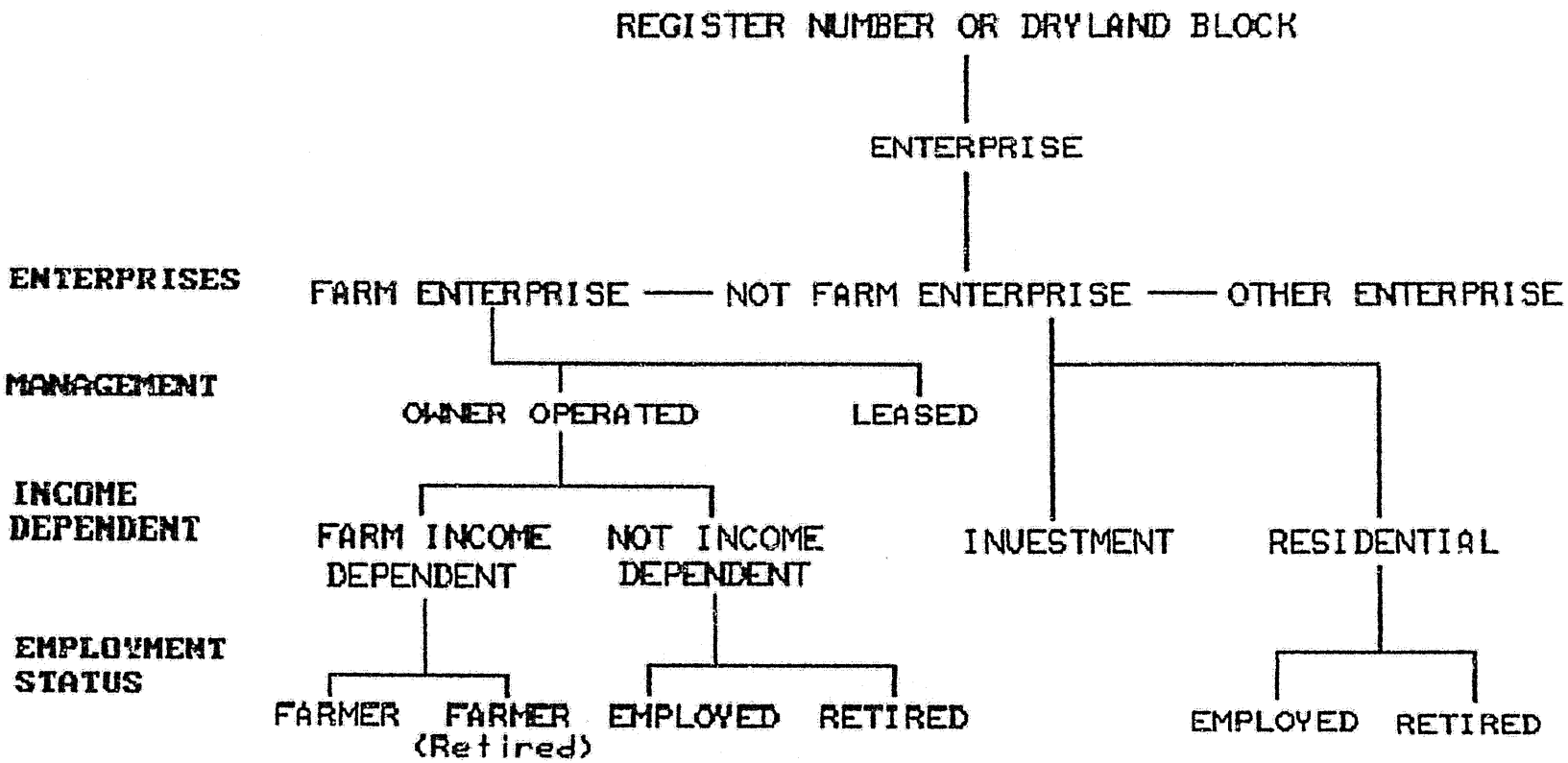



**Figure 1.**

THE PROJECT AREA ALSO INCLUDES THE WATERWAYS OF THE PYRAMID CREEK, MACORNA CHANNEL, HIRDS AND JOHNSONS SWAMPS, KOW SWAMP AND THE NATIONAL CHANNEL.

# FIGURE 2: AGRICULTURAL SECTOR STRUCTURE



Because actual income data was not available, classification of dependence on farm income was (necessarily) subjectively based upon the resources utilised by the enterprise (land, water), the likely profitability of agricultural activities conducted (e.g. dairy, lucerne, horticulture), the nature of the external employment (full-time or part- time) and the potential income from external employment.

Examples of enterprise classification are presented in Table 1.

**TABLE 1: CLASSIFICATION OF INCOME DEPENDENCE OF FARM ENTERPRISES** [1]

| Enterprise | Area (Ha) | Water Right (ML) | Water Use (ML) | Employment Status | Farm Activity | Farm Income Dependence |
|---|---|---|---|---|---|---|
| 1 | 8 | 42 | 43 | FT Labourer | Beef | Not Dep. |
| 2 | 19 | 104 | 194 | FT Driver | Sheep | Not Dep. |
| 3 | 32 | 135 | 287 | PT Labourer | Sheep | Dependent |
| 4 | 60 | 291 | 517 | Nil | Beef | Dependent |
| 5 | 128 | 538 | 710 | FT Florist | Dairy | Dependent |

Enterprises 1 and 2 are considered Not Dependent on farm income as external income is likely to exceed agricultural income. Enterprise 3 is classified Dependent on farm income because of intensive resource use for the sheep activity, and likely low external income. Enterprises 4 and 5 are considered Dependent as resource use is adequate for the farm activities, and the off-farm component of household income is clearly supplementary.

Due to the volatility of agricultural production and prices such classification is not always simple. However, where reliance upon agriculture was uncertain, enterprises were always classified Farm Income Dependent.

> Not-Farm Enterprise: A Register Number or Dryland Block forms part (or all) of a Not-Farm enterprise if it is used primarily for residential purposes, or is potentially productive but not utilised (investment).

1. From primary data base

Other Enterprise: A Register Number or Dryland Block forms part (or all) of an Other enterprise if it is used principally for community, social or non-agricultural business purposes (e.g. recreation reserves, sporting clubs and caravan parks).

