



ECONOMIC ASSESSMENT OF FISHING CAPACITY OF THE SA MARINE SCALEFISH FISHERY

A Report to PIRSA

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ABBREVIATIONS

CPUE	catch per unit effort
GSV	Gulf St Vincent
GVP	gross value of production
KI	Kangaroo Island
NER	net economic return
PIRSA	Primary Industries and Regions South Australia
SA	South Australia
SA MSF	South Australia's Marine Scalefish Fishery
SE	South East
SG	Spencer Gulf
SARDI	South Australian Research and Development Institute
TACC	total allowable commercial catch
WC	West Coast

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EXECUTIVE SUMMARY

Economic rent in South Australia's Marine Scalefish Fishery (SA MSF) has been negative for more than 20 years and the aggregate value of licences has been declining for the last nine years. Along with these pressures on the financial profitability of the fishery, total catch has followed a significant declining trend.

The SA MSF is currently undergoing a strategic review with the principal aim of restructuring the fishery in order to ensure its long-term sustainability and economic viability. The SA Government have committed to the rationalisation of the fishery with an initial aim to remove 100 licences.

Four regional scenarios (different boundary definitions) were developed through the Commercial Marine Scalefish Fishery Research Advisory Committee (CMSFRAC). One of these regional scenarios¹ has been selected for this analysis.

The overall approach to this analysis is one of ensuing sustainability in the SA MSF where the net economic return (NER) generated by the fishery is greater than zero. Using data on the average catch and effort levels of key species, BDO EconSearch were tasked with estimating the number of licences needed in each region to achieve a NER greater than zero, i.e. lifting the fishery from a position of generating negative economic returns to one of long-term positive returns. The modelling process provides an estimate of the number of licences in each region that need to be removed under a fishery restructure to achieve a positive net economic return.

The approach is an iterative one where licences, and fixed costs associated with these licences, are incrementally removed from the fishery and the income and variable costs associated with these licences redistributed to the remaining licence holders. After each licence is removed the NER is recalculated and the process continues until the NER in each region becomes positive.

Two assumptions regarding the structure of fishing businesses were used in this analysis. Businesses that leave the fishery were assumed to be either:

- similar to the average financially performing business in that region of the fishery; or
- similar to poorer financially performing businesses in that region of the fishery who also are less efficient (i.e. have a lower catch per unit effort (CPUE)).

The financial performance indicators report for the SA MSF (BDO EconSearch 2019) provides the data that form the basis for the economic analysis. The financial indicators are reported for average businesses in each of four financial performance quartiles. The first quartile denotes the worst performing businesses in the fishery, in terms of return to total capital, and the fourth quartile denotes the best performing businesses. While the average across all quartiles was used to represent the average performing business, the second quartile data were used to represent the poorer performing businesses.

In addition to the two level of business performance, three different levels of catch were analysed in the modelling:

- current catch levels (average between 2011/12 and 2015/16)
- a 20 per cent reduction in current catch levels for key species, and

¹ Referred to as Scenario 3.1 by the committee.

- indicative TACCs for key species .

Catch levels in each of the four regions for scenario 3.1 are provided in (Table ES-1).

Table ES-1 Catch levels scenarios by region (t)

	WC	SG	GSV/KI	SE	Total
Current catch	271	1,049	739	147	2,207
20% reduction in current catch of key species ^a	245	955	624	128	1,952
Indicative TACCs for key species	277	1,048	492	148	1,965

^a Catch of remaining species held constant at current levels.

In total six scenarios were analysed, three catch levels applied to the two levels of financial performance.

The estimated number of licences that would need to be removed to achieve a positive NER under each of the six scenarios are detailed at a regional level in Table ES-2.

Table ES-2 Estimated number of licences to be removed to achieve a positive net economic return

	WC	SG	GSV/KI	SE	Total
<i>Average business</i>					
Current catch	27	19	44	7	97
20% reduction in catch of key species	34	35	55	10	134
Indicative TACCs	28	18	68	6	120
<i>Poorer performing business</i>					
Current catch	39	53	57	16	165
20% reduction in catch of key species	43	61	65	17	186
Indicative TACCs	39	58	82	18	197
Current number of licences (2017/18)	56	124	93	20	293

1. INTRODUCTION

1.1. Background

Economic rent in South Australia's Marine Scalefish Fishery (SA MSF) has been negative for more than 20 years and the aggregate value of licences has been declining for the last nine years. Along with these pressures on the financial profitability of the fishery, total catch has followed a significant declining trend. The fall, from 5,036 tonnes in 1998/99 to 2,303 tonnes in 2017/18, is due to a decrease in catch of a number of key species including Australian Salmon, Shark, King George Whiting and Garfish. Catch of Snapper followed an increasing trend between 2002/03 and 2010/11, although it has declined significantly since (BDO EconSearch 2019).

