

Remote Sensed Imagery – Availability and Opportunities for Understanding Geodiversity

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Environment,
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Role of Remote Sensed Imagery

- DECCW is responsible for conserving and managing biotic, landscape and historical components of NSW's geodiversity
- The agency gathers a wide array of data to assist in this role
- Remote sensed imagery is a critical element of this data
 - Particularly for understanding and recognising the geodiversity of the state.
- I will be discussing how DECCW is managing and using imagery data

Role of Remote Sensed Imagery

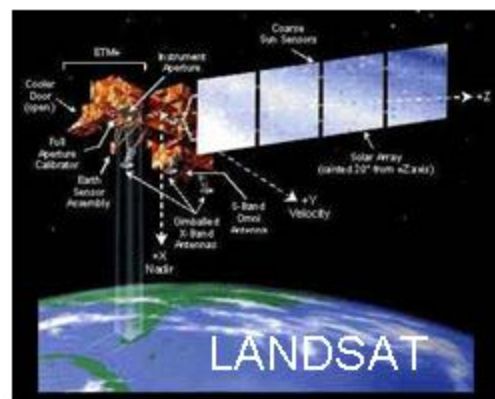
- Ongoing historic record of landscape change
 - Helps to better understand human impacts and behaviours
- Systematic and repeatable identification and analysis of landscape patterns
- Provides real-world location and context to events and features
- Readily grasped by non-technical people
 - Promotes appreciation of geological scale features of the landscapes

DECCW Imagery Genealogy

- DECCW and it's founding agencies have long applied remote sensed imagery
- Film-based aerial photography
 - From 1940s to present day
 - Manual stereoscopic interpretation
 - Large scale mapping programs
- Landsat II – VII
 - Early 1980s to present day
 - Vegetation extent and ecosystem modelling
 - Land use and cover change detection



Wild RC10 Camera



DECCW Imagery Genealogy

- **SPOT 4 & 5**
 - Mid 1990's to present day
 - Land use and cover change detection
- **MODIS**
 - 2002 to present day
 - Land use and cover change
- **IKONOS**
 - 2001 to (rarely today)
 - High-res imagery and cross-calibration with lower-res data

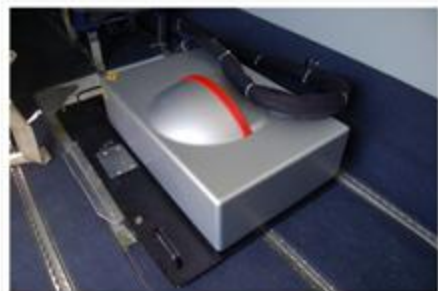


DECCW Imagery Genealogy

- Digital Frame Photography
 - ◊ 2003 onwards
 - ◊ Vexel, RC30, RC105 etc
 - ◊ Simple digital SLR
- Digital Aerial Sensor (Leica ADS40)
 - ◊ 2007 onwards
 - ◊ Digital stereo interpretation and on-screen mapping
 - ◊ Multispectral (Near Infra Red) ~10 cm
- LiDAR
 - ◊ 2005 onwards
 - ◊ 3 dimensional shape and surface characteristics
- Use of pattern recognition software
 - Definiens etc
 - Faster capture and matched to imagery features



Vexel UltraCamX



Leica ALS50
LiDAR

Monitoring and Assessment

- Over last 30 years, NSW government has invested in many programs of landscape based assessment
 - Land Capability
 - Land Use /Erosion
 - Soil Landscape
 - Acid Sulfate Soil Risk
 - Forest Type
 - Coastal Erosion
- Largely aerial imagery based
 - Time consuming and laborious
- Faster, cheaper methods were needed

Scale of monitoring has increased

- NSW State Plan expected greater monitoring and reporting by agencies across NSW
- Typically imagery costs have prohibited large-scale regular (annual) capture of high-res satellite data
 - Esp important for change detection
- Strategic hot spot targets were used at first
 - Difficult to extrapolate to full-state
- In 2007, NSW govt committed >\$20 M to native vegetation monitoring program
 - Included multiple whole state SPOT5 capture
 - 2007/08, 2008/09, 2009/10, 2010/11
 - With W-o-G access to imagery

