

Assurance Audit of the Biodiversity Conservation Fund Charge System, June 2023

1.1 Executive summary

1.1.1 Summary Findings

Based on the evidence we obtained from our audits, we find the Biodiversity Conservation Fund Charge System (BCF Charge System) **compliant** with the requirements in the [Biodiversity Offsets Payment Calculator Order 2022](#) (BOPC Order 2022).

Four minor non-compliance issues were identified as part of the audits, and were addressed by the BCT.

One issue related to indexation calculations for the 2023-24 BCF Charge System data set. This issue led us to identify a minor discrepancy in index calculations for the last financial year 2022-23 dataset. While technically outside of the scope of the current audit, this potentially resulted in a minor under estimation of BCF charges for 2022-23. This discrepancy was not identified in the assurance audit conducted in October 2022-23. The BCT commenced issuing quotes on the basis of an assurance report that did not identify any unresolved compliance issues. All charge quotes issued by the BCT in the 2022-23 period were generated using the BCF Charge System as assured at the time.

Two additional issues were identified with 2023-24 data sources which have been corrected and are now compliant. Recommendations are outlined at the end of this report for further improvements to implementing the BCF Charge System.

1.1.2 Background

On 17 October 2022, the BCF Charge System commenced, which is the calculation assessment methodology that determines the amount that may be paid into the Biodiversity Conservation Fund (BCF) as an alternative to retiring biodiversity credits upon an applicant's request. The BCF Charge System is administered by the Biodiversity Conservation Trust (BCT), part of the NSW Government Department of Planning, Industry, and Environment.

The BOPC Order 2022, made under the [Biodiversity Conservation Act 2016](#), establishes the method the BCT must apply when determining a charge. The BOPC Order also allows the Minister administering the Act to commission an independent assurance audit of the BCT's implementation of the BCF Charge System.

Marsden Jacob Associates (Marsden Jacob) was commissioned to develop an assurance audit method of the BCT's implementation of the BCF Charge System. Marsden Jacob undertook an initial assurance audit of the BCT's implementation in 2022. The assurance audit method identified each relevant aspect of the Charge System and the evidence required to consider whether it had been applied according to the BOPC Order 2022. The initial assurance audit was completed before any charges were issued under the BCF Charge System to provide greater confidence in the BCT's application of the new system. Only one minor issue of non-compliance was identified

due to an incorrect formula entered, which the BCT rectified. The outcome resulted in correct predicted credit prices issued before the BCF Charge System commences.

The second assurance audit assessed whether the application of the Charge System throughout 2022-23 was consistent with the requirements of the BOPC Order 2022. An additional component was included in the second audit that separately reviewed the key datasets. Future assurance audits will be undertaken at the end of each financial year and will comprise of two components, a backward-looking review of predicted credit prices and a forward-looking review of datasets to be used for the next financial year.

1.2 Relevant assurance audit evidence

The following table details relevant evidence that will be used to conduct the assurance audit assessment of the Trust's implementation of the Charge System for the past year and the Dataset audit for the coming year.

Table 1: Relevant assurance audit evidence

Documents	Assurance Audit (for past year)	Dataset audit (for coming year)
BOPC Order	✓	✓
BSA Size Rule	✓	
Credit Yield Rule	✓	
Species Allocation rule	✓	
Market Soundings Rule	✓	
Transitional Price Cap Rule	✓	
Econometric Model report	✓	✓
Land Value Report	✓	
Data		
TFD site data for management costs	✓	✓
Management cost index spreadsheets	✓	✓
Indexation datasets from ABS		✓
Property size and land value data set from provider	✓	
Credit yield spreadsheet and pivot tables	✓	✓
Species allocation spreadsheet	✓	✓
Species pricing spreadsheet	✓	✓
Market transaction and tender data spreadsheets	✓	
Example ecosystem credit profiles and worked prices	✓	
Credit supply and demand spreadsheets	✓	
Monte Carlo simulation outputs	✓	✓