The SA MSF is currently undergoing a strategic review with the principal aim of restructuring the fishery in order to ensure its long-term sustainability and economic viability. The SA Government have committed to the rationalisation of the fishery with an initial aim to remove 100 licences.

BDO EconSearch have been engaged by PIRSA to undertake an economic assessment of the fishing capacity within the SA MSF. The aim was to estimate the number of licences (and fishing activity) in each region that achieve the objectives of stock sustainability and economic viability.

1.2. Report Scope

Four regional scenarios were developed through the Commercial Marine Scalefish Fishery Research Advisory Committee (CMSFRAC). One of these regional scenarios, Scenario 3.1, was selected for this analysis.

Using data on the average catch levels of key species BDO EconSearch were tasked with estimating the number of licences needed in each region to achieve a net economic return (NER) greater than zero, bringing the fishery out of negative territory. In turn, this provided the number of licences that need to be removed under a fishery restructure.

Two assumptions regarding the structure of fishing businesses were used in this analysis, Businesses that leave the fishery are either:

- similar to the average financially performing business in that region of the fishery; or
- similar to poorer financially performing businesses in that region of the fishery who also are less efficient (i.e. have a lower catch per unit effort (CPUE)).

In addition to analysing current catch levels (average between 2011/12 and 2015/16), a 20 per cent reduction in catch and indicative Total Allowable Commercial Catches (TACCs) for key species were analysed under the assumptions of average performing businesses and poorer performing businesses.

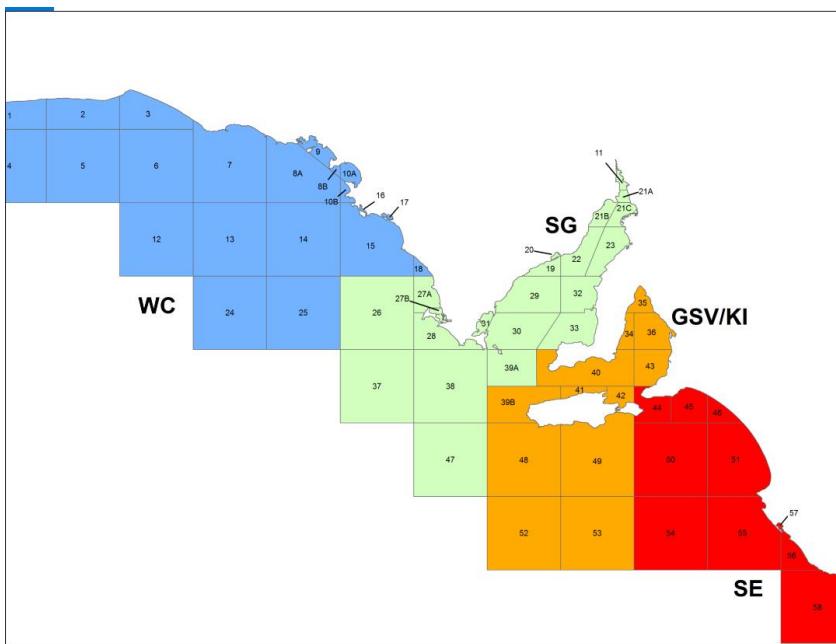
2. METHOD OF ANALYSIS AND DATA.

A description of the regional scenario, data and method used in the analysis are provided in this section.

2.1. Regional Scenario

Four regional scenarios were developed by the Commercial Marine Scalefish Fishery Research Advisory Committee (CMSFRAC) with the scenario² selected for the analysis provided in this report illustrated in Figure 2-1.

Figure 2-1 Regional scenario



The regional scenarios were based on a biological unit stock concept for the major species (Snapper, King George Whiting, Garfish and Southern Calamari) and Yellowfin whiting, Australian Salmon and Australian Herring and on an understanding of fleet dynamics and stock boundaries.

