Coastal IFOA: Monitoring plan

Research program

October 2020

Monitoring strategy summary	
Monitoring strategy	Research program
Version 1.0	8 October 2020

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Part 1: Monitoring strategy details

1.1 Strategy title

Research Program

1.2 Monitoring questions

- **Question 1**: How are koalas responding to conditions, including changes in tree retention rates, species, distribution and size?

- **Question 2**: Can technology improve the probability of detection for a range of species in forestry operations?

- **Question 3**: What are the implications of changing fire intensity and regimes on the achievement of the Coastal IFOA's objectives and outcomes?

1.3 Protocol 38 (if relevant)

- Protocol 38.3 (1) (a) The monitoring program must be designed to monitor and evaluate the effectiveness of the conditions of the approval, including:

  - (vii) Koala conditions

1.4 Coastal IFOA condition and associated outcome statements (if relevant)

NB: the condition number/title and outcome statement are provided in this section and the full detail of the conditions is included in **Appendix 1**.

Koala conditions

Outcome statement Important trees are retained and protected for shelter and food resources for native species, and to support their persistence.
Condition 65. Koala browse tree retention (Upper North East Subregion and Lower North East Subregion)

Outcome statement Site-specific measures are implemented to mitigate the impact of the forestry operation on fauna species and their habitat, and to support their persistence.
Condition 75. Koala

Species detection technology

Outcome statement: Environment features, habitat and risks are identified to ensure that protections and management actions are implemented to mitigate the impact of the forestry operation.

Condition 56. A forestry operation (other than road maintenance) must not be conducted in any part of an operational area, unless a targeted flora survey and/or targeted fauna survey has been undertaken in that part of the operational area no greater than seven years prior to that forestry operation commencing in that area.

1.5 Strategy objectives

- To effectively adapt the Coastal IFOA approved monitoring strategy to the impact of the 2019-20 and future bushfire events.

- Improve the conservation status of Koalas through improved habitat retention conditions.

- Increase the effectiveness of species and habitat surveys through the adoption of technological advances.

- Be an adaptive strategy that can respond to changes to environmental conditions, policy or knowledge and provide a program to investigate best practice forest management and monitoring.

- Provide future opportunities for priority research topics to improve the Coastal IFOA conditions and protocols or the approaches within Coastal IFOA monitoring.

1.6 Strategy summary

The proposed suite of research projects will be to, initially, inform the effectiveness of the conditions and protocols of the Coastal IFOA. The initial research questions are:

- How are koalas responding to conditions, including changes in tree retention rates, species, distribution and size?

- Can technology improve the probability of detection for a range of species and habitats in forestry operations?

- What are the implications of changing fire intensity and regimes on the achievement of the Coastal IFOA's objectives and outcomes?

Koala response to harvest conditions

The Coastal IFOA monitoring program will utilise results from Commission's existing koala research project. The koala research seeks to better understand how koalas are responding to selective harvesting, in the first instance then intensive harvesting in state forests on the NSW North Coast.

Wildlife detection

The project is aimed at improving the detectability of fauna species and habitat features during of Coastal IFOA pre-harvest species surveys and habitat searches. It will be formed of three sub-projects:

- Use of drones to detect species and habitat features during pre-harvest surveys

- Use of acoustic monitoring to improve species detection

- Use of cameras and detection dogs for Hastings River mouse

Changing fire regimes and risk to Coastal IFOA objectives and outcomes

The literature review will consider the potential consequences of fire regimes departing from their natural range of variability on the achievement of the Coastal IFOA's objectives and outcomes. As part of the research, the drivers to future wildfire events, such as changes in climate drivers, will be investigated and how predicted changes in these drivers for climate may increase the future risks of the Coastal IFOA not achieving its desired objectives and outcomes.

Building from the information presented in the literature review, this appraisal will outline the implications for coastal state forest land managers and for Coastal IFOA conditions to achieve the desired objectives and outcomes under the approval.

Where appropriate to do so, the Approved Monitoring Program will be further refined to address wildfire related impacts highlighted in this research. The design and implementation of monitoring will remain adaptive during the post-fire recovery of the forests to ensure the program can monitor Coastal IFOA conditions and ensure they continue to meet outcomes.

1.7 Outline of methods and approach

Question 1: How are koalas responding to conditions, including changes in tree retention rates, species, distribution and size?