Components of Native Vege Monitoring Program

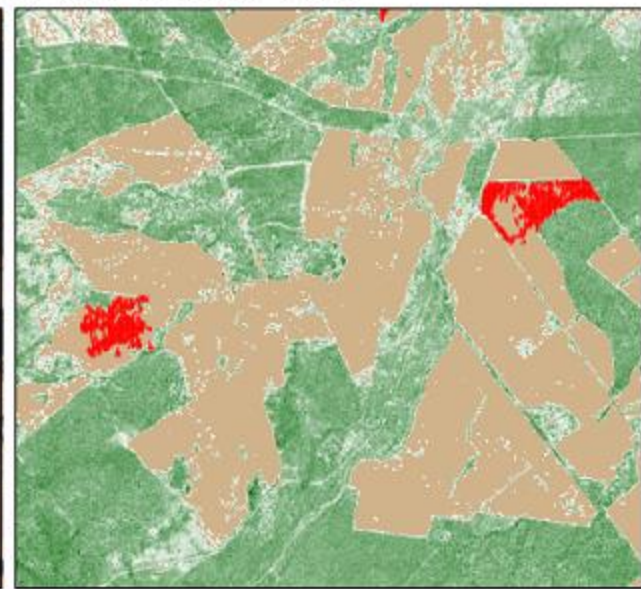
- Woody change monitoring
 - Landsat-to-Landsat, moving to Spot5-to-Spot5
- Woody extent and FPC mapping
- Imagery and products provision for compliance and other DECCW programs
- Ancillary products: water masks, ground cover index etc.



Landsat 2004



Landsat 2006



Veg. Extent+ Change

**Landsat image
showing 2007-08
change**



SPOT 5 image 2005



SPOT 5 image 2008



Vegetation Monitoring Research & Development

- The program has invested in new analysis and image preparation techniques
 - SPOT 5 atmospheric correction and radiometric standardisation of imagery
 - High resolution change detection methods
 - Vegetation extent validation and calibration
 - Long term time series analysis
- UQ/NRW/DECC joint research program providing significant assistance with research, development and training

Woody vegetation extent mapping

Example Cross Calibration Approach using SPOT and Landsat

FPC (SPOT 5)

