5. RECOMMENDATIONS

5.1 ACHIEVEMENTS

This project completed all tasks identified in the project proposal. The production of final broad forest class map and growth stage maps over all tenures was a major achievement. The project achieved a number of firsts for the Eden CRA area:

- the collation of broad forest class maps over all tenures with the exception of the central part of Wadbilliga National Park;
- the collation of growth stage maps over all tenures;
- the use and analysis of independent field validated agreement assessment of the final growth stage map;
- the use of scanning digital capture of API forest resources; and
- the digital mapping of historical fire and logging disturbances.

To achieve these outcomes within the time and financial constraints of this project's resources is a credit to the teamwork between staff, contractors and management.

5.2 ISSUES

- The three month delay in commencement;
- Under-estimating the time required for all tasks especially API;
- Acceptance of the digital BOGMP without knowledge of field agreement or lack of hardcopy records of digital amendments.

These issues could have been resolved if:

- the project had started earlier or was extended to provide time for field trials to be completed;
- the results of the CRAFTI trails were available before project planning concluded;
- BOGMP overlays were used to guide new transcription of growth stage information onto overlays rather than as a digital template to edit;
- testing was undertaken of the entire project pathway from API to final GIS collation; and
- there was a reduction of the level of broad forest vegetation classes to a less detailed level.

5.3 OPERATIONAL

These recommendations are provided to improve the operational efficiency of future regional API projects. These recommendations have been considered by other CRA API projects in NSW and applied, modified or ignored as appropriate. It should be noted that many of these recommendations have already been incorporated into CRA API projects in NSW. While some appear to be commonsense they have been included to ensure their consideration in future projects.

5.3.1 Photography

- Recommend that an assessment be carried out of the quality and coverage of current 1:25,000 photography available prior to commencement. Where necessary and considered cost effective (within overall budget constraints), negotiations for re-flying photography should commence well in advance of project commencing.

5.3.2 Staff

- Employ an additional field officer to coordinate access for interpreters, especially on private land;
- provide letter of introduction for all API staff to enable the public to identify employees or contractors of NPWS working to complete CRA assessments;
- provide one field officer for every four API people;
- rotate the field officer and interpreters so that there is continuity between staff. Field officers can pass information on between staff; and
- dedicate one staff member to manage transfer of photography between interpreters and scanning contractors. This person being responsible for developing and maintaining a system for tracing the movements of photos between the various tasks.

5.3.3 Resources

- Collate and audit all sources of past API work carried out in Southern; and
- work on a tile basis of one 1:25,000 map sheet of photos at a time for each API person.

5.3.4 Progress reporting

- Need to develop efficient useable progress reports for staff to use including those monitoring movements of photos.

5.3.5 Jargon

- Jargon needs to be standardised for ease of work with all members of the API team.

5.3.6 Procedures

- Need to standardise procedures for edge matching between 1:25,000 map sheets; and
- further work needs to be undertaken to refine the floristics table before the Southern CRA commences.

5.3.7 Equipment

- Avoid long term use of Abram's stereoscopes as these tend to bend photos and cause problems relating overlay information to the photos as well as in the digital capture process. It is suggested that mirror stereoscopes be used where possible to reduce the number of photos being bent.

5.3.8 Office space

- Provide work space so that all API staff can work in the same office. This ensures that changes can be passed on to all concerned immediately.

5.3.9 Field work

- Standardisation of field notation to ensure that all people using those field notes can understand what is being recorded.

5.3.10 Validation and auditing

- Rotate interpreters through the nomenclature audit process. This will highlight the issues regarding the quality of the work being completed to interpreters and it will also mean that no one person remains in the quality auditing task for too long; and
- assign a senior interpreter dedicated to field and desktop validation of API work at the beginning of the project. This will highlight problems with API work immediately and as a result provide immediate feedback to interpreters about their work. Improve mapping work and reduce errors that may be continued if checks are not in place early in the project.

5.3.11 Scanning

- All staff need to have a clear understanding of the digital capture process and how this relates to the API work.

5.4 USE OF BROAD FOREST VEGETATION MAP

Without independent agreement assessment, the use of the broad forest vegetation should be treated with caution, especially when using the level three eucalypt forest classes. Other areas of concern are junctions between RN17 and broad forest vegetation type. Independent checks of the spatial accuracy of line work have fallen within 37.5 metres of topographical drainage features. Given this outcome the layer is expected to be spatially useful down to a 1:25,000 scale.
Further work sorting and editing the attributes table (especially level 3) and resolving several map sheet boundary inconsistencies would be worthwhile. Most importantly though, an independent assessment of the final map agreement similar to that undertaken for growth stage mapping should be completed before the layer is used at a small scale over local areas.

5.5 USE OF GROWTH STAGE MAP

The completion of independent spatial and code agreement assessments has been an improvement on the overall utility of the original BOGMP. The final growth stage map is usable at 1:25,000 scale over local and regional areas. However some form of specific ground validation should be used when considering the individual contribution of polygons at a local scale. Like the broad forest vegetation map, care needs to be taken along map sheet boundaries.
Bias has been removed from the layer. This was done by removing inferred disturbances or sub-canopy regrowth that was not evident on to the 1:25,000 photographs. This should also improve the consistency of mapping across the Eden CRA area.
The validation procedure provides a percentage accuracy statement based on sampling strategy bias towards sampling BOGMP polygons with changed codes. This was done in response to API-EWG concerns regarding the number of changes made to the original BOGMP codes. The percentage accuracy assumes an absolute truth of a polygon. However growth stage assessments are relative measurements not absolutes. These are relative measurements because growth stages of trees and stands within polygons vary depending on

site productivity, disturbance history and species composition. Variation within polygons contributes to the different growth stage codes between interpreters. This variation in coding is influenced by interpreter experience, time spent in polygon, area of polygon checked, photo quality, time elapsed between photography and field checking and how the relative structural character of the polygon compared to its neighbours. The validation procedure may be flawed given it attempts to compare a relative measurement using absolute measurement techniques and the small number and bias in the polygon sampled. As a result some questions remain unanswered after the validation.

While it is unknown to what level the accuracy of the final CRA layer has been improved when compared to the BOGMP layer, suggested bias in the BOGMP towards over-estimating regrowth has been removed. Without an independent field agreement assessment of the original BOGMP, no absolute measure of improvement is possible. This could be considered a flaw in the validation procedure.
Little improvement is now possible to this layer given the hybrid nature of its development. As discussed previously the best way to improve the layer would be to recapture all growth stage information using this layer as a guide.

5.6 USE OF HISTORICAL DISTURBANCE MAP

The historical disturbance layer was completed with:

- no field validation;
- no validation against other sources of recorded information;
- no identification of different levels of logging and fire intensity; and
- no independent validation assessment.

The information was delineated from 1:40,000 black and white photography from which individual tree crowns within forest stands can rarely be seen.
Both the interpreters and project management team recommend that this map was provided only to provide a contextual layer to assist in conservation planning, wood resources planning and fire management planning.