internal report **370**

Thoughts and comments on a landscape-wide monitoring program for KNP

Lowry J & Begg G

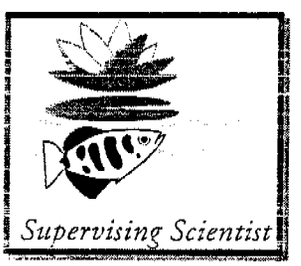
August 2001

supervising scientist

Thoughts and comments on a landscape-wide monitoring programme for KNP

These notes formed the basis of an informal talk presented to ***eriss*** *staff on the 2nd August 2001 in Jabiru. The notes are part of an ongoing internal discussion designed to develop proposals for landscape analysis.*

John Lowry, George Begg



Aim :

To conduct a landscape-wide analysis of the World Heritage values of the Kakadu National Park and, based on these analyses, develop recommendations for a comprehensive monitoring program that should distinguish between impacts due to mining from those due to other causes.

Focus :

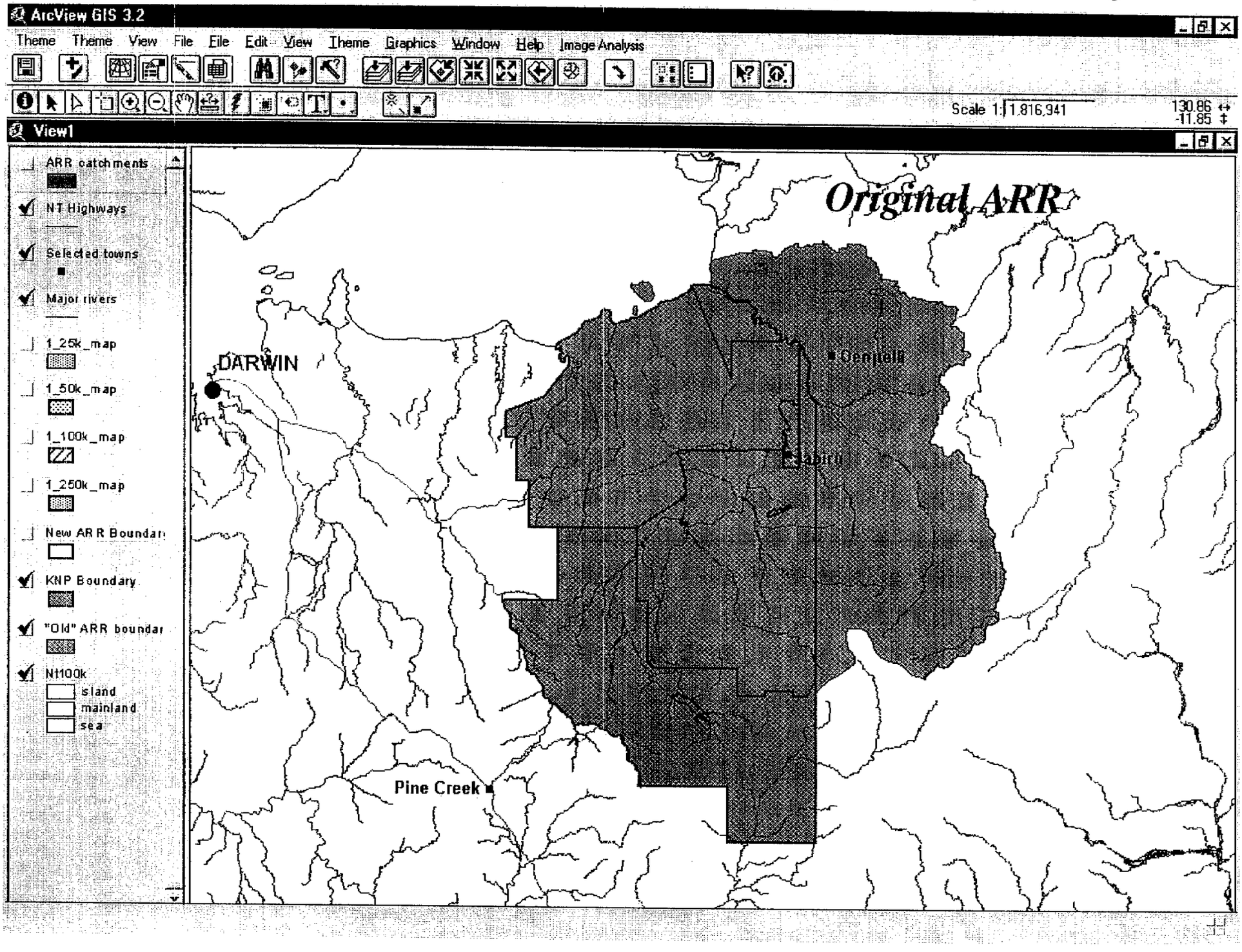
- ★ World Heritage values of Kakadu with specific emphasis on <u>natural</u> values e.g. :
  - ★ Diverse range of landscapes
  - ★ High spatial heterogeneity of habitats
  - ★ High levels of endemism and species diversity
  - ★ Plant assemblages and species of high conservation significance
  - ★ Animal assemblages and species of high conservation significance
  - ★ Etc ..... etc
- ★ State of conservation of each value (status and trend).
- ★ Evidence of change whether this be due to mining or non-mining related "impacts".
- ★ Rare and endangered species.

What *is* the Alligator Rivers Region ??

NOTE : The widely-accepted and understood definition of the Alligator River Region is the area contained within Kakadu National Park combined with the area of the East Alligator River catchment (total area of 29145.46 km^2).

For the purposes of the ISP Landscape Wide Analysis, it is necessary to place Kakadu within the context of the major river catchments that fall partially or wholly within it (the Mary, Wildman, West, South and East Alligator and Katherine Rivers). This results in an area of 40374.1km^2.