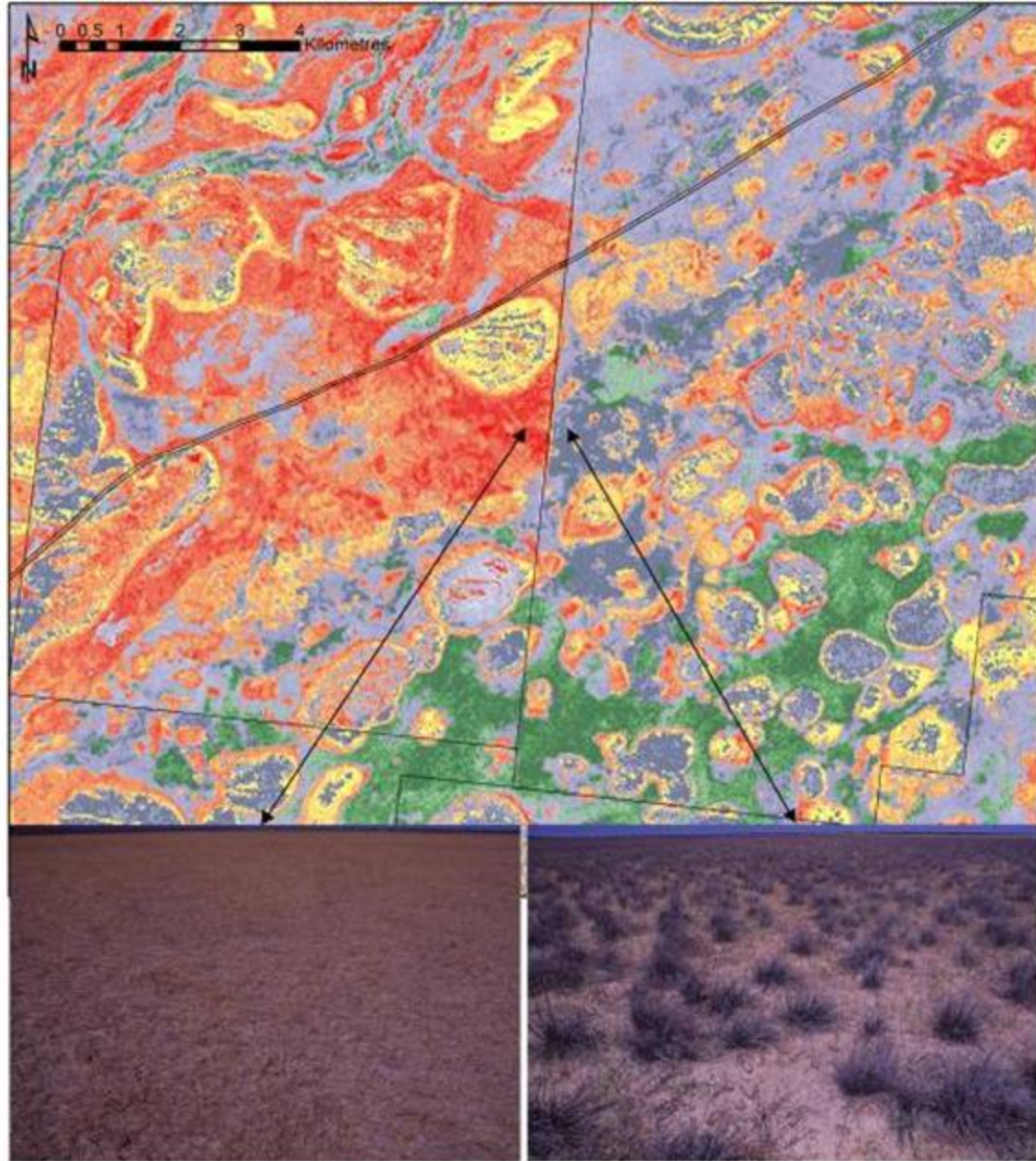


FPC (Landsat TM)

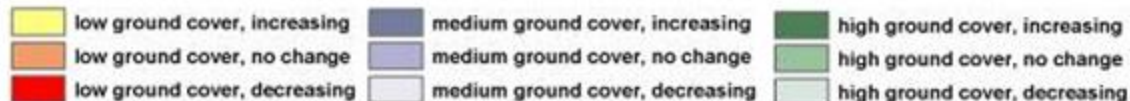


Monitoring Trend In Groundcover

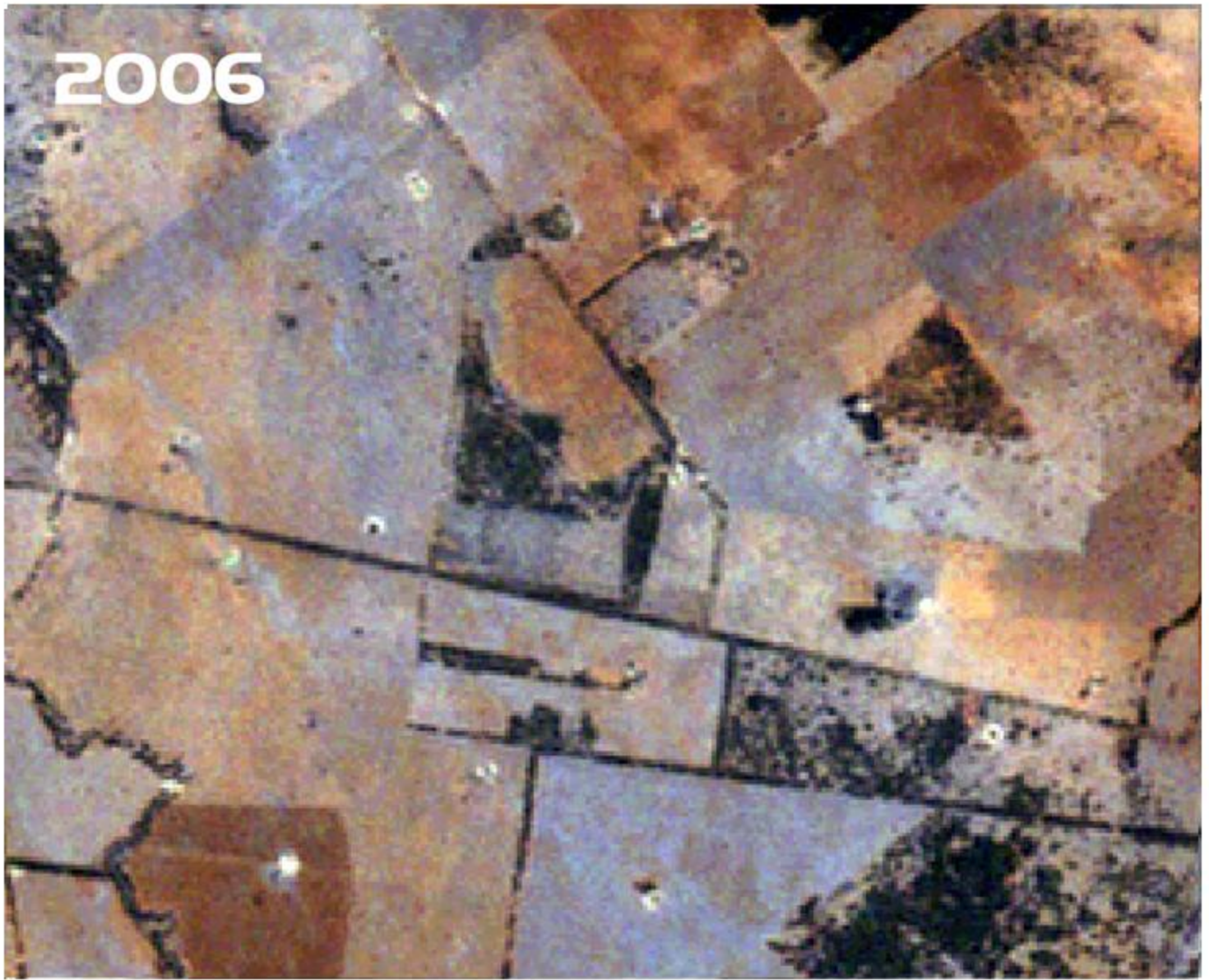
- Land condition indicated by classifying annual groundcover mean and trend.
- Good condition on eastern side (perennials)
- Poor condition on western side (annuals)