2.2. Method

The overall approach to this analysis is one of ensuring sustainability in the SA MSF where net economic return (NER) generated by the fishery is greater than zero. As previously stated, net economic return in the SA MSF has been negative for more than 20 years.

Net economic return (NER) is defined as the difference between the price of a good produced using a natural resource and the unit cost of turning that natural resource into the good. In this case the natural resource is the SA Marine Scalefish Fishery and the good produced is the landed fish. The unit costs or long-term costs all need to be covered if a licence holder is to remain in the fishery. These long-term costs include direct operating costs such as fuel, labour (including the opportunity cost of a self-employed fisher's own labour), ice, overheads such as administration and licence fees, and the cost of capital invested in the

² Referred to as Scenario 3.1 by the Committee.

boat and gear (excluding licence). Capital costs includes depreciation and the opportunity cost of the capital applied to the fishery. The opportunity cost is equivalent to what the fisher's investment could have earned in the next best alternative use.

Using data on the average catch and effort levels of key species, the number of licences needed in each region to achieve a NER greater than zero, i.e. to lift the fishery from a position of generating negative economic returns to one of long-term positive returns. The modelling process thereby provides an estimate of the number of licences in each region that need to be removed under a fishery restructure to achieve a positive and sustainable net economic return.

The approach is an iterative one where licences, and the fixed costs associated with these licences, are incrementally removed from the fishery and the income and variable costs associated with these licences redistributed to the remaining licence holders. After each licence is removed the NER is recalculated and the process continues until the NER in each region becomes positive.

Two assumptions regarding the structure of fishing businesses were used in this analysis. Businesses that leave the fishery were assumed to be either:

- similar to the average financially performing business in that region of the fishery; or
- similar to poorer financially performing businesses in that region of the fishery who also are less efficient (i.e. have a lower catch per unit effort (CPUE)).

The financial performance indicators report for the SA MSF (EconSearch 2016) provides the data that form the basis for the economic analysis. The financial indicators are reported for average businesses in each of four financial performance quartiles. The first quartile denotes the worst performing businesses in the fishery, in terms of return to total capital, and the fourth quartile denotes the best performing businesses. While the average across all quartiles was used to represent the average performing business, the second quartile data were used to represent the poorer performing businesses.

In the analysis under the assumption that the poorer performing businesses would be those that exit the fishery, a further assumption was made that the remaining businesses would be more efficient than those that leave. To validate this assumption, or at least confirm that it is reasonable, data on catch per unit effort (CPUE) were provided by SARDI. The average CPUE per licence over the five years, 2011/12 to 2015/16 was sorted into four quartiles according to catch, smallest to largest. These data showed a significant jump in efficiency (69 per cent increase in CPUE) between the second and third quartiles, which provides strong support to the assumption of higher than average efficiency of remaining businesses.

2.3. Data

Catch and effort

Catch by major species under the regional scenario is detailed in Table 2-1. These data are an average annual catch in each of the four regions over the five year period, 2011/12 to 2015/16.

Table 2-1 Catch by region by major species (t)

	WC	SG	GSV/KI	SE	Total
Snapper	15	85	344	54	498
Garfish	1	115	72	1	189
KGW	106	94	44	0	243
Southern Calamari	9	178	115	41	342
Other	140	578	165	52	935
Total	271	1,049	739	147	2,207

Source: SARDI Aquatic Sciences (unpublished data)

Licences

The current number of licences under the regional scenario, including both active³ and inactive licences, per region was provided by PIRSA and is detailed in Table 2-2. For the most recent financial year for which data were available (2017/18), 16 of the 293 licences were inactive (PIRSA). By region there were three inactive licences in the WC, four in the SG, eight in the GSV/KI region and one in the SE. It is important to note these inactive licences because, in the event of a restructure, we have assumed that these licence holders will choose to leave first. Removing these licences has no impact on the NER for the fishery or on employment levels as their inactivity implies they are currently employing no capital or labour in the fishery.

Table 2-2 Number of licences by region ^a

	WC	SG	GSV/KI	SE	Total
Active licences	53	120	85	19	277
Inactive licences	3	4	8	1	16
Total licences	56	124	93	20	293

^a Excludes all 14 Sardine licences.