Note that this does not include the whole of the Katherine River catchment - only the area immedialy within and surrounding KNP. It is proposed that the area defined by these catchments be referred to as the 'Greater Alligator Rivers Region'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ARR catchments
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Selected towns
Major rivers
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New ARR Boundar
KNP Boundary
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Nt100k
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mainland
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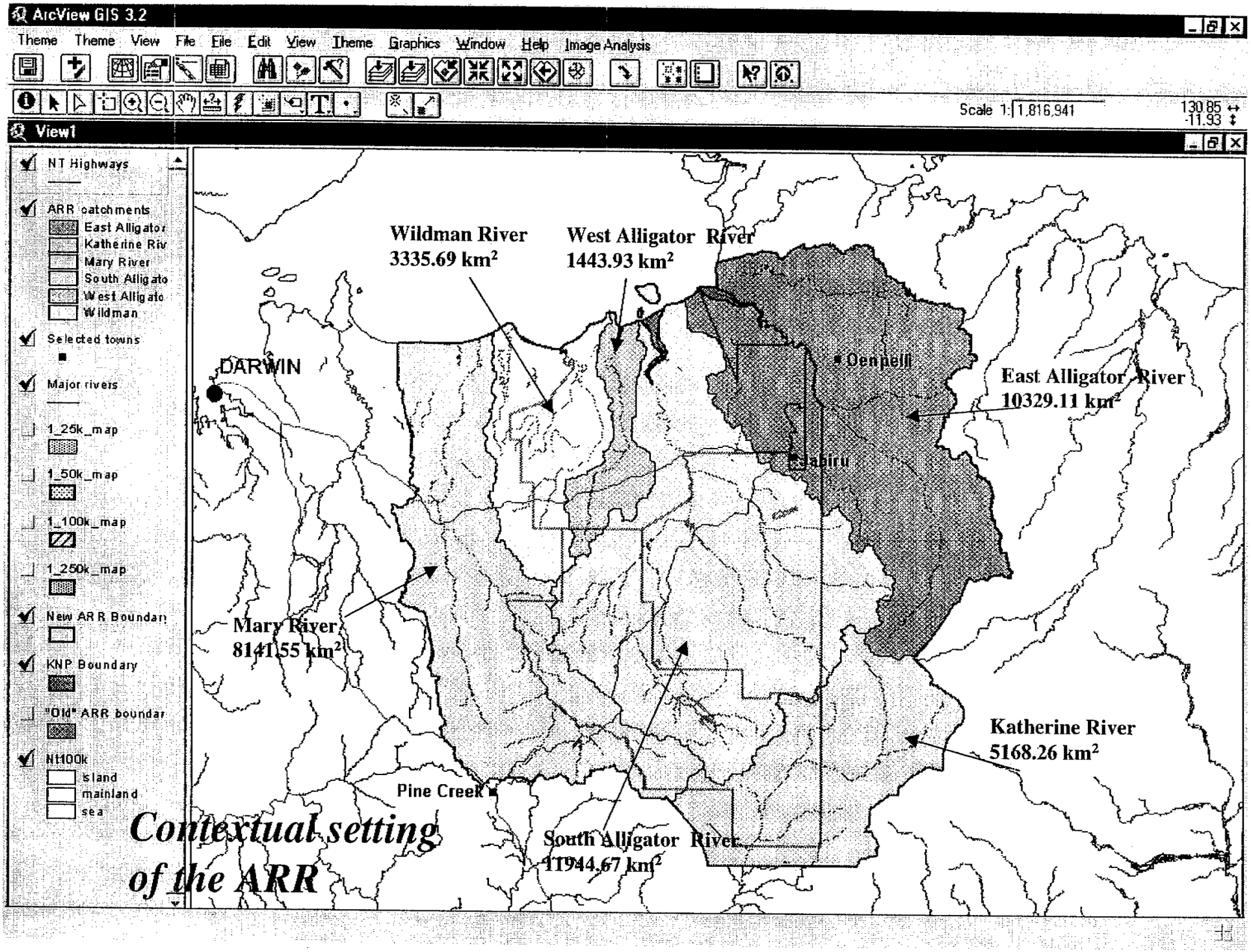
Original ARR
DARWIN
Jabiru
Oenpelli
Pine Creek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KNP Boundary
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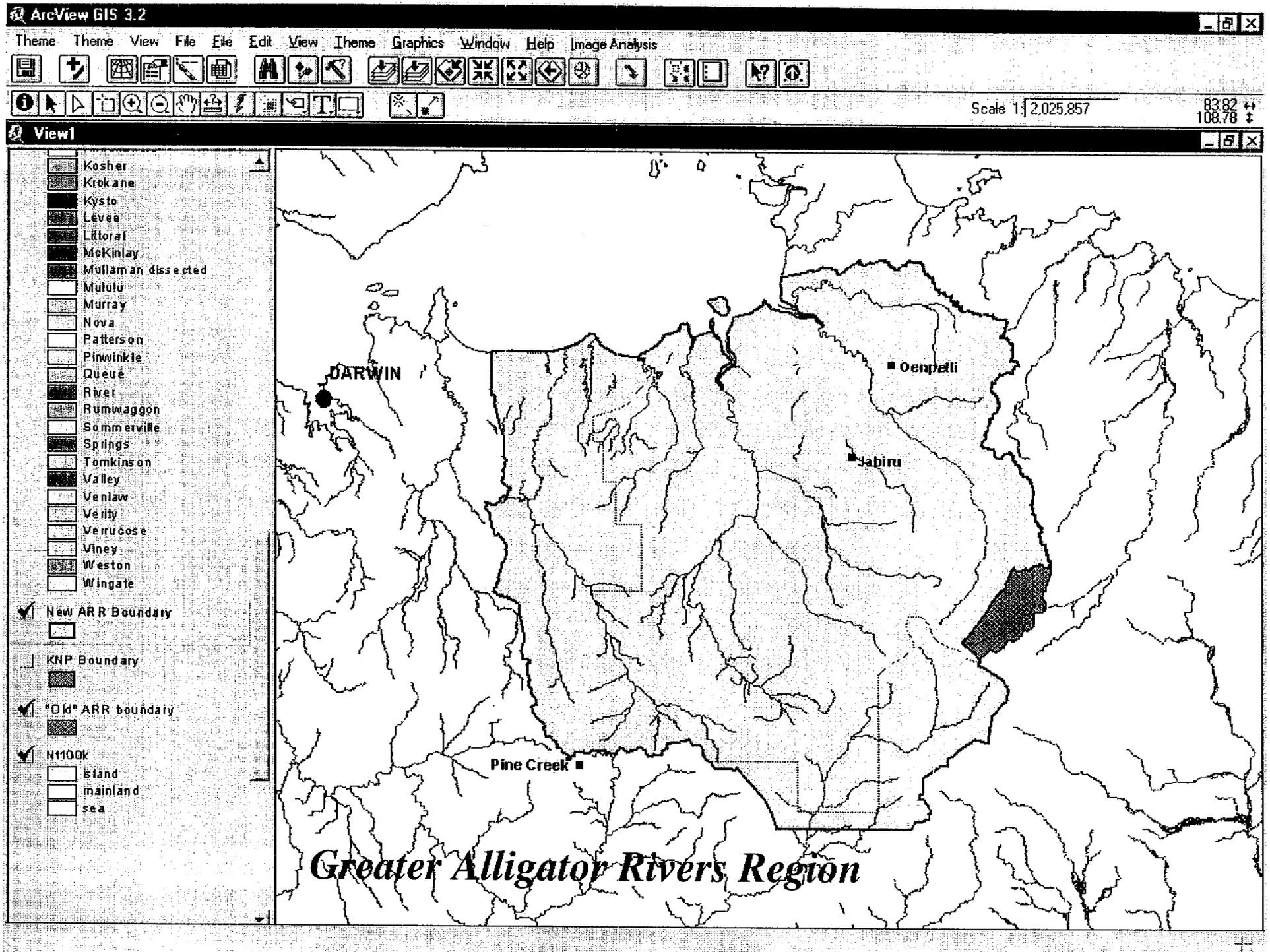
island
mainland
sea
Wildman River
3335.69 km²
West Alligator River
1443.93 km²
DARWIN
Oenpelli
East Alligator River
10329.11 km²
Jabiru
Mary River
8141.55 km²
Katherine River
5168.26 km²
Pine Creek
South Alligator River
11944.67 km²
Contextual setting
of the ARR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Levee
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McKinlay
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Murray
Nova
Patterson
Pinwinkle
Queue
River
Rumwaggon
Sommerville
Springs
Tomkinson
Valley
Venlaw
Verity
Verrucose
Viney
Weston
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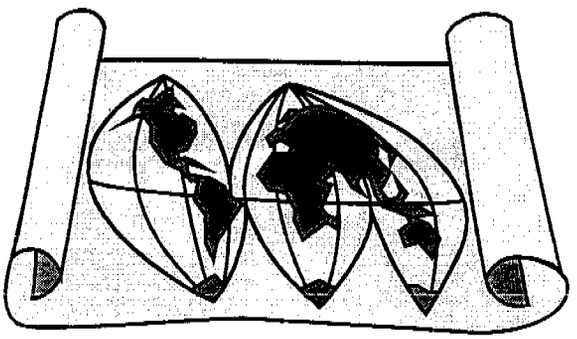
New ARR Boundary
KNP Boundary
"Old" ARR boundary
N1100k
Island
mainland
sea
DARWIN
Oenpelli
Jabiru
Pine Creek
Greater Alligator Rivers Region