## 3.4 MANAGEMENT STATUS

Two forms of management are defined for Farm enterprises:

Owner Operated: A Register Number or Dryland Block is Owner Operated if it is managed by members of the Farm enterprise or their employees. For interpretational purposes, an enterprise member would commonly be the owner, his or her spouse and dependents.

Leased: A Register Number or Dryland Block is leased if it is managed by person(s) external to the Farm enterprise. Registers and blocks may be leased because the owner is unable to effectively utilise allocated resources due to employment commitments, age or current location. Leased Registers could be expected to be managed in conjunction with a separate farm enterprise (e.g. as a dry run for a dairy) but, at this point, are not considered to constitute part of that particular enterprise.

## 3.5 EMPLOYMENT STATUS

The employment status of an enterprise member is defined as either:

Employed: A member is Employed if he or she earns income from any position (full or part-time) external to a non farm income dependent enterprise.

Retired: A member is Retired if he or she has reached 60 years of age or is prevented from employment by incapacity.

Farmer: A member is a Farmer if he or she is employed within a farm income dependent Farm enterprise. This classification incorporates those members who also earn some income from an external position.

Farmer (Retired): A relatively small number of farm income dependent enterprise members are retired. Such persons may well receive income from external sources (e.g. superannuation, social security). However, to be so classified, members were

(conservatively) considered dependent upon the farm enterprise for their livelihood.

It should be noted that Bailiffs and officers provided information under the guarantee of confidentiality. Responsibility for classification of a particular Register Number or Dryland Block, however, rests with the consultant.

## 4. RESULTS

Register Numbers were initially classified as forming part of either a "Dairy and Other" or a "Horticultural" enterprise. Such differentiation was justified on the basis of the different forms of land use, the effective restriction of horticulture to specific locations within the study area and the distinctly different social groupings within the horticultural community (Chamberlain 1988).

Dryland Blocks were initially classified as forming part of either a 'Dryland' or 'Dairy and Other' enterprise.

### 4.1 DAIRY AND OTHER ENTERPRISES

#### 4.1.1 Agricultural Sector Structure

Classification of Dairy and Other Register Numbers within the defined Agricultural Sector Structure for Bailiff Sections 1 (North), 1 (South), 9, 10, 11, 12, 13, Pental Island and Pyramid Creek is presented in summary form in Tables 2 and 3.

#### 4.1.2 Resource Use

The allocation of limited productive resources within an agricultural sector warrants examination in order to provide an additional perspective to sector structure. To this end, distributions relating to Dairy and Other enterprise area and water right/use are depicted in Graphs 1 and 2.

### 4.2 HORTICULTURAL ENTERPRISES

#### 4.2.1 Agricultural Sector Structure

Classification of Horticultural Register Numbers within the defined Agricultural Sector Structure for Bailiff Sections 1 (North), Woorinen, 1 (South), 9, Tresco, 13 and Pental Island is presented in summary form in Tables 4 and 5.

# TABLE 2: DAIRY AND OTHER ENTERPRISES SUMMARY CLASSIFICATION BY UNIT

| CLASSIFICATION | Registers (Number) | Enterprises[1] (Number) | Area (Ha) | Water Right (ML) | Water Use[2] (ML) |
|---|---|---|---|---|---|
| OTHER | 31 | 24 | 552.9 | 1490.5 | 1601.2 |
| NOT FARM | | | | | |
| INVESTMENT | 42 | 33 | 1268.9 | 2288.1 | 1315.6 |
| RESIDENTIAL | | | | | |
| RETIRED | 32 | 32 | 133.0 | 631.0 | 589.6 |
| EMPLOYED | 151 | 141 | 942.6 | 4407.7 | 3674.2 |
| TOTAL | 225 | 206 | 2344.5 | 7326.8 | 5579.4 |
| FARM | | | | | |
| NOT FARM DEPENDENT | 109 | 99 | 3589.0 | 11608.0 | 15315.6 |
| FARM DEPENDENT | | | | | |
| FARMER (RETIRED) | 39 | 33 | 966.4 | 3216.0 | 4410.4 |
| FARMER | 492 | 352 | 55024.0 | 102280.8 | 136499.4 |
| LEASED | 75 | 64 | 4257.7 | 9351.0 | 11554.4 |
| TOTAL | 715 | 548 | 63837.1 | 126455.8 | 167779.8 |
| TOTAL | 971 | 778 | 66734.5 | 135273.1 | 174960.4 |