Documents	Assurance Audit (for past year)	Dataset audit (for coming year)
Documentation relevant to exercise of discretion (e.g. rationale and evidence from market soundings)	✓	

1.2.1 Assurance audit assessment

BOPC Order Section	Assurance audit question	Assurance audit evidence	Assurance flag	Notes	Residual rating
2. Operation of the Biodiversity Conservation Fund Charge System					
2.1 Application of tools	<ul style="list-style-type: none"> Has the Trust applied the correct tool? 	<ul style="list-style-type: none"> Ecosystem and species credit profiles 	Compliant		Compliant
2.2 Application of Risk premium, Delivery cost and Indexation	<ul style="list-style-type: none"> See BOPC Order Section 7 for risk premium Section 8 for delivery costs Section 9 for indexation 	<ul style="list-style-type: none"> Assurance process is applied in BOPC Order Section: <ul style="list-style-type: none"> – 7 for risk premium evidence – 8 for delivery costs evidence – 9 for indexation 	Not applicable	No rating required as section 2.2 references further sections in relation to actions the BCT will follow.	Not applicable
2.3 Final Charge formula	<ul style="list-style-type: none"> Has the Trust determined a Charge, which equals the sum of the Predicted credit price, the Risk premium, the Delivery cost and Indexation? Has the Trust correctly applied the Transitional price cap rules for the calculation of Charges for the Biodiversity Conservation Fund Charge System? 	<ul style="list-style-type: none"> Sum of the Predicted credit price, the Risk premium, the Delivery cost and Indexation with respect to the Transitional price cap rules for the calculation of Charges for the Biodiversity Conservation Fund Charge System published by the Trust from time to time. 	Compliant		Compliant
3. Tool 1 - Cost-structure tool for ecosystem credits					
3.1 Process for estimating the	<ul style="list-style-type: none"> Has the Trust followed the process for estimating the predicted credit price for an ecosystem offset trading group? 	<ul style="list-style-type: none"> Calculations of Cost structure variables for ecosystem credits (Section 3.2 - 3.8). 	Compliant		Compliant

BOPC Order Section	Assurance audit question	Assurance audit evidence	Assurance flag	Notes	Residual rating
Predicted credit price for an ecosystem offset trading group		<ul style="list-style-type: none"> Application of equation 1 in Tool 1 - Cost-structure tool for ecosystem credits. 			
3.2 Estimating typical BSA size	<ul style="list-style-type: none"> Has the Trust correctly applied the Rules for Estimating Typical BSA size for the Biodiversity Conservation Fund Charge System when estimating the typical BSA size? 	<ul style="list-style-type: none"> The application of Rules for Estimating Typical BSA size for the Biodiversity Conservation Fund Charge System Dataset of property size and OTG area by IBRA subregion Assignment the most likely BSA size based on the criteria in Table 1. Decision on BSA size documented correctly 	Compliant	The BCT needs to apply consistent reasoning when the final category is averaged across two sizes to reduce potential inconsistencies between credit prices.	Compliant
3.3 Estimating average management costs	<ul style="list-style-type: none"> Has the Trust correctly applied the average management costs? 	<ul style="list-style-type: none"> Published average management cost value TFD site data for management costs Calculation of indexation and discount rate 	Compliant		
3.4 Estimating the management cost index	<ul style="list-style-type: none"> Has the Trust correctly applied the management cost index? 	<ul style="list-style-type: none"> Management cost index spreadsheets 	Minor non-compliance	The 1-year and 10-year indexation calculation were not calculated correctly, due to a missing data point in the averaging process. BCT has addressed this issue for 2023-24. Although this discrepancy was identified during the assurance audit for 2023-24, it also led us to the	Compliant