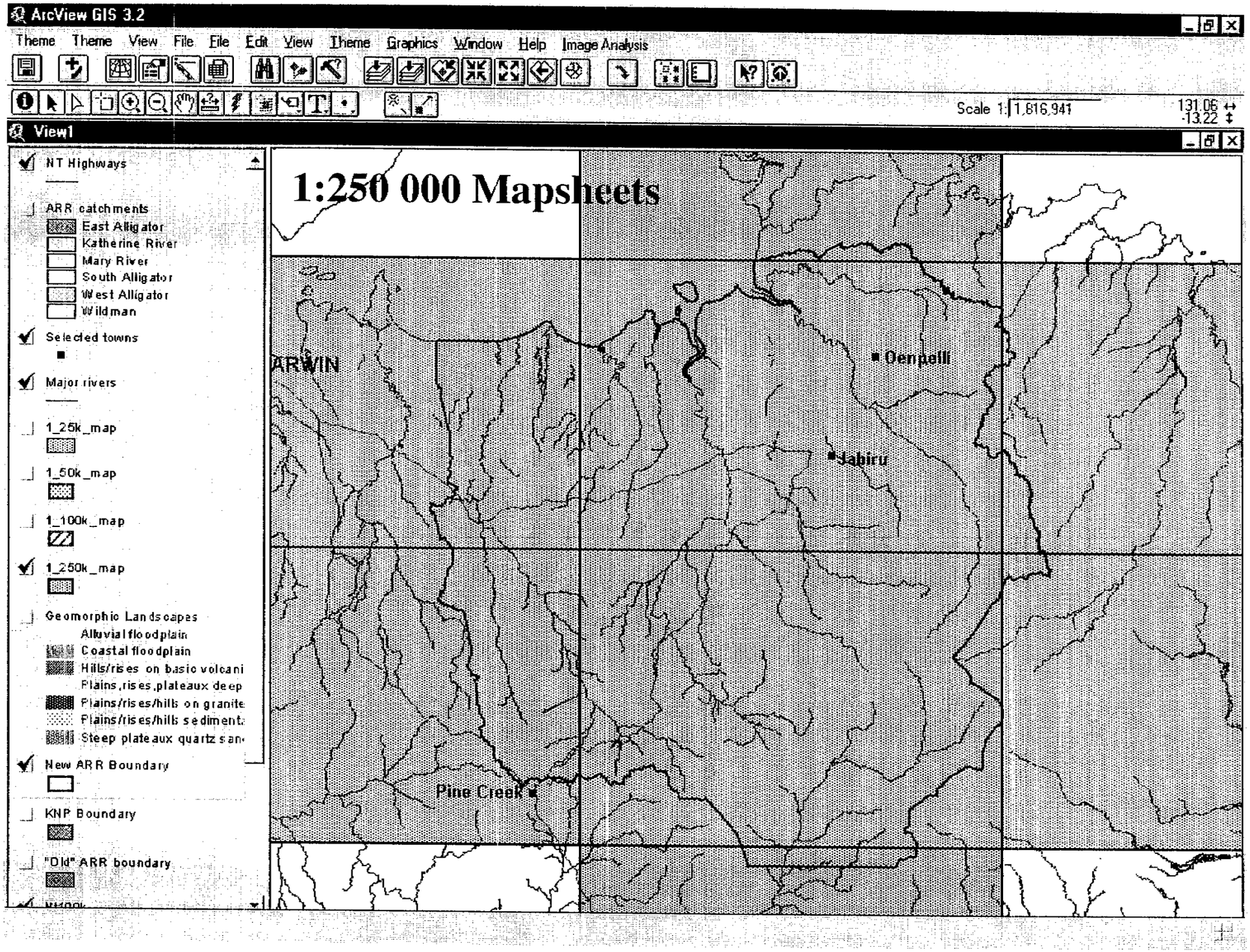
Definition of terms...

- "**Landscape wide**" – extent of the landscape ? - ARR wide? (40 000km^2); KNP wide? (20 000km^2); Magela catchment wide ? (1 600km^2); Swift Creek wide ? (50km^2)
- **"Landscape"** (includes terrestrial, aquatic and cultural components?)
- "**Ecosystems**" (systems which commonly include numerous habitats and biotic communities functioning together with their environment)
- **"Ecosystem processes"-** appreciation of the forces (eg successional relationships) and factors (eg erosion and deposition) leading to natural change in plant and animal communities.
- **"Habitat"** – the locality or niche (ie living place) of a plant or animal, normally within a particular kind of ecosystem or environment.
- **"Impacts"** – net biodiversity losses and gains?
- "**Other causes**" (ie anthropogenic influences - eg fire; invasive species (cane toads, weeds, buffalo) climate change; hunting ; tourism; road building ?)
- **"Change"** - both spatial and temporal ? Over what period ? - long term (5 – 10 – 25 – 100 years?) or short term (ie seasonal?)