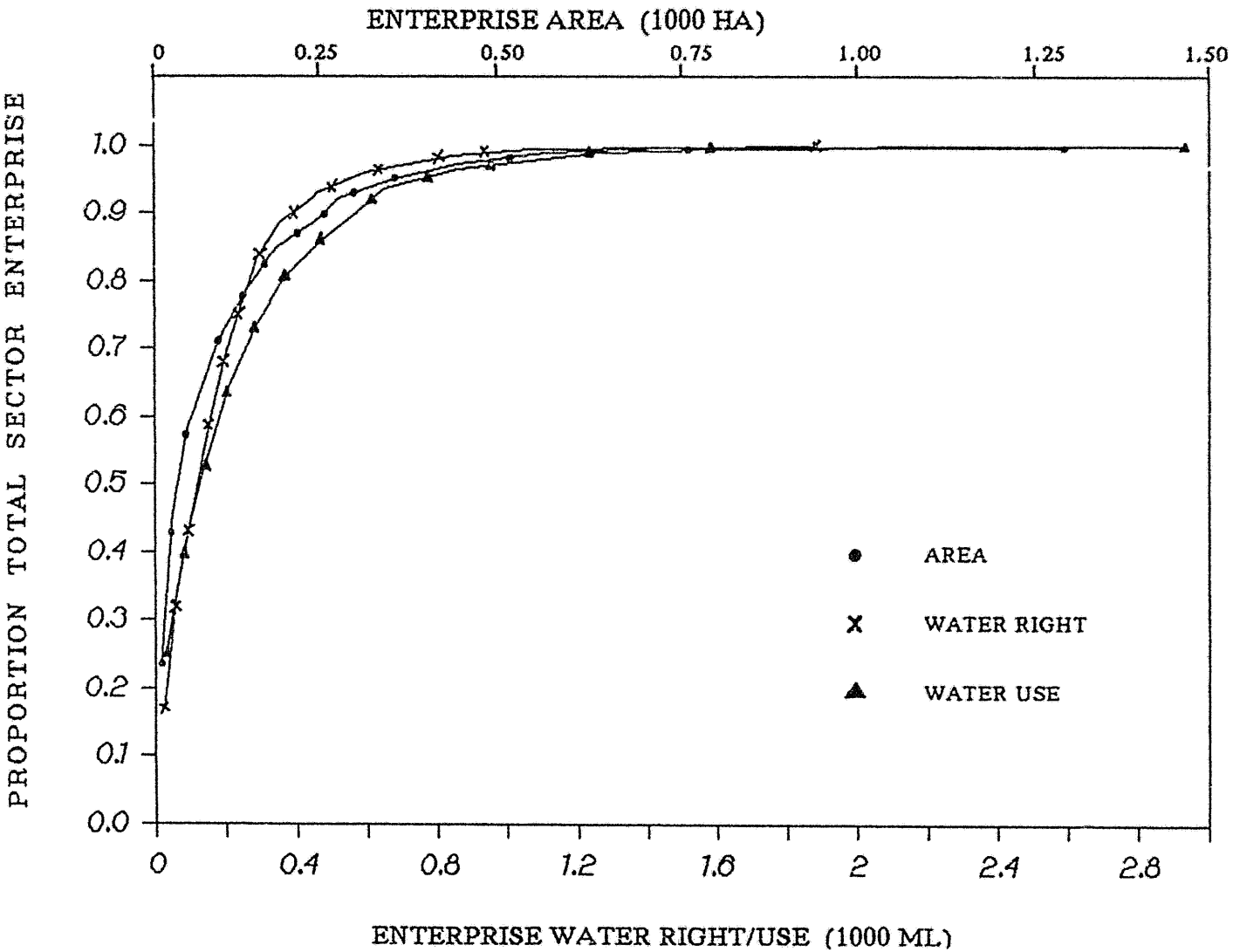
1. Adjusted for enterprises with Register Numbers in more than one Baliff Section
2. 1987/88 Season.

# TABLE 3: DAIRY AND OTHER ENTERPRISES SUMMARY CLASSIFICATION BY PERCENTAGE

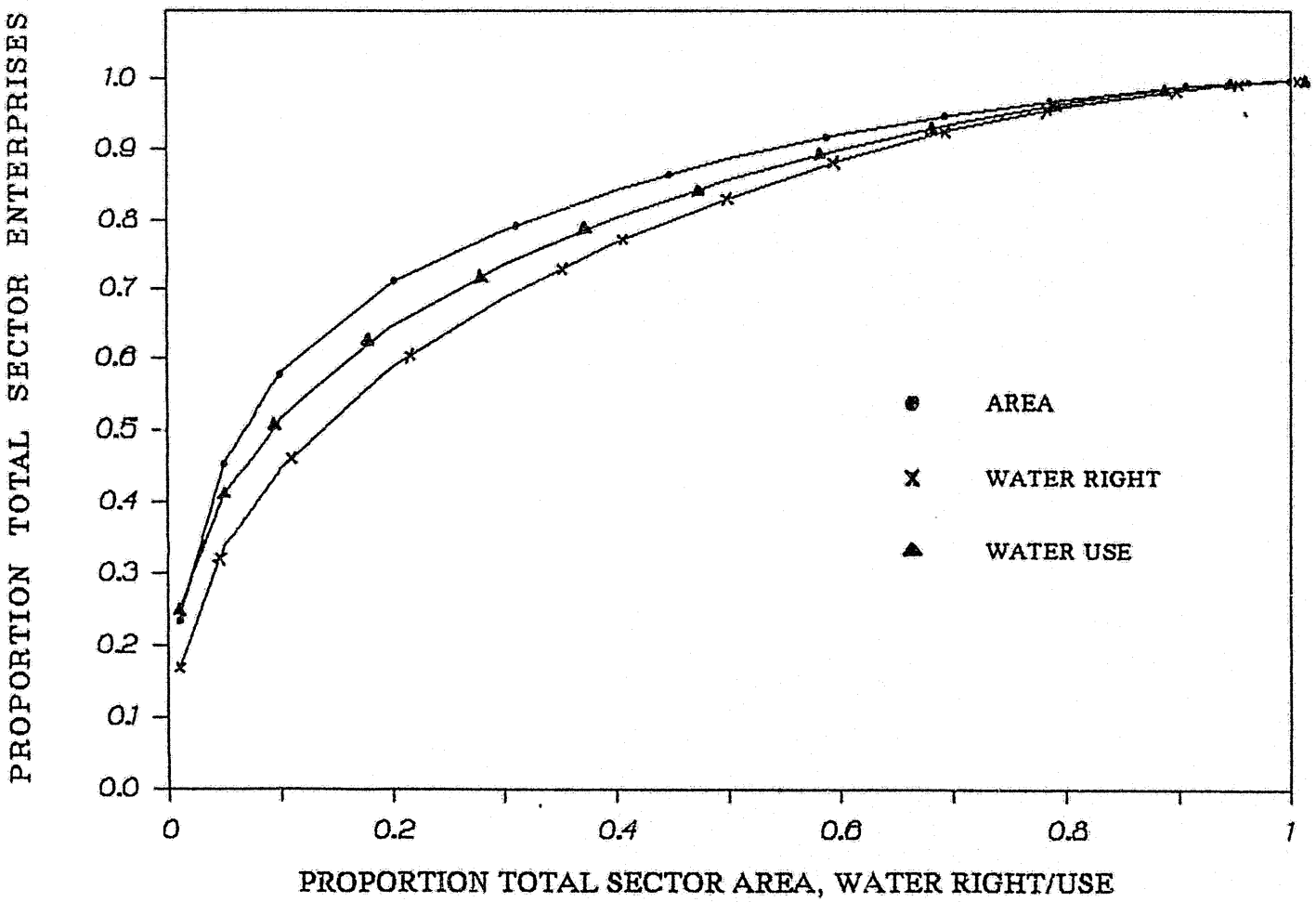
| CLASSIFICATION | Registers (Number) | Enterprises[1] (Number) | Area (Ha) | Water Right (ML) | Water Use[2] (ML) |
|---|---|---|---|---|---|
| OTHER | 3.2 | 3.1 | 1.0 | 1.1 | 0.9 |
| NOT FARM | | | | | |
| INVESTMENT | 4.3 | 4.2 | 1.8 | 1.7 | 0.7 |
| RESIDENTIAL | | | | | |
| RETIRED | 3.3 | 4.1 | 0.2 | 0.5 | 0.3 |
| EMPLOYED | 15.6 | 18.2 | 1.4 | 3.3 | 2.1 |
| TOTAL | 23.2 | 26.5 | 3.4 | 5.5 | 3.1 |
| FARM | | | | | |
| NOT FARM DEPENDENT | 11.2 | 12.7 | 5.4 | 8.6 | 8.8 |
| FARM DEPENDENT | | | | | |
| FARMER (RETIRED) | 4.0 | 4.2 | 1.4 | 2.4 | 2.5 |
| FARMER | 50.7 | 45.3 | 82.4 | 75.5 | 78.1 |
| LEASED | 7.7 | 8.2 | 6.4 | 6.9 | 6.6 |
| TOTAL | 73.6 | 70.4 | 95.6 | 93.4 | 96.0 |
| TOTAL | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