- To answer this research question, the approach was to extend the Commission's current koala research program focus beyond intensive harvesting into selective harvesting. Intensive harvesting has been postponed due to the impact of the 2019-20 fires. The focus of the research will be selective harvesting. Research may include the recovery of Koala populations post the 2019-20 fires.

- The Coastal IFOA monitoring research program will support the current koala research program to investigate this research question.

Background

- The Commission's koala research program seeks to better understand how koalas are responding to intensive harvesting in state forests on the NSW North Coast. A panel of independent subject matter experts provides advice to the Commission on the program, which is now in its second year of three. The Commission is undertaking this work for the DPIE Environment, Energy and Science Group.

- The 2019-20 wildfires have impacted significant areas of the north coast, including net harvest areas in state forests. As a result, the Forestry Corporation of NSW has postponed intensive harvesting operations at the research treatment sites and are proceeding with selective harvesting instead. As a consequence, the koala research program cannot proceed as planned in 2020.

- DPIE EES has recently agreed (June 2020) to adjust the research program to investigate koala response to selective harvesting instead, continue the research and report as per program timing. Intensive harvesting will still be considered at a later date when intensive harvesting operations resume.

- The work that will now proceed involves sampling post selective harvest at the current treatment sites with the same control sites. The program will also include three sites 5-10 years since intensive harvest (one of these completed in 2019 – Kiwarrak State Forest).

- **Delivery approach**: The Commission's Koala Research Program

Question 2: Can technology improve the probability of detection for a range of species in forestry operations?

- **Understanding the question**: The 'technology' to be considered by this research question will include any alternative methods to those currently being used, that may increase the probability of detection and also reduce monitoring costs for key species. Different approaches will be considered and tested to determine the most efficient.

  The project will focus on the probability of detection of selected fauna species as it is unlikely there is much capacity for technology to improve flora detection. The research will consider species that require targeted fauna surveys in operational areas within the conditions, and where technology can improve detection probability and reduce the time and costs to conduct the surveys.

  Where operational areas occur in modelled habitat and/or where operational areas occur in proximity to a species record, key species require targeted surveys under the Coastal IFOA conditions. The current proposed survey methods, effort and timing of the protocols will be evaluated as part of the *Independent evaluation of forestry practice monitoring strategy*.

  The survey effort required by some of these techniques is very labour intensive and is required to be completed by a trained and experienced ecologist. In addition, it is not known if the survey techniques proposed provide high detection probabilities when compared to the effort expended. This research question will investigate the difference and compare detectability and survey effort using existing and new technology (or new methods for some of these species).

- **Outline of approach**: This research question will be considered through a mix of activities including:

  - **Sub-project 1: Use of drones to detect species and habitat features during pre-harvest surveys.** Drones are increasingly being used to identify cryptic species, particularly the koala. This sub-project will investigate the detectability of the koala and habitat features as part of the pre-harvest surveys required under the Coastal IFOA conditions. Detectability will be compared to the standard, on-ground surveys techniques identified in Coastal IFOA protocols for pre-harvest surveys.

  - **Sub-project 2: Use of acoustic monitoring to improve species detection**. Call detection devices can be deployed by non-ecological staff and automated call recognisers can analyse the data without the need for specialist staff. Given that detectors can be placed out for a number of weeks, this also reduces the costs of survey required for multiple nights of call broadcasting and also increases the chances of detection.

    To improve efficiency of this survey technique, automated call recognisers will be developed for the key frog species (*Assa darlingtoni* and *Philoria* species) and also for the marbled frogmouth for this project. The use of acoustic monitors will be evaluated against call broadcast surveys, running in parallel to surveys for key operational areas. Detection probabilities will be calculated for each of the survey methods and compared.

- **Sub-project 3: Use of cameras and detection dogs for Hastings River mouse**. Current survey requirements for the Hastings River Mouse date from the 1980s and requires the use of Elliot traps with 25 traps required over 25 hectares, which are set and checked over a minimum period of 5 days.

    Camera trapping has been trialled for the Hastings River Mouse, but it has been found to be problematic[1]. Recent work on the species has identified a white-flash camera and bait set-up that can successfully identify the New Holland Mouse and Smoky Mouse[2]. It is worthwhile investigating if these findings can extend to the Hastings River Mouse and identify if this would improve detectability.