Mapping Scales



The following maps indicate the intensity / amount of detail required to map the Greater Alligator Rivers Region at the nominated scales shown on each map. Note that at present, much of the data required for mapping at the finer scales is not uniformly available across the study area.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Katherine River
Mary River
South Alligator
West Alligator
Wildman
Selected towns
Major rivers
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1_100k_map
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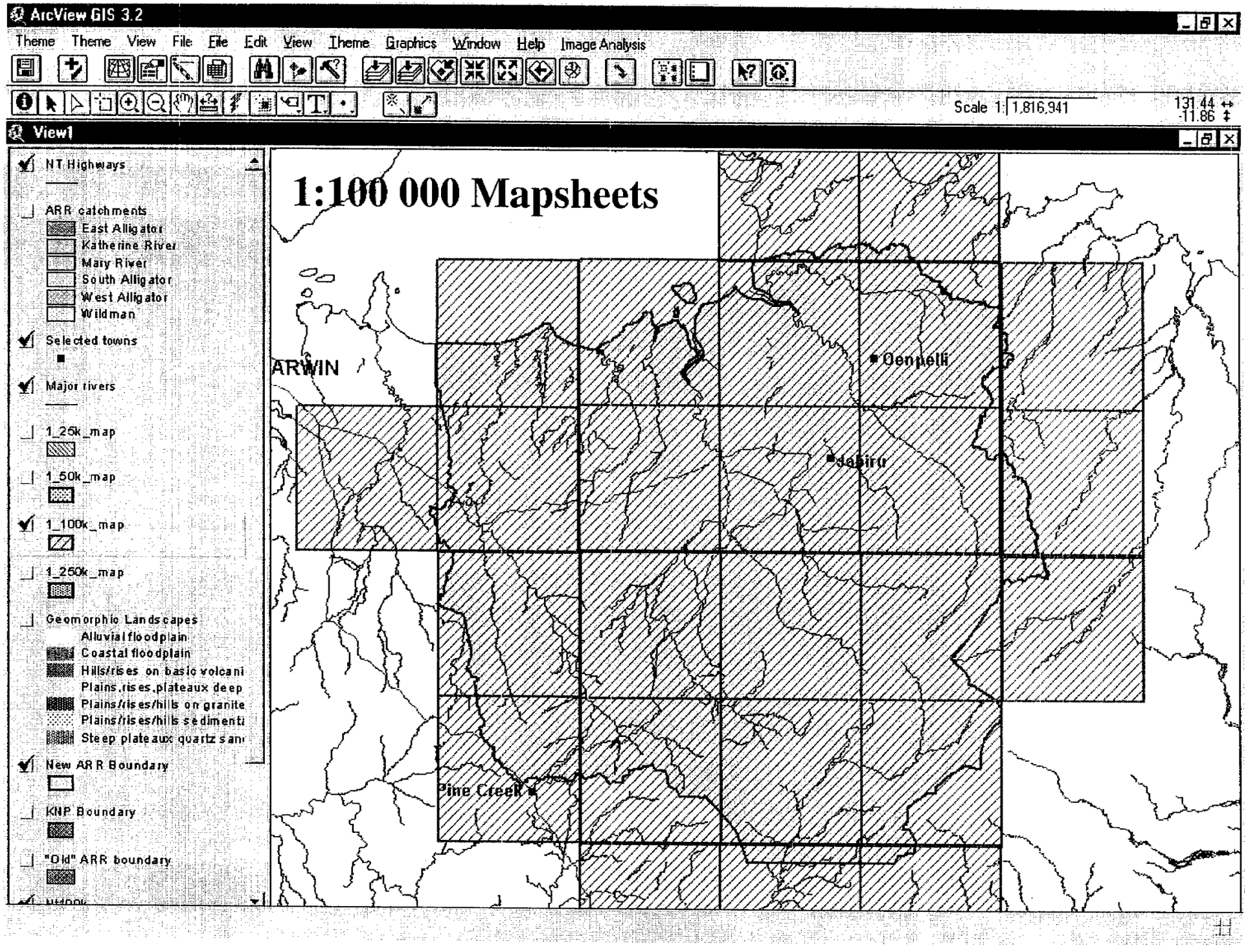
Geomorphic Landscapes
Alluvial floodplain
Coastal floodplain
Hills/rises on basic volcani
Plains,rises,plateaux deep
Plains/rises/hills on granite
Plains/rises/hills sediment
Steep plateaux quartz san
New ARR Boundary
KNP Boundary
"Old" ARR boundary
1:250 000 Mapsheets
ARWIN
Oenpelli
Jabiru
Pine Creek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ARR catchments
East Alligator
Katherine River
Mary River
South Alligator
West Alligator
Wildman
Selected towns
Major rivers
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1_50k_map
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Geomorphic Landscapes
Alluvial floodplain
Coastal floodplain
Hills/rises on basic volcani
Plains,rises,plateaux deep
Plains/rises/hills on granite
Plains/rises/hills sedimenti
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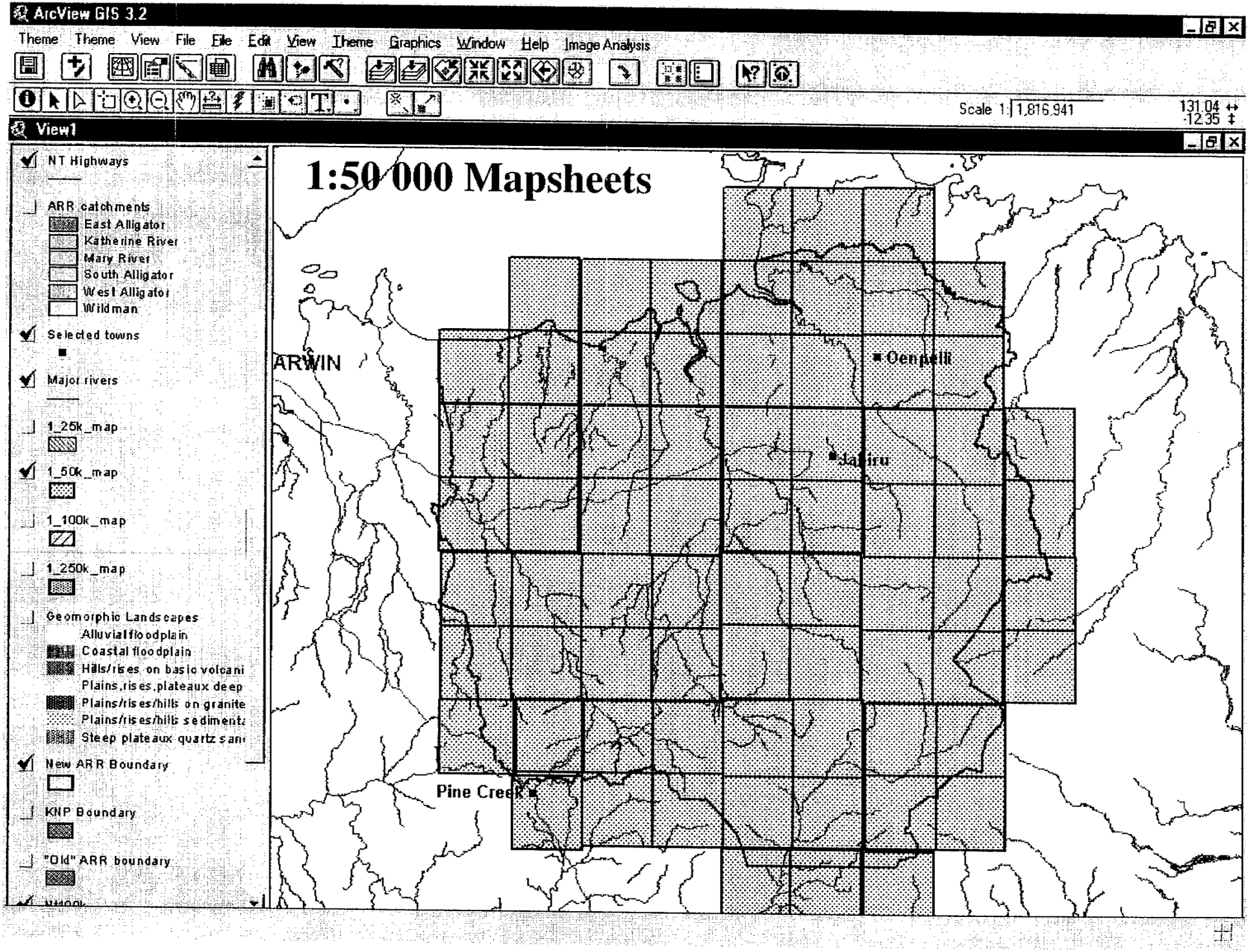
New ARR Boundary
KNP Boundary
"Old" ARR boundary
ARWIN