1. Adjusted for enterprises with Register Numbers in more than one Bailiff Section.
2. 1987/88 Season.

GRAPH 1: DISTRIBUTION BY AREA, WATER RIGHT/USE FOR DAIRY AND OTHER ENTERPRISES



GRAPH 2: RELATIONSHIP BETWEEN PROPORTION OF DAIRY AND OTHER ENTERPRISES AND PROPORTION OF TOTAL SECTOR AREA, WATER RIGHT/USE COMMANDED.



### 4.2.2 Resource Use

Distributions pertaining to Horticultural enterprise area are depicted in Graphs 3 and 4.

## 4.3 DRYLAND ENTERPRISES

### 4.3.1 Agricultural Sector Structure

All defined Dryland Blocks are located in Bailiff Section 13. They are primarily elevated lunettes (areas surrounding Lake Kangaroo, Lake Charm and Lake Tutchewop) or areas adjacent to the Marshes.

Classification of Dryland Blocks within the defined Agricultural Sector Structure for the Kerang Lakes Area is presented in Tables 6 and 7.

# 5. DISCUSSION

## 5.1 OVERVIEW

Within the Kerang Lakes area there are 1406 Register Numbers and 98 Dryland Blocks which constitute 1180 enterprises. Of these, 778 (66.0%) are classified Dairy and Other Enterprises, 360 (30.5%) are classified Horticultural Enterprises and the remaining 42 (3.5%) are classified Dryland Enterprises.

The productive resources commanded by enterprises within the study area are substantial - a defined area of 81,204.1 ha, total water right of 159,919.6 ML and total water use of 193,619.7 ML (1987/88). The distribution of such resources between and within sectors, however, is not proportional to the number of component enterprises. As might be expected from the nature of the agricultural activities, the Dairy and Other Sector accounts for the majority of area (82.2%), water right (84.6%) and water use (90.4%), whilst the Horticultural Sector's requirements (6.6, 15.4 and 9.6% respectively) are more modest. Dryland enterprises occupy 9137.0 ha or 11.2% of total area.

Within the Dairy and Other Sector, Other enterprises constitute a small proportion (3.2%) of total enterprises, with nominal resource utilisation. Not-Farm enterprises represent a significant proportion (26.5%) of total enterprises, however, associated resources are minor. Farm enterprises constitute the major proportion (70.4%) of total enterprises, with Farm Income Dependent enterprises the most significant single category: 49.7% of total enterprises, and, incorporating leased Register Numbers, account for approximately 90% of area, 85% of water right and 87% of water use within the sector. **Investigation reveals that 33% of all Dairy and Other enterprises are apparently wholly dependent on agriculture for income.**

# TABLE 4: HORTICULTURAL ENTERPRISES[1] SUMMARY : CLASSIFICATION BY UNIT

| CLASSIFICATION | Registers (Number) | Enterprises (Number) | Area (Ha) | Water Right (ML) | Water Use[2] (ML) |
|---|---|---|---|---|---|
| OTHER | 3 | 3 | 12.4 | 18.5 | 5.0 |
| NOT FARM | | | | | |
| INVESTMENT | 13 | 11 | 101.8 | 466.3 | 78.6 |
| RESIDENTIAL | | | | | |
| RETIRED | 16 | 15 | 87.7 | 470.0 | 281.0 |
| EMPLOYED | 61 | 58 | 452.2 | 2232.0 | 1179.2 |
| TOTAL | 90 | 84 | 641.7 | 3168.5 | 1338.8 |
| FARM | | | | | |
| NOT FARM DEPENDENT | 43 | 42 | 489.2 | 2344.4 | 1906.5 |
| FARM DEPENDENT | | | | | |
| FARMER (RETIRED) | 265 | 199 | 3834.8 | 17266.3 | 14331.9 |
| FARMER | 9 | 8 | 95.3 | 532.0 | 342.1 |
| LEASED | 25 | 24 | 261.2 | 1316.8 | 535.0 |
| TOTAL | 342 | 273 | 4680.5 | 21454.5 | 17115.5 |
| TOTAL | 435 | 360 | 5334.6 | 24646.5 | 18659.3 |

1. Adjusted for Enterprises with register numbers in more than 1 Bailiff Section.

2. 1987/88 Season.

