4. USE OF CLASSIFICATION SYSTEM

Two sequential procedures are involved in using the classification system: categorisation of the data; and, recording of the categorisation. Use of the primary and/or secondary classification structures is controlled by the decision making process, data scale, and classification purpose.

4.1 The decision making process

The interpretation of remotely sensed imagery or of ground covers at a reef site involves the following four steps;

- detection of features,
- recognition and identification of features,
- analysis and delineation of patterns,
- and classification.

A decision regarding the detectability of a feature is made in step one. Decisions regarding the precise identification and delineation of a feature are made in steps two and three. These two are the principal decision-making steps, and involve a combination of nomenclature decisions and general classification concepts. The first three steps are iterative until a final nomenclature decision is reached. A feature is named using the nomenclature presented in Kuchler (1986a). In the final step, the decision is categorised and labelled according to the classification system and then recorded.

4.2 Recording classified data

A critical component in using the classification system is the method of recording. The method, specifically outlined later, ensures that:

- the original pre-classification information can be retrieved

- the recording is efficient and compact, even though it may be lengthy at times

The method is systematic and consistent, and is built on the following five rules:

- The recording follows a matrix array in which 5 x 49 entries are the maximum. The 5 columns represent the five classification levels, and 49 rows represent the maximum number of multiple selections possible within any particular level.

- Each classification level occupies a unique and sequential place in a five column matrix array:

  Level I occupies column 1, the first position in any row in the matrix.

  Level II occupies column 2 and the second position.

  Level III occupies column 3 and the third position.

  Level IV occupies column 4 and the fourth position.

  Level V occupies column 5 and the fifth position.

- All multiple coding selections from any level are recorded in their respective column positions in any row in the matrix.

- With the obvious exception of Level I, the recording for any level must be preceded by a recording for each previous level. For example, a Level II record is preceded by a Level I record; and a Level IV record is preceded by records in columns 1 to 3 (Levels I, II, III). Such a system allows the classification levels to which the labels refer to be sequentially deduced from a matrix array.

- Since Levels I and II classify data at broader scales, an efficient and compact recording results, if all the categories in Levels I and II are considered before selecting categories from other levels.

For example, an 'aligned coral zone' would be inefficiently classified and bulkily recorded in the following classification:

LEVEL I	LEVEL II	LEVEL III	LEVEL IV
19-Outer Rf Flat	N-Level not used	23-Coral	10-Aligned Pn

which in the recording system is represented as **19N2310.**

A more efficient and compact recording would be;

Level I
19-Outer Rf Flat
23-Aligned coral Z

which, in the recording system is represented as 19
23

4.3 Use of primary categorising structure

Use of the primary categorising structure follows the rules outlined earlier and is detailed here. Classifying data into the primary structure involves selecting <u>one</u> category from one or more of the five levels. The category labels are recorded from left to right and sequentially for each level. Thus, the first row of the matrix is formed. A series of examples illustrate its use.

<u>Use of a single level</u>

<u>Example 4.1</u> Use of Level I only: category 26 - Seagrass zone
record as 26

<u>Example 4.2</u> Use of Level II only: category 5 - Slope
record as **N5**
(N = Level I unused)

<u>Example 4.3</u> Use of Level III only: category 37 - Ponded water
record as **NN37**
(NN = Levels I and II unused)

Use of multiple levels

Example 4.4 The use of five levels to classify a seagrass zone heavily covered by live seagrass.

Level I:	category 26 - Seagrass zone record as 26
Level II:	category N - level unused record as **26N**
Level III:	category 22 - Seagrass record as **26N22**
Level IV:	category 7 - live state record as **26N227**
Level V:	category 31 - heavy cover record as **26N22731**

Retrieval of original information from classified data record

Using the record **26N22731** from the preceeding example.

Always retrieve from left to right, from first to last row, and one row at a time.

The first numeral is 2. Since 2 is not a unit value but a tens value in the labelling system, the numeric value for column one is 26. Column one is used for Level I in which 26 represents Seagrass zone.

In the second column (Level II), the character N indicates no category was recorded.

For the third column (Level III), the first numeral 2 is not a unit value in the labelling system. Therefore, the category number is 22, which in Level III indicates Seagrass.

The first numeral in column four is 7, which is a numeric label in the system. Category 7 in Level IV indicates a Live state.

Three is the first numeral in column five. Since 3 is a tens value in the labelling system, the category is 31. In Level V, 31 indicates a Heavy cover.

Thus the classified information is a seagrass zone heavily covered by live seagrass.

4.4 Use of secondary categorising structure

Use of the secondary categorising structure is conceptually the same as for the primary structure, except the multiple categories can be recorded for each classification level. When the secondary structure is used for one level only, the labels of the multiple categories are simply listed vertically as in the following examples:

Use of a single level

Example 4.5 A site on the top of the outer reef flat which exhibits living coral may be coded, using only Level I categories, as:

17-Reef top
19-Outer reef flat
21-Living coral zone

and recorded as: 17
19
21

Example 4.6 A site displaying no Level I attributes, but which may be classified into several Level II categories; in this case, an unvegetated sloping beach; could be coded as:

5-Slope
30-Beach
37-Unvegetated

and recorded as: N5
N30
N37
(N indicating that Level I was unused)

Use of multiple levels

When the secondary structure is used for more than one level in the classification system, its method of use can be conceptualised as a series of layered primary structures which form additional rows in the recording matrix array. The following rules apply:

- Always begin to classify and record from left to right, from Level I to V.