Pine Creek
Jabiru
Oenpelli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East Alligator
Katherine River
Mary River
South Alligator
West Alligator
Wildman
Selected towns
Major rivers
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1_250k_map
Geomorphic Landscapes
Alluvial floodplain
Coastal floodplain
Hills/rises on basic volcani
Plains,rises,plateaux deep
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New ARR Boundary
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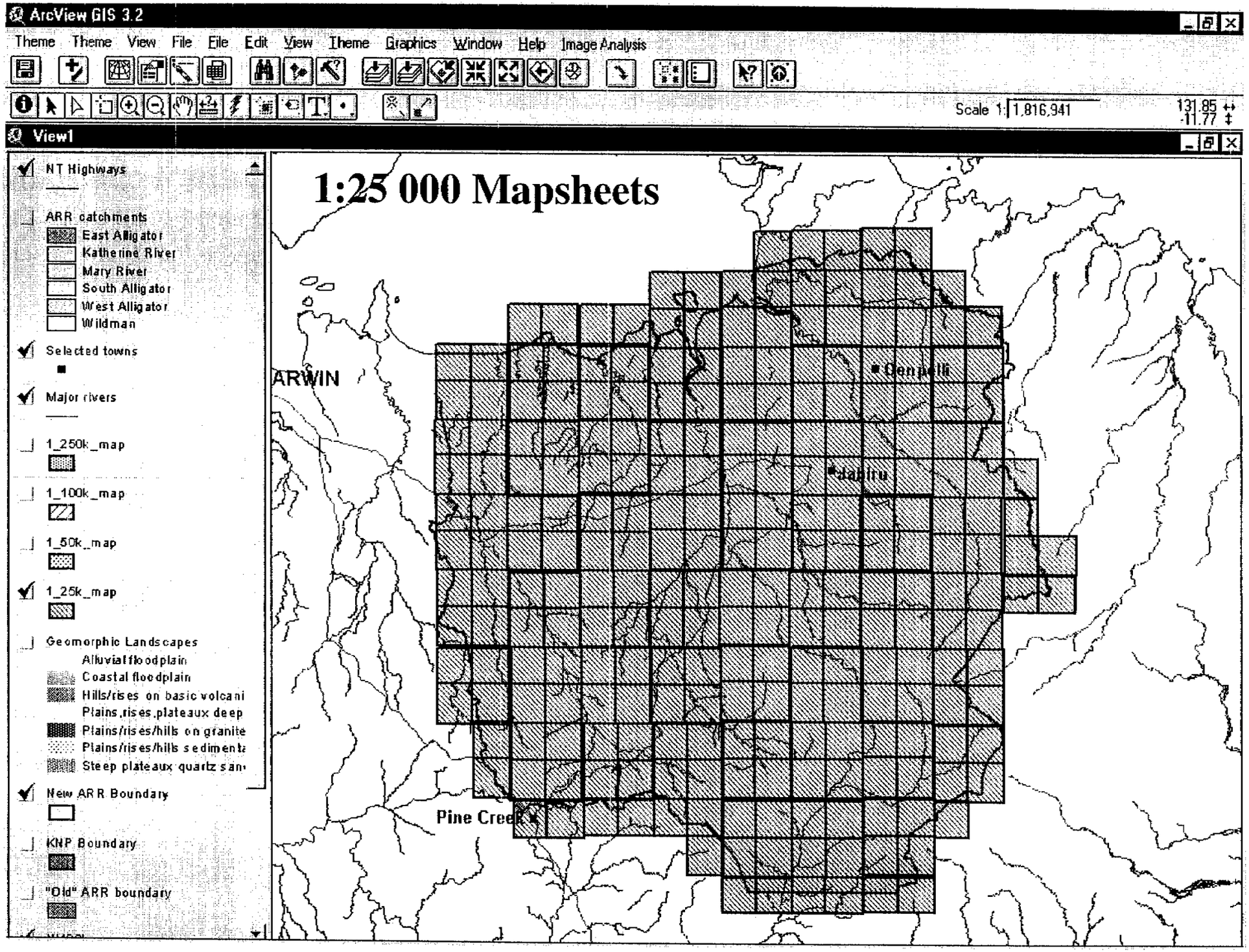
"Old" ARR boundary
ARWIN
Oenpelli
Jabiru
Pine Creek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Mary River
South Alligator
West Alligator
Wildman
Selected towns
Major rivers
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Geomorphic Landscapes
Alluvial floodplain
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Hills/rises on basic volcani
Plains,rises,plateaux deep
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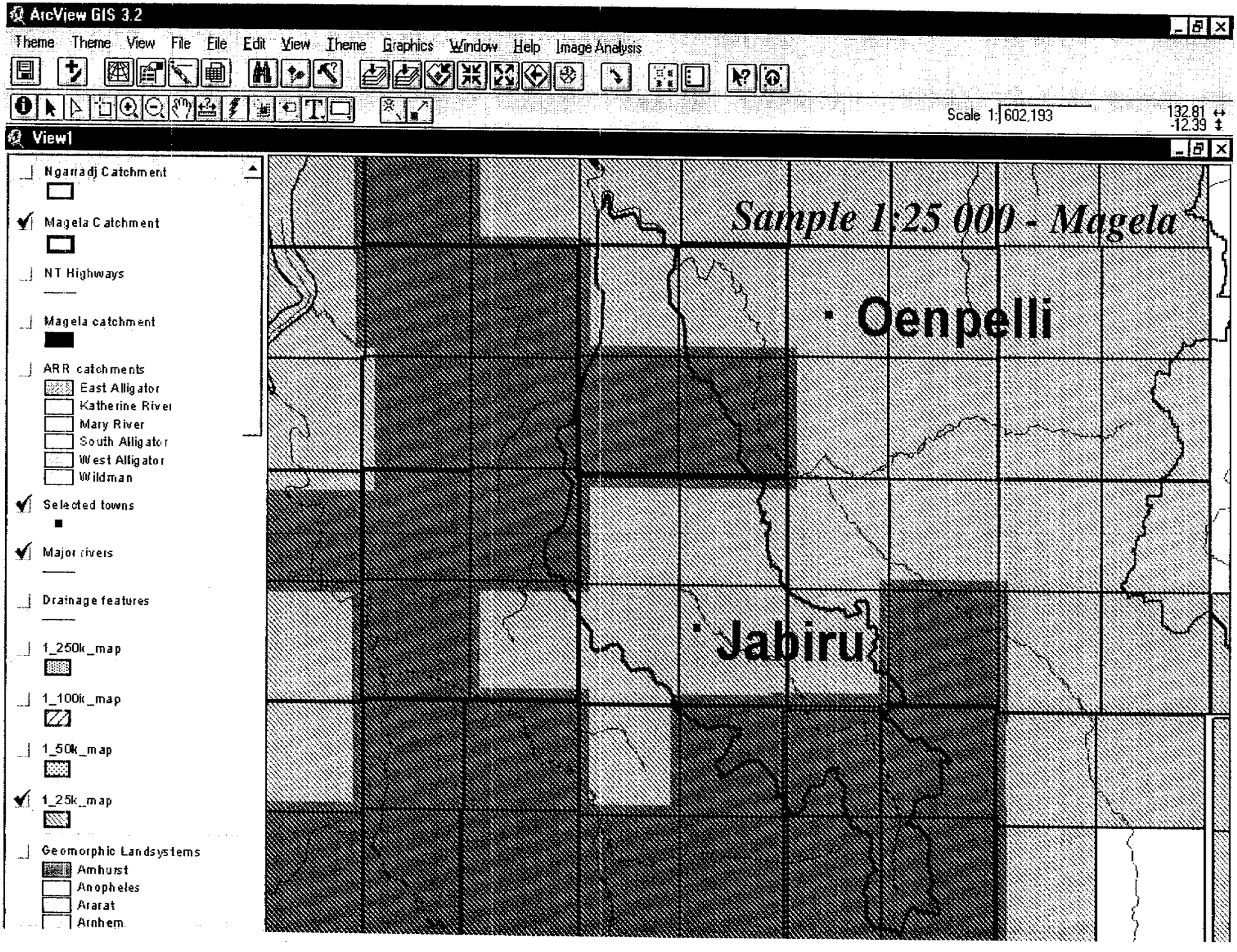
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Ngarradj Catchment
Magela Catchment
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Magela catchment
ARR catchments
East Alligator
Katherine River
Mary River
South Alligator
West Alligator
Wildman
Selected towns
Major rivers
Drainage features
1_250k_map
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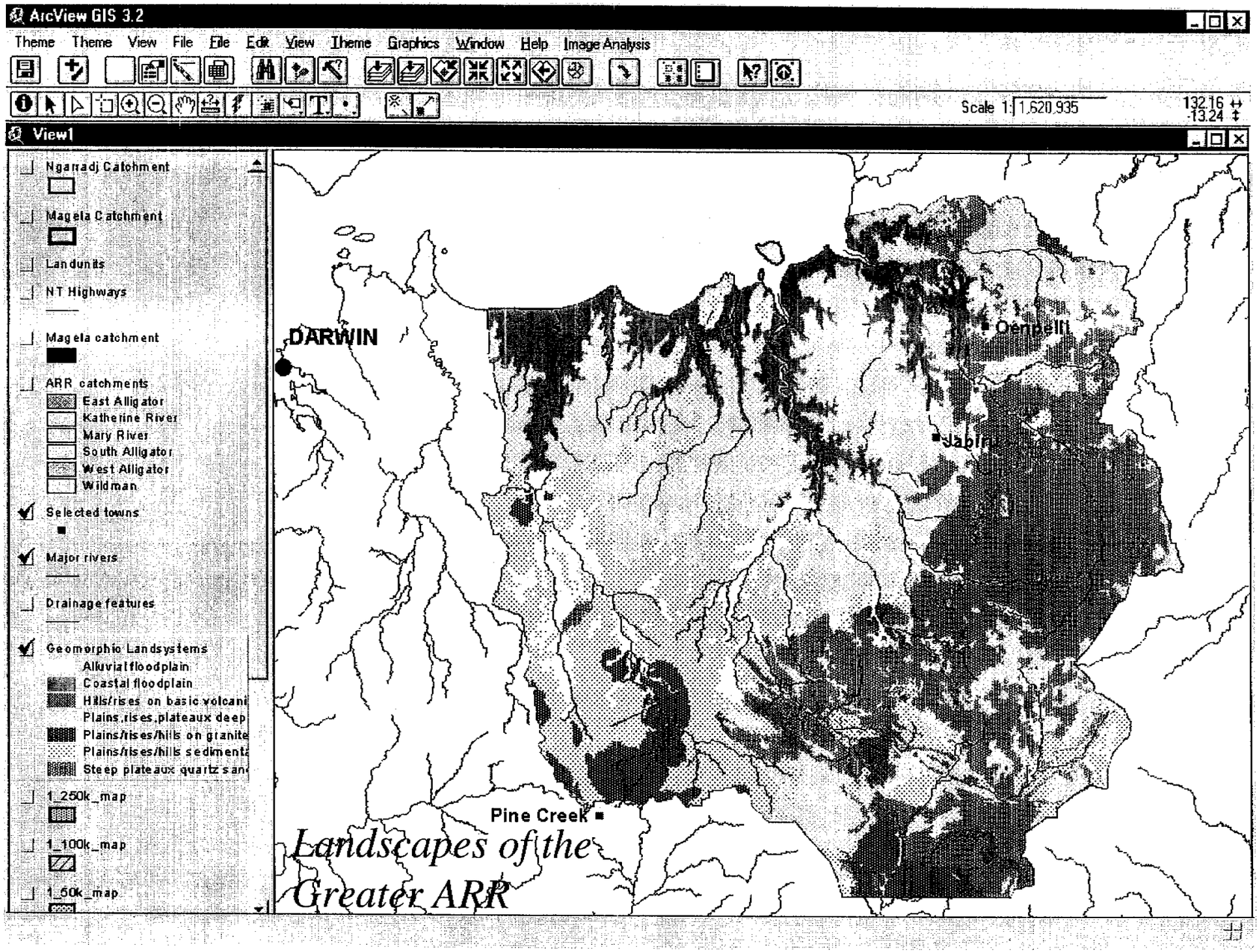
1_50k_map
1_25k_map
Geomorphic Landsystems
Amhurst
Anopheles
Ararat
Arnhem
Sample 1:25 000 - Magela
Oenpelli
Jabiru