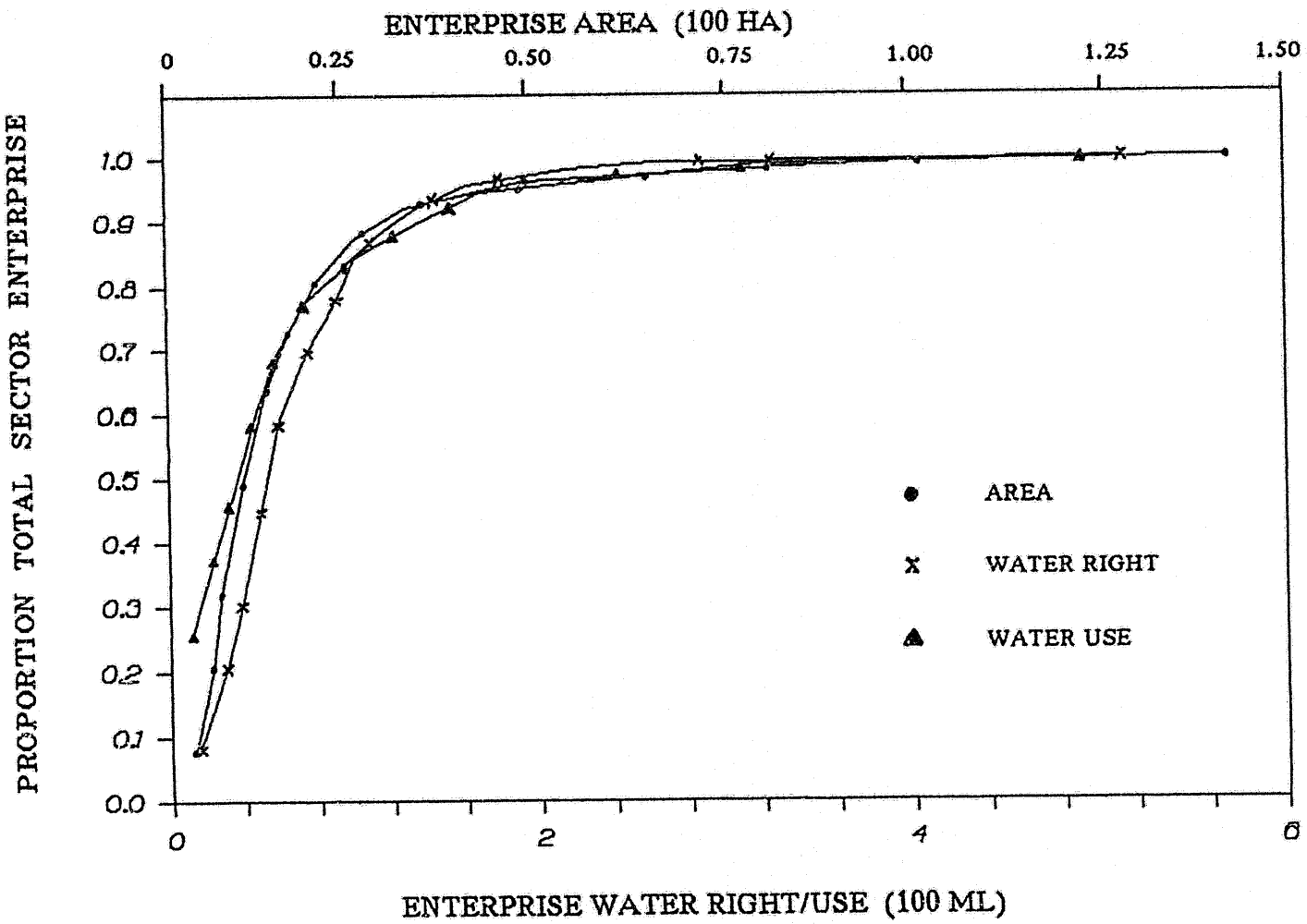
# TABLE 5: HORTICULTURAL ENTERPRISES[1] SUMMARY : CLASSIFICATION BY PERCENTAGE

| CLASSIFICATION | Registers (Number) | Enterprises (Number) | Area (Ha) | Water Right (ML) | Water Use[2] (ML) |
|---|---|---|---|---|---|
| OTHER | 0.7 | 0.8 | 0.2 | 0.1 | 0.0 |
| NOT FARM | | | | | |
| INVESTMENT | 3.0 | 3.1 | 1.9 | 1.9 | 0.4 |
| RESIDENTIAL | | | | | |
| RETIRED | 3.7 | 4.2 | 1.7 | 1.9 | 1.5 |
| EMPLOYED | 14.0 | 16.1 | 8.5 | 9.1 | 6.3 |
| TOTAL | 20.7 | 23.4 | 12.1 | 12.9 | 8.2 |
| FARM | | | | | |
| NOT FARM DEPENDENT | 9.9 | 11.7 | 9.2 | 9.5 | 10.3 |
| FARM DEPENDENT | | | | | |
| FARMER (RETIRED) | 60.9 | 55.2 | 71.8 | 70.1 | 76.8 |
| FARMER | 2.1 | 2.2 | 1.8 | 2.2 | 1.8 |
| LEASED | 5.7 | 6.7 | 4.9 | 5.3 | 2.9 |
| TOTAL | 78.6 | 75.8 | 87.7 | 87.1 | 91.8 |
| TOTAL | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