- Always complete the primary classification structure for a category before recording another from the secondary structure.

- For Levels I to IV, always record one category from the secondary classification structure at a time.

- For Level V, record as many categories as is necessary from the secondary structure at a time.

- When more than one Level V category is recorded, complete the primary classification structure for each category, by repeating the Level I to IV entries.

- The primary structure relating to the Level V categories must be complete before another category from Levels I to IV is recorded.

In operation, the following sequence occurs:

Step 1. Make one recording from Level I.
Step 2. Complete the primary classification by recording one category from Levels II, III and IV.
Step 3. Make one or more recordings for Level V.
Step 4. If more than one category is recorded for Level V, repeat the Level I to IV recordings for each category.
Step 5. Reiterate Steps 1 to 4 until all multiple selections for each level have been recorded.

The following examples will illustrate its use:

Use of multiple levels

Example 4.7

Description of sample site:
Seagrass zone - 80% live seagrass
- patch of 20% medium grain sand
- ponded water 0.25 m deep

Classify as:

LEVEL I	LEVEL II	LEVEL III	LEVEL IV	LEVEL V
26-Seagrass zone		22-Seagrass	7-live state	12-80%
26-Seagrass zone	26-Sand patch	26-Sand	27-medium grain	7-20%
26-Seagrass zone		37-Ponded water		15-<0.5m

Record as: **26N22712**
262626277
26N37N15

Example 4.8

Description of sample site:
Seagrass zone - 80% live seagrass
- 20% sand

Classify as:

LEVEL I	LEVEL II	LEVEL III	LEVEL IV	LEVEL V
26-Seagrass zone		22-Seagrass	7-Live state	12-80%
26-Seagrass zone		26-Sand		7-20%

Record as: **26N22712**
26N26N7

Example 4.9

Description of sample site:
Seagrass zone - 100% seagrass covered by 0.25 m water

Classify as:

LEVEL I	LEVEL II	LEVEL III	LEVEL IV	LEVEL V
26-Seagrass zone		22-Seagrass		14-100%
				15-<0.5 m

Record as: **26N22N14**
26N22N15

To retrieve original information from the classified data record, always retrieve left to right, from first to last row, and one row at a time.

Row 1

Column 1 = Level I
Category 26 = Seagrass zone
(2 is not a unit value)
Column 2 = Level II
Category N = Level unused
Column 3 = Level III
Category 22 = Seagrass
Column 4 = Level IV
Category N = Level unused
Column 5 = Level V
Category 14 = 100% cover

Row 2

Columns 1 to 4 (Levels I to IV) same as Row 1
Column 5 = Level V
Category 15 = <0.5 m

Example 4.10

Description of sample site:

Reef rim	- Rubble bank with algal encrustation
	- Coral head with no living coral
Outer reef flat	- Shingle 50%
	- Sand 50%
	- Windward

Classify as:

LEVEL I	LEVEL II	LEVEL III	LEVEL IV	LEVEL V
15-Reef rim	18-Bank	24-Rubble		
15-Reef rim		21-Algal encrust		
15-Reef rim	9-Coral head	8-Dead state		
19-Outer rf flat		25-Shingle		9-50%
19-Outer rf flat		26-Sand		9-50%
19-Outer rf flat		12-Windward		

Record as:

151824NN	or shortened to	**151824**
15N21NN		**15N21**
1598NN		**1598**
19N25N9		**19N25N9**
19N26N9		**19N26N9**
19N12NN		**19N12**

To retrieve original information from this classified data record, retrieve left to right, from first to last row, and one row at a time.

Row 1

Column 1 = Level I
Category 15 = Reef rim
(1 is not a unit value)

Column 2 = Level II
Category 18 = Bank
(1 is not a unit value)

Column 3 = Level III
Category 24 = Rubble
(2 is not a unit value)

Row 2

Column 1 = Level I
Category 15 = Reef rim
(1 is not a unit value)

Column 2 = Level II
Category N = Level unused

Column 3 = Level III
Category 21 = Algal Encrust
(2 is not a unit value)

Row 3

Column 1 = Level I
Category 15 = Reef rim
(1 is not a unit value)

Column 2 = Level II
Category 9 = Coral head

Column 3 = Level III
Category 8 = dead state

Row 4

Column 1 = Level I
Category 19 = Outer rf flat
(1 is not a unit value)

Column 2 = Level II
Category N = Level unused

Column 3 = Level III
Category 25 = Shingle
(2 is not a unit value)

Column 4 = Level IV
Category N = Level unused

Column 5 = Level V
Category 9 = 40 - 50%

Row 5

Column 1 = Level I
Category 19 = Outer rf flat
(1 is not a unit value)

Column 2 = Level II
Category N = Level unused

Column 3 = Level III
Category 26 = Sand
(2 is not a unit value)

Column 4 = Level IV
Category N = Level unused

Column 5 = Level V
Category 9 = 40 - 50%

Row 6

Column 1 = Level I
Category 19 = Outer rf flat
(1 is not a unit value)

Column 2 = Level II
Category N = Level unused

Column 3 = Level III
Category 12 = Windward
(1 is not a unit value)