    The use of detection dogs for identifying small, cryptic mammal species is increasing. Recently, surveys for *Antechinus arktos*, found that detection dogs can be a highly effective means of locating threatened, cryptic species, especially when traditional methods are unable to detect low-density mammal populations[3]. The Saving Our Species program is also using detection dogs to detect the presence of the smoky mouse, which could limit the detection period to one day, and there may be potential to test this approach for the Hastings River mouse.

    This project would be completed by a research organisation which would compare the current live-trapping method, with detection dogs and the use of cameras to identify difference in detection probability and also in cost effectiveness of surveys for the Hastings River mouse.

Question 3: What are the implications of changing fire intensity and regimes on the achievement of the Coastal IFOA's objectives and outcomes?

- **Background to the question**: The 2019/20 NSW wildfire season was preceded by the second warmest and driest period on record leading to above normal fire potential spread across most states. The fire danger period commenced early, record values for the Forest Fire Danger Index were recorded for spring 2019 following three consecutive years of drought conditions for parts of NSW. In addition to the extreme seasonal bushfire conditions experienced in 2019/20, anthropogenic climate change is contributing to fire weather seasons becoming more intense and high forest fire danger days occurring earlier in the season (spring). While the original intent of this research in the approved monitoring program was to research the risks posed to the Coastal IFOA objectives and outcomes from predicted changes to wildfire regimes, it will be expanded to cover the impacts of that event with the future predicted risk. This research will consider the broad implications of predicted changing fire regimes on the achievement of the Coastal IFOA's objectives and outcomes, the specific risks to achieving the Coastal IFOA objectives and outcomes as result of the legacy landscape scale impacts of the NSW 2019/20 wildfire season and options to mitigate risks

- **Understanding the question**: The consideration of fire regimes will cover temporal, spatial and behavioural characteristics and the departure from their natural range of variability. Departures from natural (or historic) range of variability could include but are not limited to departures in frequency, intensity, seasonality, heterogeneity and

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[1] Meek P. D. Vernes K. (2016) Can camera trapping be used to accurately survey and monitor the Hastings River mouse (*Pseudomys oralis*)?, Australian Mammalogy 38(1): 44-51

[2] Burns P.A., Parrott M.L., Rowe K.C. and Phillips B.L. (2018) Identification of threatened rodent species using infrared and white-flash camera traps, Australian Mammalogy 40: 188-197

[3] Thomas M.L., Baker L., Beattie JR, Baker AM (2019) Determining the efficacy of camera traps, live capture traps and detection dogs for locating cryptic small mammal species. Ecology and Evolution 10: 1054-1068.

extent. Fire intensity will be considered as a component of fire regime. Fire will be considered under two themes, being wildfires and hazard reduction burns.

▪ This research question will be considered through a high level, conceptual approach that will consist of:

- **literature review**: Both the NSW and Australian Governments are conducting inquiries into the NSW 2019/20 fire seasons. Each are collecting evidence relevant to this RFQ. Both are considering the the implications of changing fire intensity and regimes in terms of '*any role of weather, drought, climate change, fuel loads and human activity*[4]' and '*Australia's arrangements for improving resilience and adapting to changing climatic conditions*'[5],

  The final report of the NSW Bushfire Inquiry was released in early August 2020. The interim observations of the The Royal Commission into National Natural Disaster Arrangements were released in early September 2020 and the final report is due on 28 October 2020. Relevant submissions and analyses from both inquiries will be reviewed as part of the evaluation.

  The literature review will consider the potential consequences of fire regimes departing from their natural range of variability on the achievement of the Coastal IFOA's objectives and outcomes. Departures from their natural (or historic) range of variability could include but are not limited to departures in frequency, intensity, seasonality, heterogeneity and extent. This information will be considered in the context of coastal state forest management, including how predicted future fire regimes (including wildfire and hazard reduction burns) may impact on the ability to achieve objectives and outcomes under the Coastal IFOA.

- **expert appraisal**: building from the information presented in the literature review, this appraisal will outline the implications for coastal state forest land managers and for Coastal IFOA conditions to achieve the desired objectives and outcomes under the approval.

- **recommendations:** for existing or new modelling to understand the risks and opportunities of business as usual or alternative management/mitigation approaches

1.8 Summary of approach to develop baselines and benchmarks for adaptive management

Research programs may be used to inform the baselines and benchmarks of other monitoring programs. For example, tree retention species and rates for Koalas.