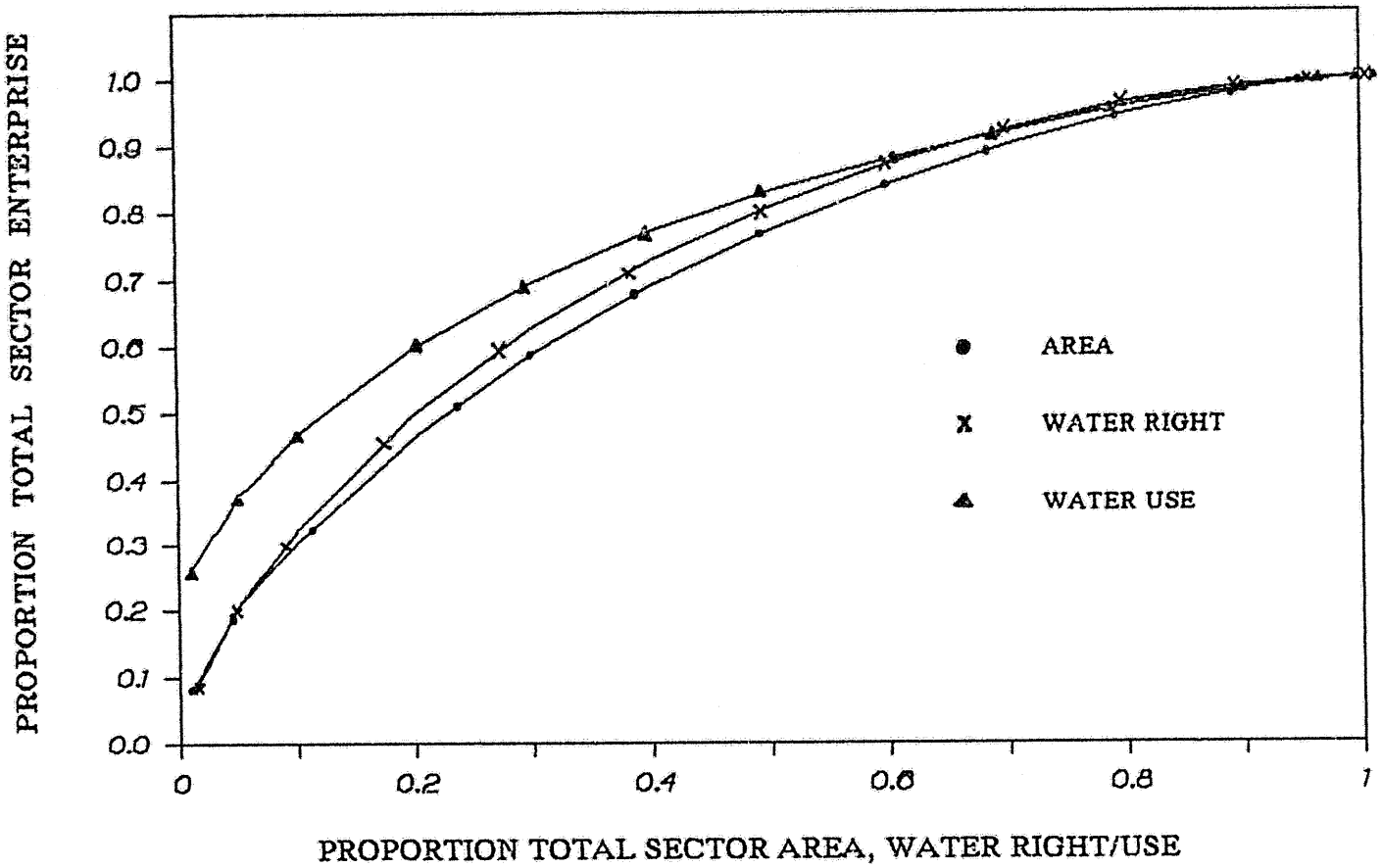
1. Adjusted for enterprises with Register Numbers in more than 1 Bailiff Section.
2. 1987/88 Season.

GRAPH 3: DISTRIBUTION BY AREA, WATER RIGHT/USE FOR HORTICULTURAL ENTERPRISES.





GRAPH 4: RELATIONSHIP BETWEEN PROPORTION OF HORTICULTURAL ENTERPRISES AND PROPORTION OF TOTAL SECTOR AREA, WATER RIGHT/USE COMMANDED.



# TABLE 6: DRYLAND ENTERPRISES SUMMARY : CLASSIFICATION BY UNIT

| CLASSIFICATION | Dryland Blocks (Number) | Enterprises (Number) | Area[2] (Ha) |
|---|---|---|---|
| OTHER | 1 | 1 | 2.0 |
| NOT FARM | | | |
| INVESTMENT | 18 | 12 | 25.2 |
| RESIDENTIAL | 4 | 4 | 15.2 |
| TOTAL | 22 | 16 | 40.4 |
| FARM | | | |
| NOT FARM DEPENDENT | 3 | 3 | 136.9 |
| FARM DEPENDENT | | | |
| FARMER | 57 | 22 | 6533.4 |
| FARMER (Dairy & Other)[1] | 15 | (15) | 2424.3 |
| TOTAL | 75 | 25 | 9094.6 |
| TOTAL | 98 | 42 | 9137.0 |

1. Dryland Blocks owned by Dairy and Other Enterprises (Maximum 15) within the Study Area

2. 1987/88 Season.

# TABLE 7: DRYLAND ENTERPRISES SUMMARY : CLASSIFICATION BY PERCENTAGE

| CLASSIFICATION | Dryland Blocks (Number) | Enterprises (Number) | Area[2] (Ha) |
|---|---|---|---|
| OTHER | 1.0 | 2.4 | 0.0 |
| NOT FARM | | | |
| INVESTMENT | 18.4 | 28.5 | 0.3 |
| RESIDENTIAL | 4.1 | 9.6 | 0.1 |
| TOTAL | 22.5 | 38.1 | 0.4 |
| FARM | | | |
| NOT FARM DEPENDENT | 3.1 | 7.1 | 1.5 |
| FARM DEPENDENT | | | |
| FARMER | 58.2 | 52.4 | 71.5 |
| FARMER (Dairy & Other)[1] | 15.2 | ----- | 26.5 |
| TOTAL | 76.5 | 59.5 | 99.6 |
| TOTAL | 100.0 | 100.0 | 100.0 |

1. Dryland Blocks owned by Dairy and Other Enterprises (Maximum 15) within the Study Area

2. 1987/88 Season.