BOPC Order Section	Assurance audit question	Assurance audit evidence	Assurance flag	Notes	Residual rating
				<p>identification of the same discrepancy for the 2022-23 audit period. This discrepancy was not identified in the 2022-23 assurance audit, which was undertaken in October 2022, before BCT began issuing quotes. The BCT commenced issuing these quotes on the basis of an assurance report that did not identify any unresolved compliance issues.</p> <p>As a result of this discrepancy, BCF charge quotes issued in 2022-23 were potentially marginally undervalued in 2022-23. However, this is technically outside the scope of this 2023-24 assurance audit.</p>	
3.5 Estimating land value of an OTG (LV)	<ul style="list-style-type: none"> Has the Trust correctly estimated the land value of an OTG? 	<ul style="list-style-type: none"> Dataset of land value estimates for each OTG and IBRA subregion 	Compliant		Compliant
3.6 Estimating land value index	<ul style="list-style-type: none"> Has the Trust correctly estimated the land value index? 	<ul style="list-style-type: none"> Dataset of the long-term average annual increase in land value for relevant land Indexation datasets from ABS 	Compliant		Compliant

BOPC Order Section	Assurance audit question	Assurance audit evidence	Assurance flag	Notes	Residual rating
3.7 Estimating credit value per hectare constants	<ul style="list-style-type: none"> Has the Trust correctly estimated the credit value per hectare constants? 	<ul style="list-style-type: none"> Formula to estimate credit value per hectare ($CV/ha = C + MCa + LVy$) 	Compliant		Compliant
3.8 Estimating ecosystem credit yield	<ul style="list-style-type: none"> Has the Trust correctly applied the Rules for Estimating ecosystem credit yield for the Biodiversity Conservation Fund Charge System when calculating typical ecosystem credit yield? 	<ul style="list-style-type: none"> Dataset of credit yields for each OTG, Vegetation Class and Vegetation formation 	Compliant	For formation class category, ensure consistency across which subregions are included in the calculations so numbers are more easily replicated	Compliant
4. Tool 2 - Cost structure tool for species credits					
4.1 Calculating the predicted species credit price	<ul style="list-style-type: none"> Has the Trust correctly estimated the species credit price value? 	<ul style="list-style-type: none"> Species Credit Calculator dataset M1D1 price calculation and market transaction and tender data Charges for the remaining Species Credit pricing categories, either by ratio, or by equation, once the independent market transaction threshold has been reached. 	Compliant		Compliant
4.2 Allocation of species and dataset updates	<ul style="list-style-type: none"> Has the Trust correctly applied the Rules for Allocating Species to Categories in the Biodiversity Conservation Fund Charge System? 	<ul style="list-style-type: none"> Species allocation spreadsheet 	Compliant		Compliant
5. Tool 3 - Econometric model for ecosystem credits					

BOPC Order Section	Assurance audit question	Assurance audit evidence	Assurance flag	Notes	Residual rating
5. Tool 3 - Econometric model for ecosystem credits	<ul style="list-style-type: none"> Has the Trust correctly applied the econometric model for ecosystem credits? 	<ul style="list-style-type: none"> Econometric model outputs 	Compliant		Compliant
6. Tool 4 - Market soundings					
6.1 Supply and demand forecasting	<ul style="list-style-type: none"> Has the Trust correctly applied the Rules for application of market soundings in the Biodiversity Conservation Fund Charge System? 	<ul style="list-style-type: none"> Econometric model parameters Credit supply and demand spreadsheets Trade data and weighted average price calculations in OTG profiles Trust value-for-money credit tender prices Evidence from market soundings undertaken The rationale for using market soundings 	Compliant		Compliant
6.2 Market sounding input to cost-structure tools					
6.3 Market sounding to estimate the Predicted credit price			Compliant		Compliant
7. Risk premium					
7.1 Calculating the Risk premium	<ul style="list-style-type: none"> See BOPC Order Section: 7.2 for risk premium for credits priced via the econometric model 7.3 for risk premium for credits priced via the cost-structure tool and market soundings 	<ul style="list-style-type: none"> See 7.2 and 7.3 	Not applicable	See 7.2 and 7.3	Not applicable