Landscape Map - ARR
(*what we have now...*)

Note : The landscape boundaries represented on the following map is derived from land system mapping which is 25 years old. When compared with current satellite imagery of the area, significant variations in some landscape boundaries exist. Further analysis is required to refine / correct the landscape mapping.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Ngarradj Catchment
Magela Catchment
Landunits
NT Highways
Magela catchment
ARR catchments
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Coastal floodplain
Hills/rises on basic volcani
Plains,rises,plateaux deep
Plains/rises/hills on granite
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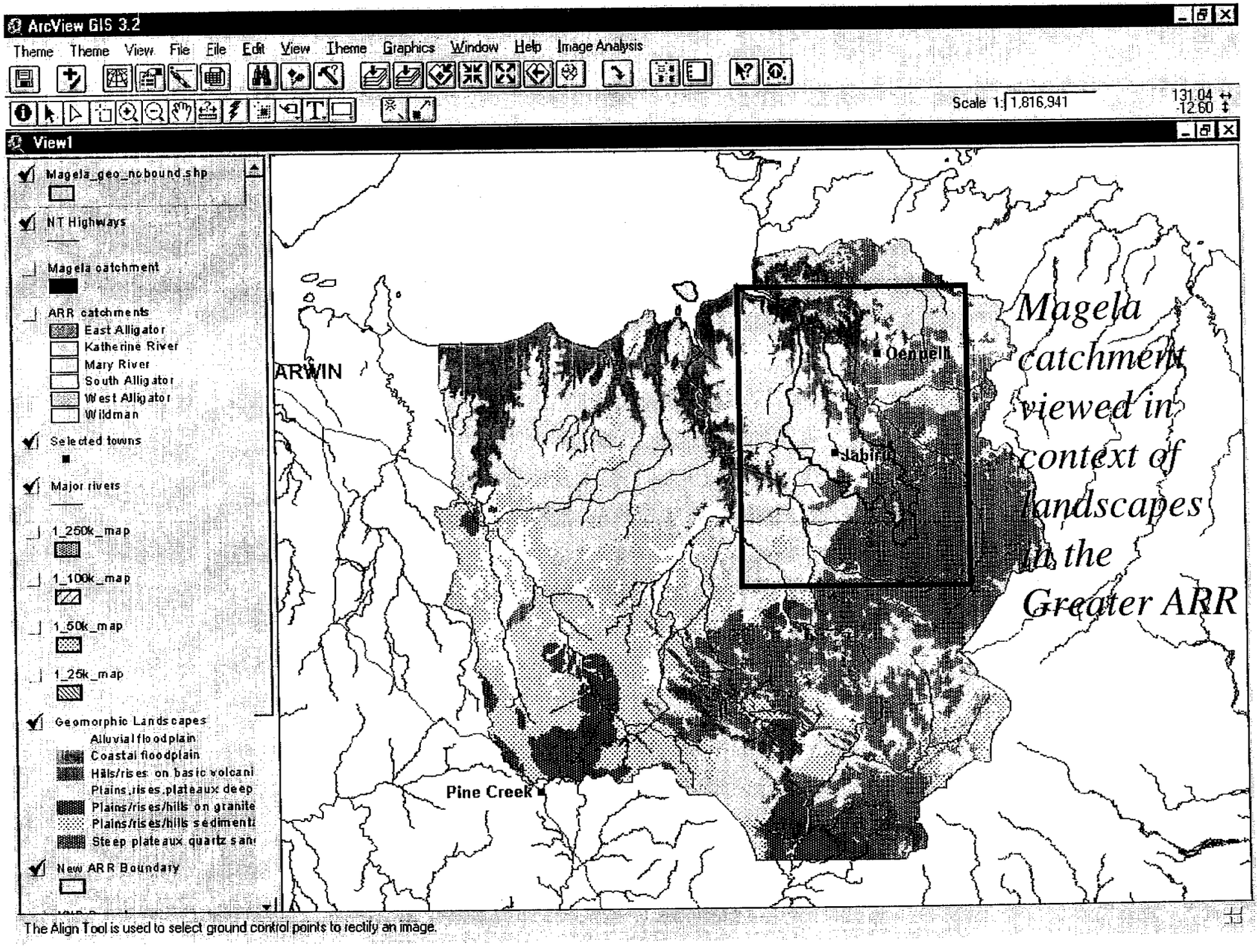
Steep plateaux quartz san
1_250k_map
1_100k_map
1_50k_map
DARWIN
Oenpelli
Jabiru
Pine Creek
Landscapes of the Greater ARR

Issue of Phasing :