The research program is designed to adapt to changes to the Coastal IFOA and the monitoring itself. Where adaptation is required, the research program provides the avenue to investigate different approaches and practices in a forestry setting.

1.9 Existing programs and data that will inform the strategy

▪ The NRC Koala research program forms the basis of one element of the strategy

▪ The fire intensity mapping and assessment of fire impact by FCNSW and DPIE EES will inform the assessment of fire impact.

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[4] https://www.nsw.gov.au/nsw-government/projects-and-initiatives/nsw-bushfire-inquiry/nsw-independent-bushfire-inquiry-%E2%80%93

[5] https://naturaldisaster.royalcommission.gov.au/publications/commonwealth-letters-patent-20-february-2020

- The Commission is engaged in a research program regarding the causes of forest dieback with the NSW Environmental Trust.

1.10 How the data will be stored, analysed and presented

- The detailed design will include a data management plan that identifies how the data generated by the program will be managed.

- Data will be collected and stored to the standards set out in the Forest Monitoring and Improvement Program data management system, including analysis and presentation, then made available for integration with the state-wide forest monitoring program analysis platform.

- Intellectual Property rights created through the research program should be assigned to the NSW Government, and not vest in the research provider – this will need to be carefully considered during the setup and negotiation phase for the research program.

1.11 Expected strategy outcomes

- Commission managed forestry research program established to support the delivery of the CIFOA monitoring program

- Improved information to inform adaptive management of the Coastal IFOA and the monitoring program

- Improved understanding of emerging methods and approaches to be incorporated into the Coastal IFOA monitoring program.

- Identification of future risks to the objectives and outcomes of the Coastal IFOA.

1.12 Linkages and uses with the overall NSW Forest Monitoring and Improvement Program Framework

- The FMIP identifies a number Coastal IFOA research program may be integrated into part of the broader FMIP research strategy

- The evaluation of detection methodologies will also improve the cost effectiveness of the FMIP

- The Coastal IFOA condition effectiveness monitoring plan for waterway and wetland health.

Part 2: Timeline		
Activity description	Start date	End date
Extension or modification of the Koala research program	August 2020	June 2021
Assessment of the impact of 2019-20 fires on the Coastal IFOA objectives and outcomes	October 2020	January 2021
Detection sub-project 1: Use of drones to detect species and habitat features during pre-harvest surveys	September 2020	December 2021
Detection sub-project 2: Comparison of detectability for Marbled Frogmouth and frogs	September 2020	June 2021

Detection sub-project 3: Comparison of Hasting River Mouse surveys to improve detection	**September 2020**	**June 2021**

Appendix 1: Relevant Coastal IFOA conditions

Koala conditions

Outcome statement for Division 3 of Chapter 4 of the approval Important trees are retained and protected for shelter and food resources for native species, and to support their persistence.

65. Koala browse tree retention (Upper North East Subregion and Lower North East Subregion)
65.1 The following trees must be retained for the duration, and at the completion of, each forestry operation in accordance with Protocol 23: Tree retention:

(a) a minimum of 10 Koala browse trees per hectare of net harvest area where Koala browse prescription 1 applies;

(b) a minimum of five Koala browse trees per hectare of net harvest area where Koala browse prescription 2 applies and in any (or remaining part of a) compartment where a contemporary koala record exists but is not otherwise attributed Koala browse prescription 1 or 2; and

(c) all Koala browse trees in areas where the minimum coverage of Koala browse trees set out in conditions 65.1(a) and 65.1(b) does not exist in the net harvest area before the commencement of the forestry operation.

Note: For the purposes of determining the rate of tree retention in the net harvest area under condition 65.1(a) and 65.1(b), Protocol 23: Tree retention must be used.

Outcome statement for Division 4 of Chapter 4 of the approval Site-specific measures are implemented to mitigate the impact of the forestry operation on fauna species and their habitat, and to support their persistence.

75. Koala
75.1 A suitably qualified person must visually assess each tree for Koalas immediately prior to it being felled, where:
(a) Koala browse prescription 1 or Koala browse prescription 2 applies; or
(b) there is a contemporary Koala record in any operational areas in the Southern Subregion or Eden Subregion.
75.2 If a Koala is located in a tree, an exclusion zone with a radius of 25 metres or greater must be retained around the tree. The exclusion zone may be removed once the Koala moves from that tree.
75.3 Koala browse prescription 2 must be applied to the remainder of an operational area where evidence of Koala is detected during a harvesting operation in an area which is not identified in condition 75.1.
75.4 FCNSW must maintain records, updated each week, in accordance with Protocol 3: Operational tracking, to demonstrate condition 75 of the approval has been applied.