BOPC Order Section	Assurance audit question	Assurance audit evidence	Assurance flag	Notes	Residual rating
7.2 Risk premium for credits priced via the econometric model	<ul style="list-style-type: none"> Has the Trust correctly applied the risk premium for credits priced via the econometric model? 	<ul style="list-style-type: none"> Econometric model outputs 	Compliant		Compliant
7.3 Risk premium for credits priced via the cost-structure tool and market soundings	<ul style="list-style-type: none"> Has the Trust correctly applied the risk premium for credits priced via the cost-structure tool and market soundings? 	<ul style="list-style-type: none"> Monte Carlo simulation outputs and correct calculation for the approved percentile level. Credit calculation spreadsheets for ecosystem and species credits applied correctly for risk premium. 	Compliant		Compliant
8. Delivery Costs					
8. Delivery Costs	<ul style="list-style-type: none"> Has the Trust correctly calculated the delivery costs for each offset trading group or species in a Charge issued for a particular project proposal? 	<ul style="list-style-type: none"> Credit calculation spreadsheets for ecosystem and species credits applied correctly for delivery costs. 	Compliant		Compliant
9. Indexation					
9.1 Monthly Indexation rate in the econometric model	<ul style="list-style-type: none"> Has the Trust correctly applied the monthly indexation rate where the econometric model is given full weight to determine the Predicted credit price? 	<ul style="list-style-type: none"> Credit calculation spreadsheets for ecosystem and species credits applied correctly for delivery costs. Management cost index spreadsheets 	Compliant		Compliant
9.2 Monthly Indexation rate in the	<ul style="list-style-type: none"> Has the Trust correctly applied the monthly indexation rate where a cost structure tool or market soundings are 		Compliant		Compliant

BOPC Order Section	Assurance audit question	Assurance audit evidence	Assurance flag	Notes	Residual rating
cost-structure tools and market soundings	used to determine the Predicted credit price?				
9.3 Monthly Indexation rate if multiple tools used to predict credit price	<ul style="list-style-type: none"> Has the Trust correctly applied the monthly indexation rate where the econometric model tool and one or more other tools are used to determine the Predicted credit price? 		Compliant		Compliant

1.2.2 Summary comments and actions

Below is a summary of Marden Jacob's findings from the assurance audit, along with recommendations for improvement for BCT.

Due to their continued relevance, some comments and recommendations have been carried over from the initial 2022 assurance audit.

Comments

- The process for estimating the likely BSA size for the OTG is outlined in Section 3.1 and 3.2 of the BOPC Order and *Rules for Estimating Typical BSA size for the BCF Charge System* (Rule 1). The rules allow the BCT to assign BSA size to an OTG using their informed rationale when criteria suggest there are more than one typical BSA size category. The rationale for selecting the final BSA size category should be better documented, especially if an average of two size categories (see Table 3, Rule 1) is proposed.
- Equation 1 in BOPC Order Section 3 calculates predicted credit prices for ecosystem credits. The equation variables and their identifier should be used consistently across all documents used to calculate the predicted credit prices.
- Section 3 in the BOPC Order outlines how management costs are estimated. As part of the updated assurance process to include the Data Assurance, MJA identified that the indexation calculation was missing one data point in the averaging process. Although this discrepancy was identified during this assurance audit, it also affects the previous audit period. As a result, BCF charge quotes were potentially marginally under-valued in 2022-23. This discrepancy was not identified in the audit conducted in October 2022-23 before BCT commenced issuing quotes under the new charge system. All charge quotes issued by BCT in the 2022-23 period were generated using the BCF Charge System as assured at the time. The BCT commenced issuing these quotes on the basis of an assurance report that did not identify any unresolved compliance issues. BCT has addressed this issue for 2023-24. BCT has also updated the indexation calculation to ensure best practice methods are applied.
- The document *Rules for Estimation Ecosystem Credit Yield for the BCF Charge System* (Rule 2), and Section 3.8 in the BOPC Order outline the rules for calculating typical ecosystem credit yields. Rule 2 states that credit yields are sometimes calculated using data in relevant (filtered) subregions. If subregions need to be filtered when determining the credit yield, a standard list of relevant sub-regions and adjoining sub-regions should be used to replicate the process more efficiently.
- Data traceability could be updated to ensure more efficient audits and reconciliation of inputs to generate predicted credit prices. There are a number of datasets with hard-coded results that limit tracing their original source.