Source: PIRSA Fisheries and Aquaculture

Costs and returns

Average costs and returns for the four main species and the remaining species by region were developed for the report titled *SA Marine Scalefish Fishery Economic Analysis of Core Species 2013/14* prepared for PIRSA Fisheries and Aquaculture (EconSearch 2016). To utilise these financial data for this study the following information was used to adjust the 2013/14 indicators to reflect the fishery's performance in 2017/18.

- SARDI data were used to reflect changes in catch and its value between 2013/14 and 2017/18. Catch and value data were used to estimate the average total boat income in the fishery.
- Information on change in fishing effort (number of days fished) between 2013/14 and 2017/18 was used to adjust the cost of inputs that were assumed to vary with fishing effort. These inputs included fuel, repairs and maintenance, ice and provisions.
- The consumer price index (CPI) for Adelaide and components of the CPI were used to adjust the cost of inputs to reflect local levels of inflation (ABS 2018).

³ A licence is considered active if it was used to fish for one or more days in that financial year.

2.4. Scenarios for Analysis

In addition to the two levels of business performance (as noted in Section 2.2), three different levels of catch were analysed in the modelling:

- current catch levels (average between 2011/12 and 2015/16)
- a 20 per cent reduction in current catch levels for key species, and
- indicative TACCs for key species .

Catch levels in each of the four regions for scenario 3.1 are provided in (Table ES-1).

Table 2-3 Catch levels scenarios by region (t)^a

Catch Scenario	WC	SG	GSV/KI	SE	Total
Current catch	271	1,049	739	147	2,207
20% reduction in current catch of key species ^a	245	955	624	128	1,952
Indicative TACCs for key species	277	1,048	492	148	1,965

^a Catch of remaining species held constant at current levels.

Source: SARDI

In total six scenarios were analysed to estimate the number of licences that would need to be removed to enable the fishery to generate a positive NER. The scenarios can be categorised under two levels of financial performance, with three catch levels applied to both, as shown below.

- Average business performance:
 - Current catch
 - 20% reduction in catch of key species
 - Indicative TACCs
- Poorer performing business:
 - Current catch
 - 20% reduction in catch of key species
 - Indicative TACCs

3. RESULTS

3.1. Remove Average Performing Businesses

The results reported in this section are based on the assumption that the financial performance of businesses leaving the fishery are at the fishery average. The analysis was replicated for each of the three catch scenarios, current catch, reduced catch (20%) and indicative TACCs, as detailed in Table 2-3.

3.1.1. Current catch

The *current* number of licences by region and method (line and net) and the number of licences that would *need to be removed* to generate a positive NER are detailed in Table 3-1 under the current catch, average business scenario.

Under this scenario, a total of 97 licences would need to be removed to ensure a positive NER in all four regions. Almost half (44 licences) would need to be removed from GSV/KI, followed by WC (27), SG (19) and SE (7). The majority would be line only licences (83) with the balance net licences (14).

The estimated improvement in fishery NER of removing one more boat in each region was, on average, approximately \$28,000 in the WC, \$44,000 in SG, \$52,000 in GSV/KI and \$51,000 in the SE.

Table 3-1 Number of licences to be removed for positive NER: current catch, average business scenario ^a

	WC	SG	GSV/KI	SE	Total
<i>Current licences</i>					
Net	4	21	26	0	51
Line	52	103	67	20	242
Total	56	124	93	20	293
<i>Licences to be removed</i>					
Net	0	5	8	0	14
Line	27	14	36	7	83
Total	27	19	44	7	97

^a Includes inactive licences but excludes all 14 Sardine endorsed licences.

Source: BDO EconSearch analysis

3.1.2. Reduction in catch

The ‘reduction in catch’ scenario assumes a 20 per cent reduction in the level of catch for each of the four key species in each region and that the businesses leaving the fishery have average financial performance. The current number of licences by region and method (line and net) and the number of licences that would need to be removed to generate a positive NER are detailed in Table 3-5 under the reduction in catch, average business scenario.

The estimated improvement in fishery NER of removing one more boat in each region was, on average, \$18,000 in the WC, \$14,000 in SG, \$38,000 in GSV/KI and \$20,000 in the SE.

Table 3-5 under the reduction in catch, average business scenario.