- Where to begin? (a particular catchment or whole region?)
- Drill down or start small (with pilot study) and expand thereafter?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Magela catchment
ARR catchments
East Alligator
Katherine River
Mary River
South Alligator
West Alligator
Wildman
Selected towns
Major rivers
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1_100k_map
1_50k_map
1_25k_map
Geomorphic Landscapes
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Coastal floodplain
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Plains/rises/hills on granite
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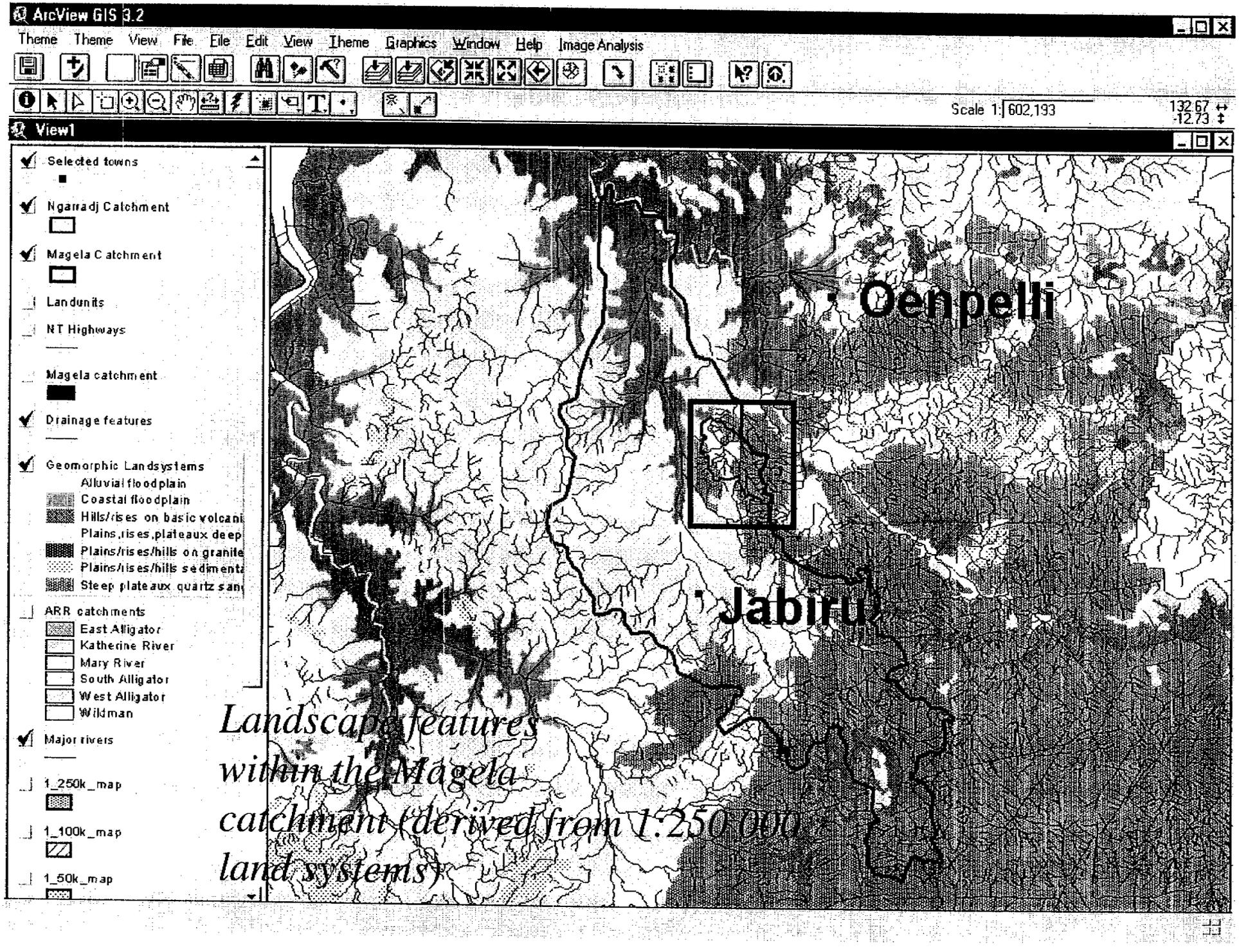
Steep plateaux quartz san
New ARR Boundary
ARWIN
Oenpelli
Jabiru
Pine Creek
Magela catchment viewed in context of landscapes in the Greater ARR
The Align Tool is used to select ground control points to rectify an image.