Recommended actions

We recommend the following actions to improve processes:

- We recommend an appropriate evaluation and review process be conducted on the content and implementation of the BOPC Order 2022 to ensure the framework remains appropriate to achieving the desired outcomes.
- Explore providing data sources or using linked data where possible across databases.
- Explore updating the price template to ensure the formula variables are the same as in the order.

1.2.3 Dataset audit

BOPC Order Section	• Dataset audit question	• Dataset audit evidence	Assurance flag	Notes	Residual rating
3. Tool 1 – Cost structure tool for ecosystem credits					
3.1 Process for estimating the predicted credit price for an ecosystem offset trading group	<ul style="list-style-type: none"> • In the Master Credit Price Register, are the correct variables used for each ecosystem category's Indexation and risk premium? • In the Ecosystem Credit Template, are the correct variables used to calculate the predicted credit price? 	<ul style="list-style-type: none"> • Master Credit Price Register input variables • Ecosystem Credit Template fixed constants (C, a, and y) and TFD values by BSA size category 	Compliant	In BCT data "Entry", "LV", and "TFD" are used for the fixed constant values "C", "a", and "y" respectively.	
3.3 Estimating the average management costs	<ul style="list-style-type: none"> • Has the Trust correctly calculated the management costs of BSA size categories based on the TFD dataset? 	<ul style="list-style-type: none"> • TFD dataset • TFD calculation by BSA size category 	Compliant		

BOPC Order Section	• Dataset audit question	• Dataset audit evidence	Assurance flag	Notes	Residual rating
3.4 Estimating the management cost index (i)	<ul style="list-style-type: none"> Has the Trust correctly calculated the management cost index (i)? 	<ul style="list-style-type: none"> Indexation datasets from ABS: Quarterly material and wage cost indices 10-year average calculated as an average annual percentage change 1-year calculated as a percentage change. Land value index Management cost index spreadsheets 	Minor non-compliance	<p>The 1-year and 10-year indexation calculation were not calculated correctly, due to a missing data point in the averaging process. BCT has addressed this issue for 2023-24.</p> <p>Although this discrepancy was identified the assurance audit for 2023-24, it also led to the identification of the same discrepancy for the 2022-23 audit period. This discrepancy was not identified in the 2022-23 assurance audit, which was undertaken in October 2022, before BCT began issuing quotes. The BCT commenced issuing these quotes on the basis of an assurance report that did not identify any unresolved compliance issues.</p> <p>As a result of this discrepancy, BCF charge quotes issued in 2022-23</p>	Compliant

BOPC Order Section	• Dataset audit question	• Dataset audit evidence	Assurance flag	Notes	Residual rating
				were potentially marginally under-valued. However, this is technically outside of the scope of this 2023-24 assurance audit.	
4. Tool 2 – Cost structure tool for species credits					
4.1 Calculating the predicted species credit price	<ul style="list-style-type: none"> Has the Trust correctly calculated the species credit price value of the M1D1 category? In the Species Credit Calculator, are the correct variables used for the M1D1 category, the Indexation, and risk premium? 	<ul style="list-style-type: none"> From the Credit Trade Data, all M1D1 category species credit trade data for transactions in the previous 24 months and calculation of M1D1. Species Credit Calculator input variables 	Minor non-compliance	The M1D1 calculation was referencing trades from outside the previous 24 months. BCT has addressed this issue for 2023-24.	Compliant
5. Tool 3 - Econometric model for ecosystem credits					
5. Tool 3 - Econometric model for ecosystem credits	<ul style="list-style-type: none"> Has the Trust correctly applied the econometric model for ecosystem credits? 	<ul style="list-style-type: none"> Econometric model outputs 	Minor non-compliance	The Econometric model has three variables that can be adjusted. One of the variables was inconsistently selected. BCT has addressed this issue for 2023-24.	Compliant
7. Risk Premium					