Ground Cover Mean and Trend 1988 - 2002



2006





Aerial-based Imagery Expanding

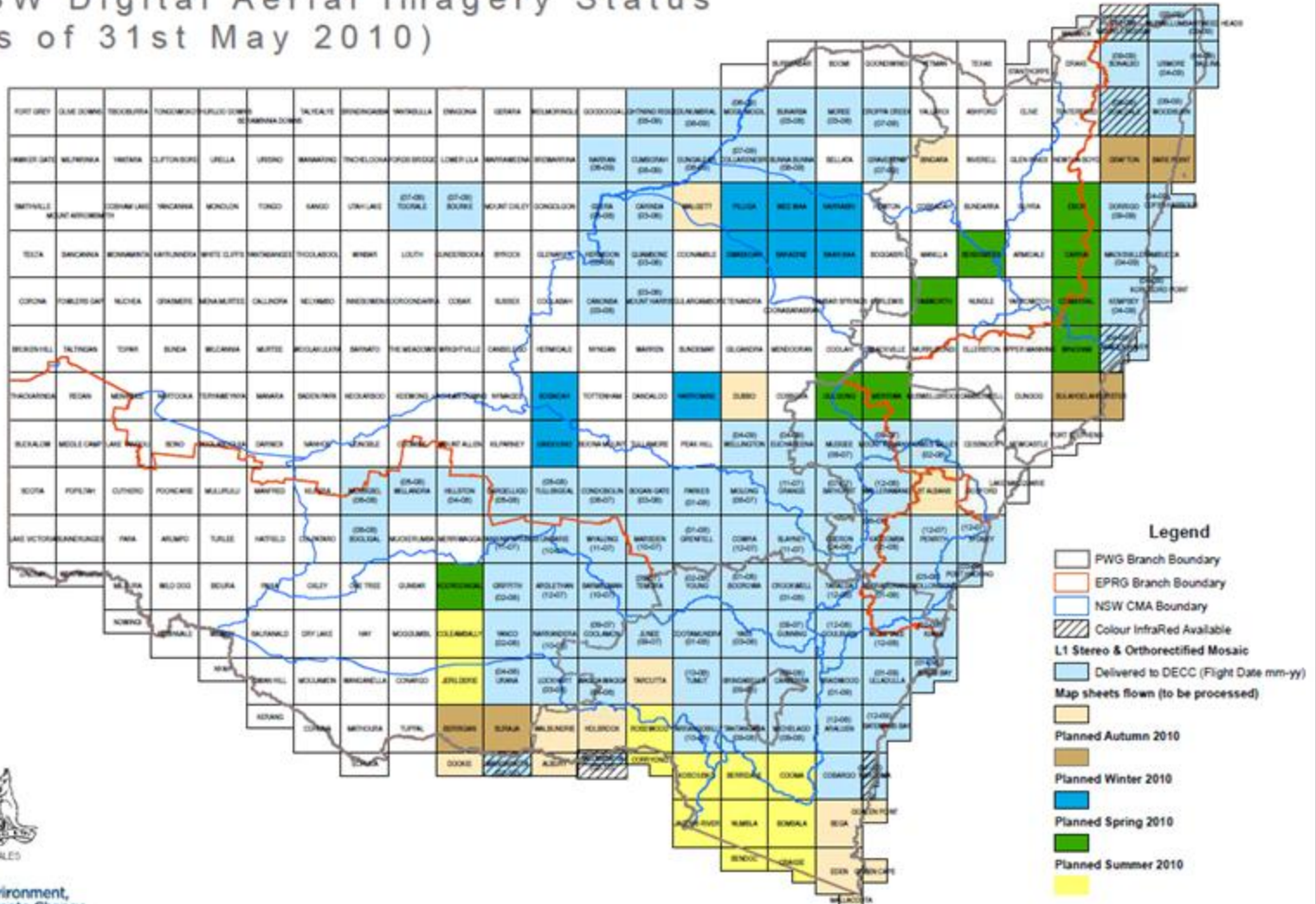
- NSW LPMA ADS40 and LiDAR Programs
- ADS40 replaced the analogue film based technologies in 2007
 - Film was too expensive and materials becoming scarce
- DECCW close partnership with LPMA
 - Compliments satellite programs
 - Investment in companion technology
 - Software and hardware
- LiDAR increasingly more relevant
 - lower costs of LPMA capture
 - Large investment in classification still required