Riparian exclusion zones and ground protection zones on class 1 classified drainage lines

Outcome statement for Division 3 of Chapter 5 of the approval Vegetation adjacent to drainage features and wetlands is protected, and groundcover is retained, to maintain water quality, stream stability, riparian habitat and contribute to habitat connectivity.

95. Riparian exclusion zones for classified drainage features

95.1 A riparian exclusion zone with a minimum width as specified in Table 6a or Table 6b of this condition (depending on the applicable harvesting type and ground slope) must be retained on each side, and for the entire length of, each of the drainage categories listed in column one of those tables.

95.2 Table 6a must be applied to compartments:

(a) subject to intensive harvesting where at least 20 percent of the compartment has a ground slope of 18 degrees or greater;

(b) subject to alternate coupe logging where at least 20 per cent of the compartment has a ground slope of 18 degrees or greater;

(c) where dispersible soils have been identified in the operational area;

(d) subject to intensive harvesting or alternate coupe logging with any areas classified as inherent hazard level 4 as determined in accordance with Protocol 15: Inherent soil erosion and water pollution hazard assessment, unless:

(i) the total extent of areas classified as inherent hazard level 4 in the compartment is less than 1 hectare; or

(ii) it is otherwise approved by the EPA in accordance with Protocol 5: Approvals for restricted activities.

(e) subject to selective harvesting where the compartment is inherent hazard level 3 as determined in accordance with Protocol 15: Inherent soil erosion and water pollution hazard assessment.

95.3 Table 6b must be applied to compartments in all areas where condition 95.2 and Table 6a does not apply.

95.4 For the purpose of applying Table 6a and Table 6b, FCNSW must:

(a) determine drainage class in accordance with Protocol 19: Determination of drainage class and stream order; and

(b) measure and retain each riparian exclusion zone in accordance with Protocol 16: Riparian protection.

Excerpt from Table 6a: ESA categories and minimum riparian exclusion zone and ground protection zone widths for the compartments identified in condition 95.2 of the approval

Class 1 classified drainage line — riparian exclusion zone minimum width =10 metres; ground protection zone minimum width = 10 metres

Class 1 classified drainage line within class 1 aquatic habitat — riparian exclusion zone minimum width =10 metres; ground protection zone minimum width = 10 metres

Excerpt from Table 6b: ESA categories and minimum riparian exclusion zone and ground protection zone widths for all other subregions and zones not prescribed by Table 6a

Class 1 classified drainage line — riparian exclusion zone minimum width =5 metres; ground protection zone minimum width = 10 metres

Class 1 classified drainage line within class 1 aquatic habitat — riparian exclusion zone minimum width =10 metres; ground protection zone minimum width = 10 metres

Exclusion zones for Coastal SEPP Wetlands

Outcome statement for Division 3 of Chapter 5 of the approval Vegetation adjacent to drainage features and wetlands is protected, and groundcover is retained, to maintain water quality, stream stability, riparian habitat and contribute to habitat connectivity.

99. Wetlands

99.1 For a wetland or major water storage:

(a) FCNSW must retain an exclusion zone around any wetlands or major water storages with a minimum width as specified in Table 7 of this condition;

(b) for the purposes of applying Table 7 to wetlands:

(i) the presence of the wetland must be verified and its location determined in the field;

(ii) the surface area of the wetland, and the associated exclusion zone for a wetland, must be measured from either the edge of the current saturated zone, or the outer edge of where the vegetation type indicates a wetter micro-environment than the surrounding country, whichever results in a larger surface area;

(c) the width of the exclusion zone for the wetland must be measured along the ground surface and must be determined in the field; and

(d) if an exclusion zone for a wetland or major water storage extends beyond the catchment of the wetland or major water storage it is protecting, the exclusion zone may be terminated at the catchment boundary.

> _**Excerpt from Table 7**: **Minimum exclusion zone widths for wetlands and major water storages**_
> SEPP wetlands — All (i.e. any area) — exclusion zone is 40 metres