Distributions of resource utilisation within the Dairy and Other sector indicate that many farm enterprises are small (46% have area less than 25 ha), command low volumes of water (46% have water right less than 100 ML) and utilise small quantities of water (44% have water use less than 100 ML). Though numerous, such enterprises account for only minor proportions of total resources: approximately 5% of area and 10% of water right/water use. **Conversely, the 10% of Dairy and Other enterprises with highest resource utilisation account for a substantial proportion of total sector resources: approximately 47% of area and 40% of water right/water use.**

Within the Horticultural sector Other enterprises comprise a nominal proportion (0.8%) of total enterprises with negligible resource utilisation. Not Farm enterprises constitute a significant proportion (23.4%) of total enterprises, though resource use is relatively minor. Farm enterprises represent the major proportion (75.8%) of total enterprises. Again, Farm Income Dependent enterprises are the most significant single enterprise category: 57.4% of total enterprises, and incorporating leased Register Numbers, utilising approximately 78% of area, 77% of water right and 81% of water use. **Investigation reveals that 44% of all Horticultural enterprises are apparently solely dependent upon agriculture for income.**

Distributions of resource utilisation within the Horticultural sector indicates that many enterprises are small (48% have area less than 10 ha), access low volumes of water (48% have water right less than 50 ML) and utilise even smaller quantities of water (63% have water use less than 50 ML). Though common, these enterprises account for relatively minor proportions of total resources: approximately 20% of area and water right and 10% of water use. **In contrast, the 10% of Horticultural enterprises with highest resource utilisation again account for a substantial proportion of total sector resources: approximately 35% of area, 30% of water right and 35% of water use.**

Comparison of the results for the component sectors indicates a similar partitioning of enterprises between the other, Not-Farm and Farm components. However, a higher proportion (57.4%) of Horticultural enterprises are classified Farm Income Dependent than Dryland (52.4%) or Dairy and Other enterprises (49.5%). **Most importantly, analysis of this data indicates that within the Kerang Lakes Area approximately 35% of all irrigated enterprises depend entirely upon agriculture for income.**

## 5.2 DAIRY AND OTHER ENTERPRISES

### 5.2.1 Agricultural Sector Structure

**Other Enterprises**

Other enterprises constitute a small proportion of total enterprises (3.2%). Similarly total area (1%), water right (1.1%) and water use (0.9%) are trivial.

Examination of the primary data reveals that such land is used primarily for commercial purposes (17 Register Numbers), though agricultural, sporting and educational uses also occur (6, 6 and 2 Register Numbers respectively). The majority of these enterprises, as might be expected, are located in Bailiff Sections adjacent to Swan Hill.

**Not-Farm Enterprises**

Not-Farm enterprises comprise a significant proportion of total enterprises (26.5%). However, somewhat surprisingly, they constitute only a modicum of total area (3.4%), water right (5.5%) and water use (3.1%).

Residential enterprises compose the majority of this classification (173 enterprises), with one or more members employed externally (141 enterprises). The bulk of these enterprises, as employment requirements would dictate, are found in Bailiff Sections surrounding Swan Hill.

**Farm Enterprises**

Farm enterprises constitute the major proportion of total enterprises (70.4%) within the Dairy and Other sector. Significantly, they also dominate total area (95.6%), water right (93.4%) and water use (96.0%).

Not-Farm Income Dependent enterprises represent 12.7% of total enterprises, but only utilise 5.42% of the total area, 8.6% of water right and 8.8% of water use. Inspection of Tables 1 to 8 indicates that these enterprises are most numerous in the Bailiff Sections adjacent to Swan Hill. Average enterprise area and water right ranges from 21.2 ha and 96.5 ML (Section 1 North) to 218.1 ha and 515.5 ML (Pental Island).

Farm Income Dependent enterprises represent 49.5% of total enterprises, but notably, utilise 83.8% of the total area, 77.9% of water right and 80.6% of water use. This is clearly the single most significant enterprise category within the Dairy and Other sector. Examination of Bailiff Section data reveals that average enterprise resource use varies substantially within the Study Area. Such variation is a reflection of the lands current

productivity. For example, Farm Income Dependent enterprises in Bailiff Section 1 (North) have an average area of 45.6 ha, water right of 164.5 ML and water use of 256.6 ML, whilst the average area of such enterprises in Bailiff Section 13 is 264.9 ha with water right of 317.1 ML and water use of 404.0 ML.

Examination of the primary data reveals that of the 352 Farmer Farm Income Dependent enterprises, 68 (19.3%) had members employed externally in a full-time capacity (44 males, 24 females); a further 26 (7%) had members employed externally in a part-time capacity (18 males, 8 females). **Therefore 258 (73.3%) of such enterprises, or 33.2% of all enterprises within the Dairy and Other Sector, are apparently wholly dependent on agriculture for income.**

Lease enterprises account for a relatively minor, though significant, proportion of total enterprises (8.2%). Similarly, total area (6.4%), water right (6.9%) and water use (6.6%) are relatively small.

### 5.2.2 Resource Use

#### Enterprise Area

Dairy and Other enterprises range in area from 0.4 to 1330.0 ha. The majority of such enterprises are relatively small: 46% are less than 25 ha and 73% are less than 100 ha (Graph 1). Though large in number, small enterprises occupy only a nominal proportion of total sector area. Ranking enterprises by increasing area indicates that the bottom 50% account for only 6% of the area; 75% account for 25% of the area (Graph 2). Therefore, the relatively few large enterprises which currently exist occupy the majority of the area. Indeed, the top 10% (78 enterprises) account for 47% of the total area.

#### Enterprise Water Right

Water rights for Dairy and Other enterprises range from 0.0 to 1882 ML. A large proportion of such enterprises have relatively meagre water rights: 46% are less than 100 ML and 79% are less than 250 ML (Graph 1). The proportion of total sector water rights commanded by such enterprises is also small: the bottom 50% account for 13% of the water right; and 75% account for 38% of the water right (Graph 2). Again, the relatively few large enterprises dominate the resource. Notably, the top 10% (78 enterprises) account for 37% of the total water right.

**Enterprise Water Use**

Water usage (1987/88 season) by the Dairy and Other enterprises ranged from 0.0 to 2930.0 ML. Most enterprises did not apply a large volume of water: 44% used less than 100 ML and 69% used less than 250 ML. Examination of Graph 1 indicates that water use exceeded water right across the spectrum of enterprises, with the relative difference increasing with water right. Overall, many enterprises do not use a large volume of water: the bottom 50% utilise 9% of the water; 75% only apply 32% of the water (Graph 2). However, large enterprises are substantial users with the top 10% (78 enterprises) accounting for 40% of total water use.

## 5.3 HORTICULTURAL ENTERPRISES

### 5.3.1 Agricultural Sector Structure

**Other Enterprises**

Other enterprises comprise only a very small proportion of total enterprises (0.8%). Total area (0.2%), water right (0.1%) and water use (less than 0.1%) are comparably nominal.