Under this scenario, a total of 134 licences would need to be removed to ensure a positive NER in all four regions. Over 40 per cent (55 licences) would need to be removed from GSV/KI, around 25 per cent each from the WC (34) and SG (35), and less than 10 per cent from the SE (10). The majority would be line only licences (112) with the balance net licences (22).

The estimated improvement in fishery NER of removing one more boat in each region was, on average, \$28,000 in the WC, \$18,000 in SG, \$44,000 in GSV/KI and \$19,000 in the SE.

Table 3-2 Number of licences to be removed for positive NER: catch reduction, average business scenario^a

	WC	SG	GSV/KI	SE	Total
<i>Current licences</i>					
Net	4	21	26	0	51
Line	52	103	67	20	242
Total	56	124	93	20	293
<i>Licences to be removed</i>					
Net	0	11	10	0	22
Line	34	24	45	10	112
Total	34	35	55	10	134

^a Includes inactive licences but excludes all 14 Sardine endorsed licences.

Source: BDO EconSearch analysis

3.1.3. Indicative TACCs

Total catch by region for each of the scenarios, including the indicative regional TACCs scenario, were provided in Table 2-3. The indicative TACCs *by species* by region are detailed in **Error! Reference source not found.** Table 3-3. These indicative TACCs were developed by SARDI but will require further development prior to the setting of actual TACCs.

Table 3-3 Indicative TACCs for the major species by region (t) ^a

	WC	SG	GSV/KI	SE	Total
Snapper	24	12	33	17	86
King George Whiting	80	125	54	1	260
Southern Calamari	21	209	151	73	454
Garfish	10	124	90	6	230

^a Indicative only - actual TACCs will need further development.

Source: SARDI Aquatic Sciences

The ‘indicative TACCs’ scenario is based on the quota for key species reported in Table 3-3, catch levels for other species as per the ‘current catch scenario, and the assumption that the businesses leaving the fishery have average financial performance. The current number of licences by region and method (line and net) and the number of licences that would need to be removed to generate a positive NER are detailed in Table 3-4 under the indicative TACCs, average business scenario.

Under this scenario, a total of 120 licences would need to be removed to ensure a positive NER in all four regions. Around 57 per cent (68 licences) would need to be removed from GSV/KI, around 23 per cent from the WC (28), 15 per cent from the SG (18) and just 5 per cent from the SE (6). As with the previous two scenarios, the majority would be line only licences (101) with the balance net licences (19).

The estimated improvement in fishery NER of removing one more boat in each region was, on average, \$27,000 in the WC, \$48,000 in SG, \$31,000 in GSV/KI and \$61,000 in the SE.

Table 3-4 Number of licences to be removed for positive NER: indicative TACC, average business scenario^a

	WC	SG	GSV/KI	SE	Total
<i>Current licences</i>					
Net	4	21	26	0	51
Line	52	103	67	20	242
Total	56	124	93	20	293
<i>Licences to be removed</i>					
Net	0	5	13	0	19
Line	28	13	55	6	101
Total	28	18	68	6	120

^a Includes inactive licences but excludes all 14 Sardine endorsed licences.

Source: BDO EconSearch analysis

3.2. Remove Poorer Performing Businesses

The results reported in this section are based on the assumption that the financial performance of businesses leaving the fishery are below the fishery average. Under this scenario it was further assumed (detailed in Section 2.1) that the remaining businesses would be more efficient (higher CPU) than those that leave. The analysis under these assumptions was replicated for each of the three catch scenarios, current catch, reduced catch (20%) and indicative TACCs, as detailed in Table 2-3.

3.2.1. Current catch

The *current* number of licences by region and method (line and net) and the number of licences that would *need to be removed* to generate a positive NER are detailed in Table 3-5. The estimated improvement in fishery NER of removing one more boat in each region was, on average, \$18,000 in the WC, \$14,000 in SG, \$38,000 in GSV/KI and \$20,000 in the SE.

Table 3-5 under the current catch, poorer performing business scenario.

Under this scenario, a total of 165 licences would need to be removed to ensure a positive NER in all four regions.

The estimated improvement in fishery NER of removing one more boat in each region was, on average, \$18,000 in the WC, \$14,000 in SG, \$38,000 in GSV/KI and \$20,000 in the SE.