Montague Island – ADS40



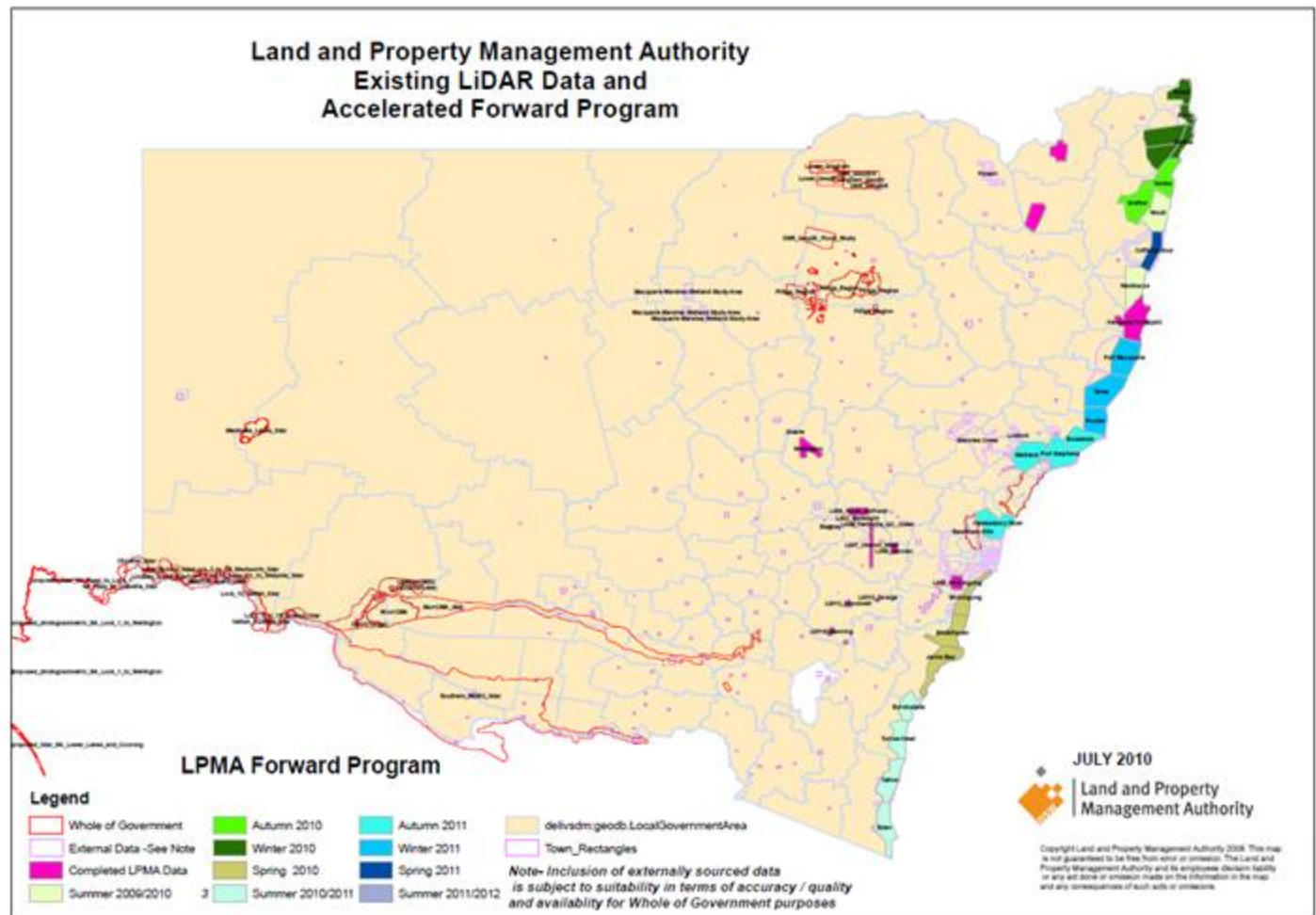
DECCW is largest user of ADS40

NSW Digital Aerial Imagery Status
(as of 31st May 2010)