ArcView GIS 3.2
Theme Theme View File Edit View Theme Graphics Window Help Image Analysis
Scale 1: 602,193
View1
Selected towns
Ngarradj Catchment
Magela Catchment
Landunits
NT Highways
Magela catchment
Drainage features
Geomorphic Landsystems
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ARR catchments
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Katherine River
Mary River
South Alligator
West Alligator
Wildman
Major rivers
1_250k_map
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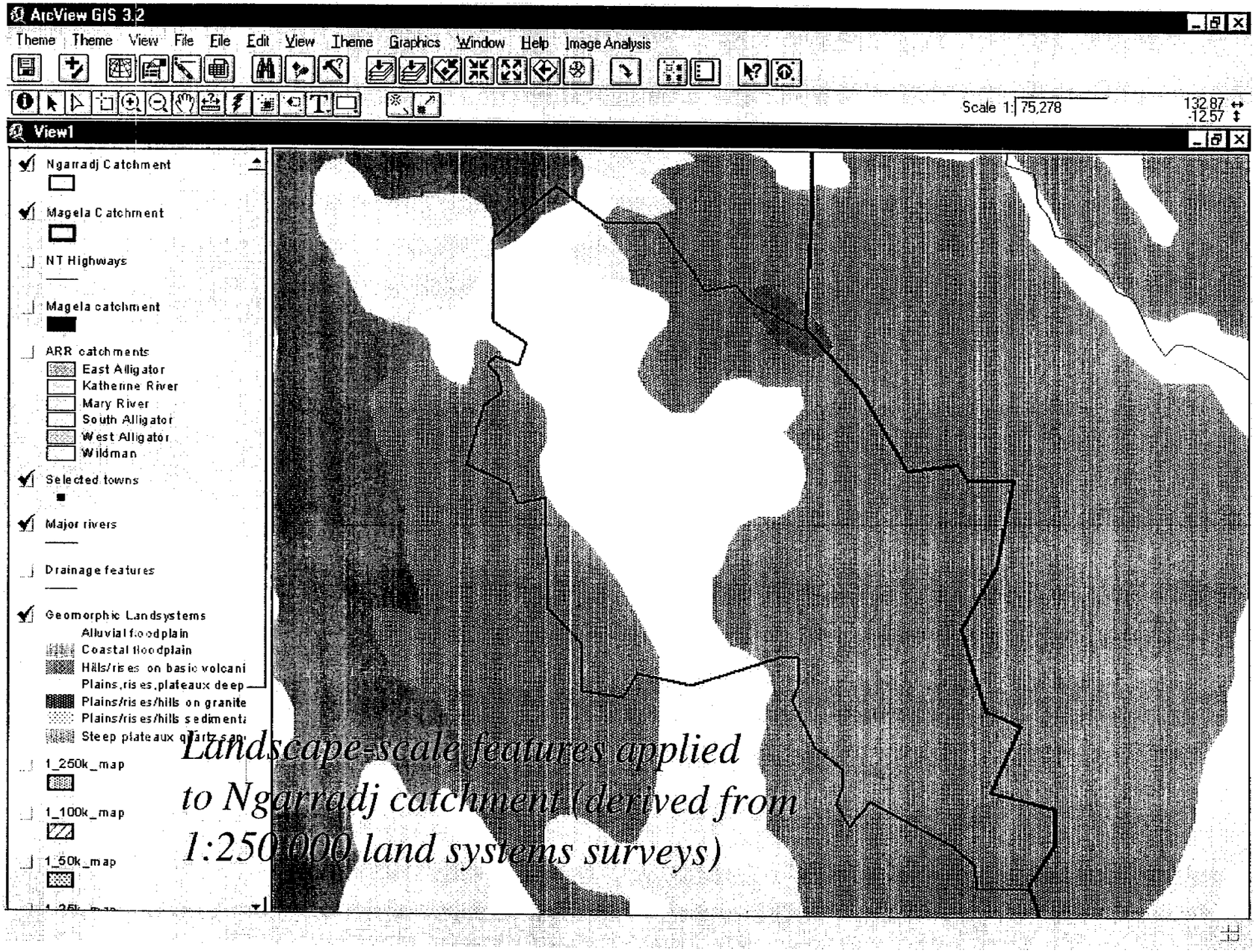
Oenpelli
Jabiru
Landscape features within the Magela catchment (derived from 1:250 000 land systems)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Magela catchment
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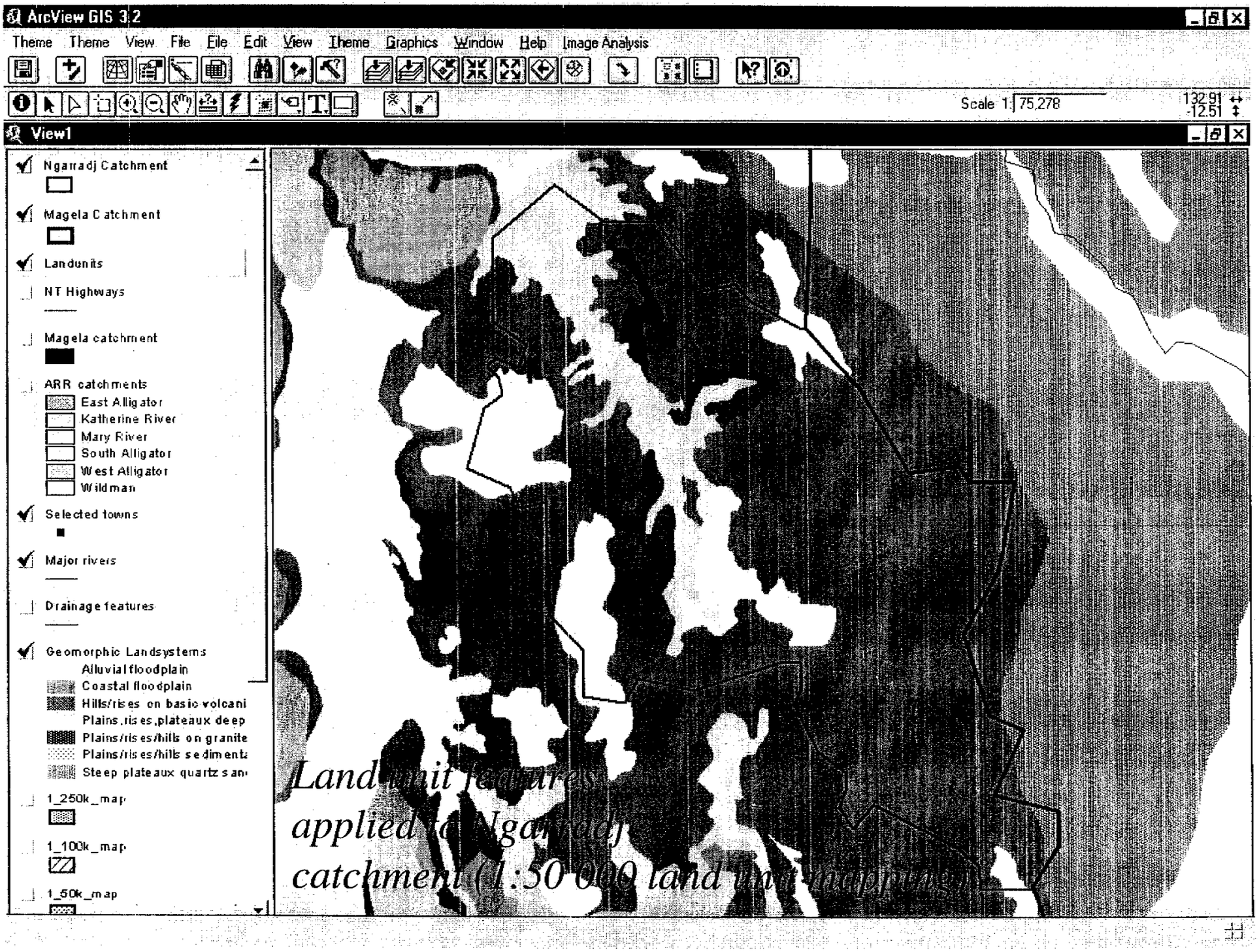
1_50k_map
Landscape-scale features applied to Ngarradj catchment (derived from 1:250000 land systems surveys)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Plains/rises/hills on granite
Plains/rises/hills sedimenta
Steep plateaux quartz san
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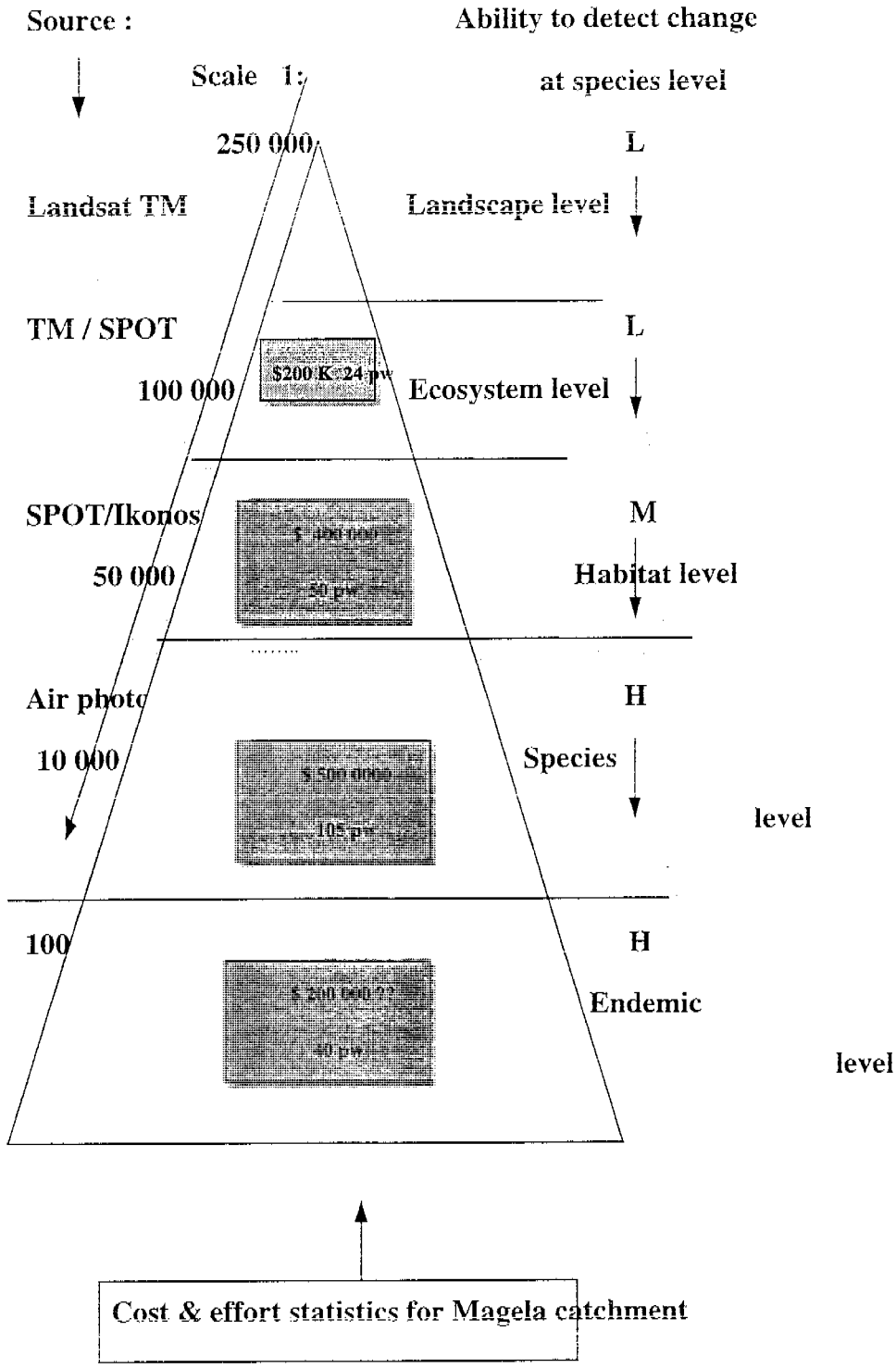
1_100k_map
1_50k_map
Land unit features
applied to Ngarradj
catchment (1:50 000 land unit mapping)

Approach

- **Hierarchical approach involving use of:**
  - **Remote sensing** (aerial photos? satellite imagery? videography?)
  - **Mapping change** (over last 50 years?)
  - **Participatory mapping** (?)
  - **Groundtruthing** (site selection, access, permits .....)
- **Status and trend report** for each WH value?

Hierarchical approach to landscape wide analysis



Ability to detect change H - High

M - Moderate

L - low

Key questions:

- Which of the listed World Heritage values can be quantified and m
- In a multifunctional landscape such as Kakadu how are the differen the various stakeholders to be ascertained and accommodated?
- Can EA (SSD, PAN and World Heritage Branch) afford to disregar cultural criteria (ie links to traditional values)? eg:
    - Aboriginal archaeological remains
    - Aboriginal rock art sites
    - Areas (viewsheds) of high aesthetic value
    - Areas of significant spiritual value
- Is programme relevant to PAN's current Plan of Management?
- Can the aquatic, terrestrial and cultural components of study be run
- If so, who would act as the co-ordinator?
- Is the programme practicable with the limited resources currently a