BOPC Order Section	• Dataset audit question	• Dataset audit evidence	Assurance flag	Notes	Residual rating
7.1 Calculating the Risk premium	<ul style="list-style-type: none"> • See BOPC Order Section: <ul style="list-style-type: none"> • 7.2 for risk premium for credits priced via the econometric model • 7.3 for risk premium for credits priced via the cost-structure tool and market soundings 	<ul style="list-style-type: none"> • Risk premium percentile distributions are documented in the simulation report. • BCT have documented which risk premiums they will use for each credit category. 	Compliant		

1.2.4 Summary comments and actions

Below is a summary of Marden Jacob’s findings from the dataset audit, along with recommendations for improvement for BCT. Some recommendations are consistent with the recommendations in the assurance audit above.

Comments

- Equation 1 in BOPC Order Section 3 calculates predicted credit prices for ecosystem credits. The equation variables and their identifier should be used consistently across all documents used to calculate the predicted credit prices.
- Section 3 in the BOPC Order outlines how management costs are estimated. As part of the updated assurance process to include the Data Assurance, MJA identified that the indexation calculation was missing one data point in the averaging process. Although this discrepancy was identified during this assurance audit, it also affects the previous audit period. As a result, BCF charge quotes were potentially marginally under-valued in 2022-23. This discrepancy was not identified in the audit conducted in October 2022-23 before BCT commenced issuing quotes under the new charge system. All charge quotes issued by BCT were generated using the BCF Charge System as assured at the time. The BCT commenced issuing these quotes on the basis of an assurance report that did not identify any unresolved compliance issues. BCT has addressed this issue for 2023-24. BCT has also updated the indexation calculation to ensure best practice methods are applied.

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- Section 4.1 in the BOPC Order outlines how the weighted average credit value of species credits transacted in the previous 24 months should be used to calculate the species credit price value of the M1D1 category. Sorting the transacted species credits by date (month and year) instead of by species will assist in accurately capturing all relevant transactions to accurately calculate the species credit price value for the M1D1 category. BCT has addressed this issue for 2023-24.
- Section 5 in the BOPC Order outlines the econometric model for ecosystem credits. Three key variables in the econometric model can be adjusted to suit market conditions. The variables settings should be recorded to allow for easier assurance reviews and internal QA. BCT has addressed this issue for 2023-24.
- Section 7 in the BOPC Order outlines the risk premium calculation methodology. The BCT's assigned risk premiums were rounded to the first decimal place although the externally produced *BCF Charge System updated simulation results* reported without decimals. Although it is not specified in the BOPC order, using unrounded values is better practice. The BCT correctly used the risk premiums directly calculated from the Monte Carlo simulation spreadsheet with the decimals, instead of rounded values included in the Monte Carlo simulation report. Although not currently specified in the BOPC Order, this is a more robust practice.

Recommended actions

We recommend the following actions to improve dataset conformance:

- Request the external consultants who run Monte Carlo simulations to determine the risk premium to report numbers to the first decimal place.
- Update data traceability to ensure more efficient audits. There are a number of datasets with hard-coded results that limit tracing their original source. For example, the indexation is hard coded across a number of spreadsheets and the assurance processes would benefit from an assumption tab with the relevant data used in any calculations.
- Explore updating the price template to ensure the formula variables match those used in the Order's equations.

Disclaimer

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