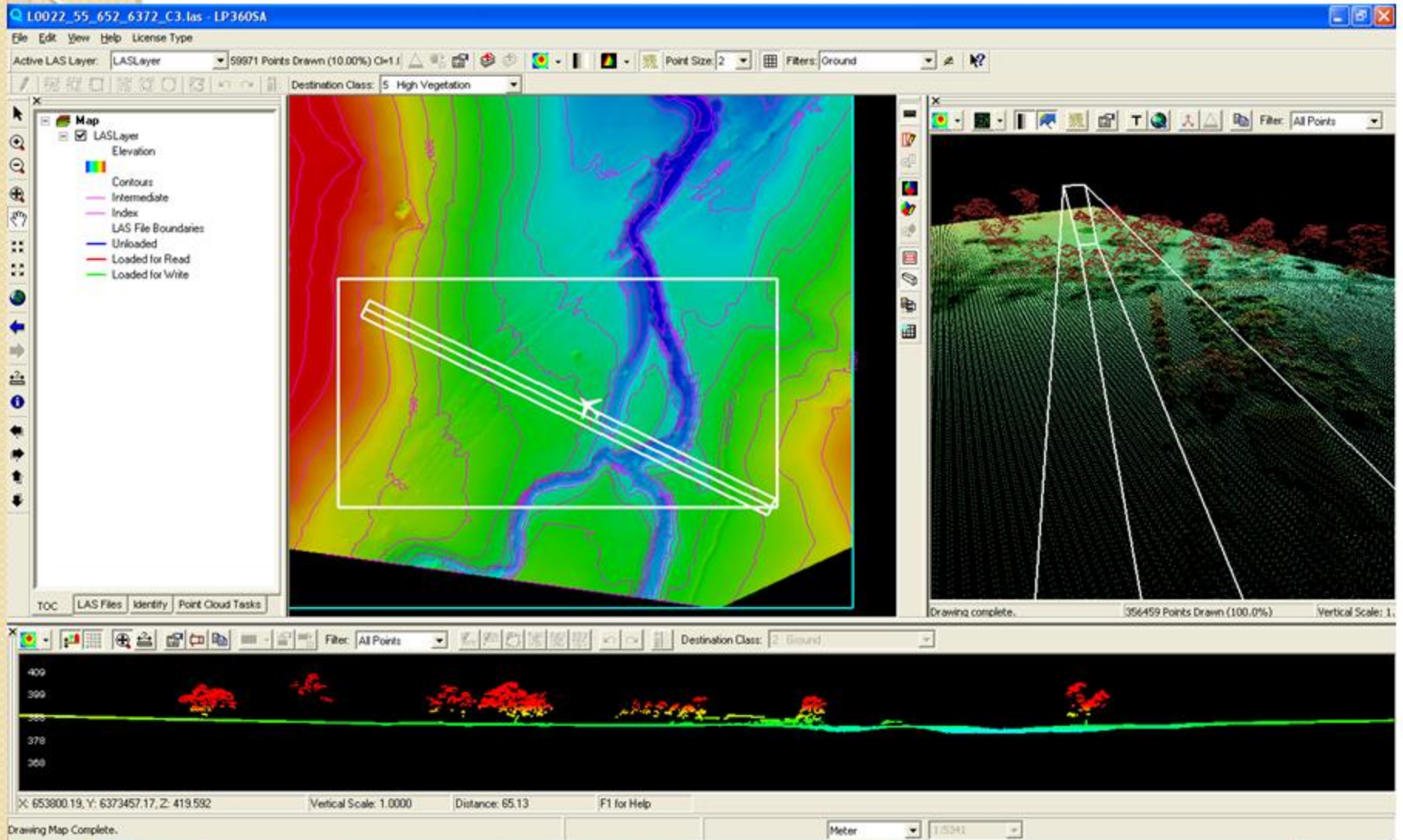


LPMA Expands Activity in LiDAR

- Expanding access to LiDAR for all levels of government
- Main target is coastal floodplains and inland wetlands



LIDAR



Access to Historic Imagery

- LPMA have embarked on high-resolution scanning of entire film archive
 - Film is deteriorating
 - High quality image for perpetuity
- Last standard film runs already complete
- Back-capture starting with strategic areas
 - DECCW updating photo-centres geodatabase
- Mainly used to confirm native vegetation status and record land use history

Improved Image Data Delivery

- Imagery storage requirements are huge
 - Need to provide alternatives
 - DECCW has built a multi-petabyte storage system at AC3 Technology Park
- Greater use of streamed imagery
 - Erdas Apollo Image Web Server &
 - ArcGIS Image Server
 - Potentially including image classification web services to run on-demand by users
- Faster delivery and analysis is paramount

Improved Product Delivery

- Following the Google Maps revolution, the community expects to have much greater access to imagery
- NSW Spatial Information Exchange (SIX) is one of govt initiatives to provide access to govt information including imagery
 - New opportunity for geotourism
- Our community can also play a part in landscape monitoring
 - new spatial web tools and
 - access to more up-to-date imagery

Community Access to Imagery

The image displays a web-based GIS application interface. The main window shows a satellite map of a coastal town, identified as Port Macquarie, with a river and surrounding greenery. The interface includes a top navigation bar with icons for navigation and a 'HELP GUIDE' link. The 'Department of Lands' logo is visible in the top right corner. A search panel on the right side of the interface shows the search results for 'Port Macquarie'. The search results are displayed in a table with columns for 'Type' and 'Details'. The status bar at the bottom of the map window shows the current latitude and longitude coordinates, scale, and progress.

Department of Lands HELP GUIDE ?

CHANNEL : PEOPLE FIRST

SEARCH

Address Place names Lot / DP

Name: Port Macquarie

Results 1:

Info tool results

Type 1 Details 1

Latitude : -33.800559 Longitude : 147.073191 Scale : 1:6,111,926 Progress : 50 % STATUS

Community Access to Imagery

The image is a screenshot of a web browser displaying two map services: Google Maps and Bing Maps. The Google Maps interface is at the top, showing the search bar with 'port macquarie nsw' and the location 'Port Macquarie, NSW'. Below it, there are links for 'Directions', 'Save', and 'Email'. The Bing Maps interface is below, showing the search bar with 'port macquarie nsw' and the location 'Port Macquarie, NSW'. A central image shows a small aircraft with 'NearMap HyperPod' pods on a tarmac. The text 'NearMap HyperPod' is overlaid on this image. The background of the browser window shows a satellite view of a coastal area. At the bottom, there are various icons and a footer with copyright information for Microsoft Corporation.

Google maps Australia Search Maps Show search options

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bing beta port macquarie nsw Location (address, town, postcode), or search for businesses

Maps Web News Maps

Port Macquarie, NSW

Search for: Businesses, User Contributions

Directions · Save · Email

Explore user-contributed places

NearMap HyperPod

nearmap

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Community Access to Imagery



Thank you for your time

Any Questions?