Examination of the primary data reveals that such land is used for commercial, agricultural and sporting purposes (5, 1 and 1 Register Numbers respectively). These enterprises are distributed throughout the Kerang Lakes Area.

**Non-Farm Enterprises**

Not-Farm enterprises constitute an important proportion of total enterprises (23.4%). However, the level of resources commanded is significantly lower: total area (12.1%), water right (12.9%) and water use (8.2%).

Residential enterprises comprise the majority of the classification (73 enterprises), with one or more members employed externally (58 enterprises)

As might be expected, the greater number of such enterprises are located in the horticultural centres of Woorinen and Tresco.

**Farm Enterprises**

Farm enterprises embody the major proportion of total enterprises (75.8%) within the Horticultural sector. Notably, they also control total area (87.7%), water right (87.1%) and water use (91.8%).

Not-Farm Income Dependent enterprises represent 11.7% of total enterprises and account for 9.2% of total area, 9.5% of water right and 10.3% of water use. Examination of Bailiff Section data reveals that these enterprises are found predominantly in Bailiff Section 1 (North) and Woorinen, doubtless to access employment in Swan Hill. There appears to be little variation in average resource usage with the study area.

Farm Income Dependent enterprises constitute 57.4% of total enterprises but, significantly, utilise 73.6% of the total area, 72.3% of water right and 78.6% of water use. This is manifestly the most important single enterprise category within the Horticultural sector. Inspection of the primary data indicates that average enterprise resource use varies substantially within the Kerang Lakes area. However, it should be noted that enterprises classified Horticultural may not necessarily pursue such activities over the entire available area. Comparison of enterprises within district horticultural districts is, therefore, more appropriate. Farm Income Dependent enterprises in Tresco, for example, have an average area of 17.3 ha, water right of 72.8 ML and water use of 56.7 ML, whilst the average area of such enterprises in Woorinen is 16.6 ha, with water right of 94.5 ML and water use of 84.2 ML.

Examination of the primary data base reveals that of the 199 Farmer Farm Income Dependent enterprises, 27 (13.6%) had members employed externally in a full-time capacity (12 males, 13 females); a further 14 (7.1%) had members employed externally in a part-time capacity (13 males, 1 female). **Therefore, 157 (79.3%) of such enterprises, or 43.7% of all enterprises within the Horticultural sector, are apparently wholly dependent upon agriculture for income.**

Leased enterprises comprise only a minor proportion of total enterprises (6.7%). Similarly, total area (4.9%), water right (5.3%) and water use (2.9%) are negligible.

### 5.3.2 Resource Use

**Enterprise Area**

Horticultural enterprises range in area from 0.4 to 142.4 ha. A substantial proportion of such enterprises are relatively small: 48% are less than 10 ha and 80% are less than 20 ha (Graph 3). These small enterprises occupy only a minor segment of total sector: the bottom 50% account of 20% of the area; 75% account for 43% of the area (Graph 4). In a similar fashion to Dairy and Other enterprises, a few large horticultural enterprises occupy the majority of the area. Notably, the top 10% (36 enterprises) account for 35% of the total area.

**Enterprise Water Right**

Water Rights for Horticultural enterprises range from 0.0 to 484.9 ML. A large proportion of these enterprises enjoy relatively superficial water rights: 48% are less than 50 ML and 70% are less than 75 ML (Graph 3). The proportion of total sector water rights commanded by these enterprises is also small: the bottom 50% account for 23% of the water right; 75% account for 47% of the water right (Graph 4). Again, the relatively few large enterprises monopolise the resource. In fact, the top 10% (36 enterprises) account for 30% of the total water right.

**Enterprise Water Use**

Water utilisation (1987/88 season) by Horticultural enterprises ranged from 0.0 to 513 ML. Most enterprises were not large water users: 63% applied less than 50 ML and 77% applied less than 75 ML. Examination of Graph 3 reveals, somewhat surprisingly, that water use was below water right across the range of enterprises. In total, the bulk of enterprises utilise a small proportion of the sector water: the bottom 50% apply 12% of the water; 75% utilise 37% of the water (Graph 4). It should be noted that large enterprises are prodigious users with the top 10% (36 enterprises) accounting for 35% of total water use.

## 5.4 DRYLAND ENTERPRISES

### 5.4.1 Agricultural Sector Structure

Somewhat surprisingly, 'Other and Not Farm enterprises comprise 41.4% of all Dryland enterprises. This is primarily attributable to the large number of residential blocks, apparently held for investment, adjacent to Lake Kangaroo. However, these enterprises only occupy less than 0.5% of the total Dryland area.

Farm enterprises comprise 59.5% of all Dryland enterprises. The majority of these are considered Farm Income Dependent. Examination of the primary data base reveals that 15 dryland blocks (totalling 1686 ha) are owned by and form part of Dairy and Other enterprises within the study area. Such blocks are recorded here because they do not possess separate water rights and are utilised solely for dryland agriculture.

# 6. CONCLUSIONS

The results of the research reported above have important ramifications for the development and implementation of a land and water management plan for the Kerang Lakes Area.

Factors warranting recognition include:

**Sector Structure**

(a) The 1406 Register Numbers and 98 Dryland Blocks within the study area constitute only 1180 enterprises. Therefore, approximately 1180 households own agricultural land within the region.

(b) Of these enterprises approximately (28%) are not directly involved in agricultural production; (20%) are partly dependent upon agriculture; and (52%) are considered dependent upon agriculture for income. However, within this last category 95 enterprises (15%) had members who were employed externally in a full-time capacity and a further 40 enterprises (7%) had members employed externally in a part-time capacity. Therefore, the direct reliance upon agriculture by landowners is less than is likely to be perceived upon initial inspection of the district.

**Resource Use**

(a) The majority of enterprises individually command relatively small quantities of available land and water resources. Therefore, the nature of agricultural activities which may be (rationally) undertaken by farmers must be carefully considered.

(b) The majority of enterprises when combined utilise only a small proportion of the total productive resources available. Conversely, larger enterprises are prodigious users of resources. This has policy ramifications for the pricing of water resources and practical implications for the targeting of extension services, particularly in relation to land management practices.

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