Table 3-5 Number of licences to be removed for positive NER: current catch, poorer business scenario^a

	WC	SG	GSV/KI	SE	Total
<i>Current licences</i>					
Net	4	21	26	0	51
Line	52	103	67	20	242
Total	56	124	93	20	293
<i>Licences to be removed</i>					
Net	0	18	11	0	29
Line	38	35	46	16	136
Total	38	53	57	16	165

^a Includes inactive licences but excludes all 14 Sardine endorsed licences.

Source: BDO EconSearch analysis

3.2.2. Reduction in catch

The following results assume a 20 per cent reduction in the level of catch for each of the four key species in each region and are based on a poorer financially performing business. The current number of licences by region and method (line and net) and the number of licences that need to be removed are detailed in Table 3-6. The estimated improvement in fishery NER of removing one more boat in each region was, on average, \$17,000 in the WC, \$12,000 in SG, \$33,000 in GSV/KI and \$19,000 in the SE.

Table 3-6.

Under this scenario, a total of 186 licences would need to be removed to ensure a positive NER in all four regions.

The estimated improvement in fishery NER of removing one more boat in each region was, on average, \$17,000 in the WC, \$12,000 in SG, \$33,000 in GSV/KI and \$19,000 in the SE.

Table 3-6 Number of licences to be removed for positive NER: catch reduction, poorer business scenario^a

	WC	SG	GSV/KI	SE	Total
<i>Current licences</i>					
Net	4	21	26	0	51
Line	52	103	67	20	242
Total	56	124	93	20	293
<i>Licences to be removed</i>					
Net	1	21	12	0	34
Line	42	40	53	17	152
Total	43	61	65	17	186

^a Includes inactive licences but excludes all 14 Sardine endorsed licences.

Source: BDO EconSearch analysis

3.2.3. Indicative TACCs

Indicative regional TACCs were developed by SARDI as detailed in Table 3-3. The following results are based on a poorer financially performing business. The current number of licences by region and method (line and net) and the number of licences that need to be removed are detailed in Table 3-7. Under this scenario, a total of 197 licences would need to be removed to ensure a positive NER in all four regions.

The estimated improvement in fishery NER of removing one more boat in each region was, on average, \$18,000 in the WC, \$12,000 in SG, \$25,000 in GSV/KI and \$18,000 in the SE.

Table 3-7 Number of licences to be removed for positive NER: indicative TACCs poorer business scenario^a

	WC	SG	GSV/KI	SE	Total
<i>Current licences</i>					
Net	4	21	26	0	51
Line	52	103	67	20	242
Total	56	124	93	20	293
<i>Licences to be removed</i>					
Net	1	20	16	0	36
Line	38	38	66	18	161
Total	39	58	82	18	197

^a Includes inactive licences but excludes all 14 Sardine endorsed licences.

Source: BDO EconSearch analysis

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- Australian Bureau of Statistics (ABS) 2018, *Consumer Price Index, Australia*, Cat. No. 6401.0.
- BDO EconSearch 2019, *Economic and Social Indicators for the South Australian Marine Scalefish Fishery 2017/18*, report prepared for PIRSA Fisheries and Aquaculture, Adelaide, July.
- EconSearch 2016, *SA Marine Scalefish Fishery Economic Analysis of Core Species 2013/14*, prepared for PIRSA Fisheries and Aquaculture, April.

Disclaimer

The assignment is a consulting engagement as outlined in the ‘Framework for Assurance Engagements’, issued by the Auditing and Assurances Standards Board, Section 17. Consulting engagements employ an assurance practitioner’s technical skills, education, observations, experiences and knowledge of the consulting process. The consulting process is an analytical process that typically involves some combination of activities relating to: objective-setting, fact-finding, definition of problems or opportunities, evaluation of alternatives, development of recommendations including actions, communication of results, and sometimes implementation and follow-up.

The nature and scope of work has been determined by agreement between BDO and the Client. This consulting engagement does not meet the definition of an assurance engagement as defined in the ‘Framework for Assurance Engagements’, issued by the Auditing and Assurances Standards Board, Section 10.

Except as otherwise noted in this report, we have not performed any testing on the information provided to confirm its completeness and accuracy. Accordingly, we do not express such an audit opinion and readers of the report should draw their own conclusions from the results of the review, based on the scope, agreed-upon procedures carried out and findings.