2022 Scientific Consensus Statement | Process

Approach to author selection

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1.   Introduction

The 2022 Scientific Consensus Statement (SCS) brings together the latest scientific evidence to understand how land-based activities can influence water quality in the Great Barrier Reef (GBR), and how these influences can be managed to improve water quality outcomes for the GBR. The SCS is updated periodically and is used by policymakers as a foundational evidence-based document for making decisions about managing GBR water quality. It is one of several projects that provide supporting information for the design, delivery and implementation of the Australian and Queensland government's Reef 2050 Water Quality Improvement Plan (the WQIP). The WQIP defines objectives and targets related to water quality improvement, identifies spatial management priorities, and describes actions for improving the quality of the water that enters the GBR from the adjacent catchment area. C_2O Consulting coasts|climate|oceans was engaged by the Australian government (Department of Climate Change, Energy, the Environment and Water; DCCEEW) and Queensland government (Department of Environment, Science and Innovation; DESI) to coordinate and deliver the 2022 update of the SCS, supported by a multidisciplinary group of over 70 authors and contributors with expertise in GBR water quality and evidence synthesis.

The **primary outputs** of the 2022 SCS are shown in Figure 1 and are:

- The 2022 SCS Conclusions
- The 2022 SCS Summary
- The 2022 SCS Synthesis of the Evidence and high-level Evidence Statements.

These outputs follow an informal hierarchy in terms of the level of detail presented, moving from the full details of the **synthesis of the evidence**, to a **summary** of that material followed by the highest-level **conclusions**.
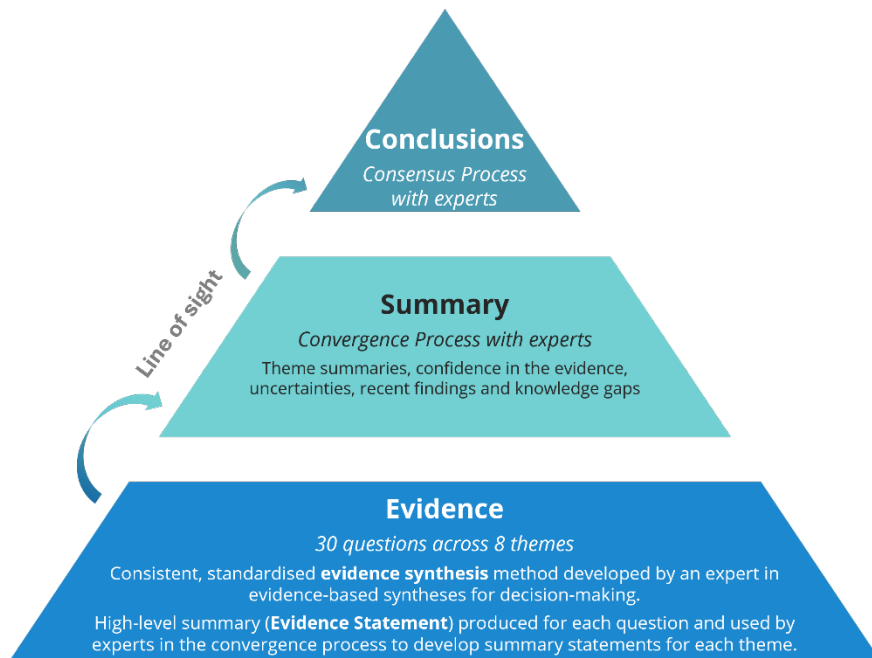
Figure 1. Main outputs and hierarchy of the 2022 SCS.

1.1 Summary of author selection process

Lead Authors were required for the synthesis of the evidence of the 2022 SCS. The synthesis of evidence addressed 30 (originally 32)[1] priority questions that were organised into Themes: values and threats, sediments and particulate nutrients, dissolved nutrients, pesticides, other pollutants, human dimensions of water quality improvements, and future directions, and covered topics including pollutant distribution and impacts, delivery and source, and management options. The 30 questions were addressed using a formal evidence review and synthesis method (Richards et al., 2023), and delivered by a Lead Author and their team. Selection criteria were established to screen and assess applicants. These criteria included (i) extensive knowledge and experience in nominated Theme(s), (ii) a strong publication record in peer reviewed academic literature, and (iii) demonstrated experience assembling and leading a team of scientists to deliver technically and scientifically sound products. To select Lead Authors, an Expression of Interest (EOI) call was widely advertised using social media channels and professional networks. Applicants were asked to complete a standardised form with questions relating to the pre-determined eligibility and selection criteria, and submit an up-to-date CV. A formal Selection Panel (see details in Section 4.1) with a minimum of three assessors was convened to evaluate the information provided by applicants. Assessors separately scored each applicant against the selection criteria, then met to discuss outcomes and identify applicants to invite as Lead Author for each question. Due to a combination of potential conflicts of interest, science discipline gaps, offers declined, and applicant withdrawals, three EOI rounds were needed before a full complement of Lead Authors were appointed. The major steps of the author selection process are presented in Figure 2.

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[1] Three questions about the drivers, pressures and threats to the current condition of the GBR (1.2, 1.3 and 2.1) that provided background context for the remaining SCS questions were merged during the author interpretation and final refinement step, resulting in a final list of 30 questions.

1	**2**	**3**	**4**	**5**
Preparation	**Call for Expression of Interest**	**Applications**	**Selection Panel**	**Lead Author appointment**

Preparation

- Design approach for identifying and recruiting Lead Authors.
- Develop eligibility and selection criteria.
- Prepare Expression of Interest (EOI) pack including information for interested parties and EOI form.
- Prepare advert for release via social media and professional networks.

Call for Expression of Interest

- Advertise Lead Author roles using social media (e.g., Twitter, 2022 SCS social engagement platform) and via professional networks (~500 individuals across a broad range of sectors including research and industry contacted with invitation to share EOI broadly).
- **Round 1** – November 2021.
- **Round 2** – August 2022.
- **Round 3** – October 2022.

Applications

- **Round 1** – applicants asked to indicate interest at a thematic level.
- **Rounds 2 & 3** – targeted for remaining questions.
- Standard EOI form with applicants asked to describe relevant experience, evidence of strong publication record and working collaboratively.
- CV including additional supporting information.

Selection Panel

- Independent Selection Panel convened with a Chair and minimum of two other members.
- All panel members required to complete Conflict of Interest (COI) Declarations. SCS Coordination Team prepared COI Management Plan, agreed by all panel members.
- SCS Coordination Team checked applicants against eligibility criteria (e.g., availability, access to international literature databases).
- Independent evaluation by each Panel member against selection criteria.
- Scoring matrix completed.
- Moderation meeting to discuss scores and agree final rankings.

Lead Author appointment

- Notify applicants of the outcome.
- **Round 1** – offer specific question to Lead Author (as advert was at thematic level due to question setting process taking place at the same time).
- Lead Authors complete COI Declaration and Confidentiality Deed Poll.
- Establishment of COI Management Plans for all Lead Authors in accordance with 2022 SCS COI Policy.
- Lead Authors establish author team.
- All contributors complete COI Declaration and Confidentiality Deed Poll and COI Management Plan if relevant.
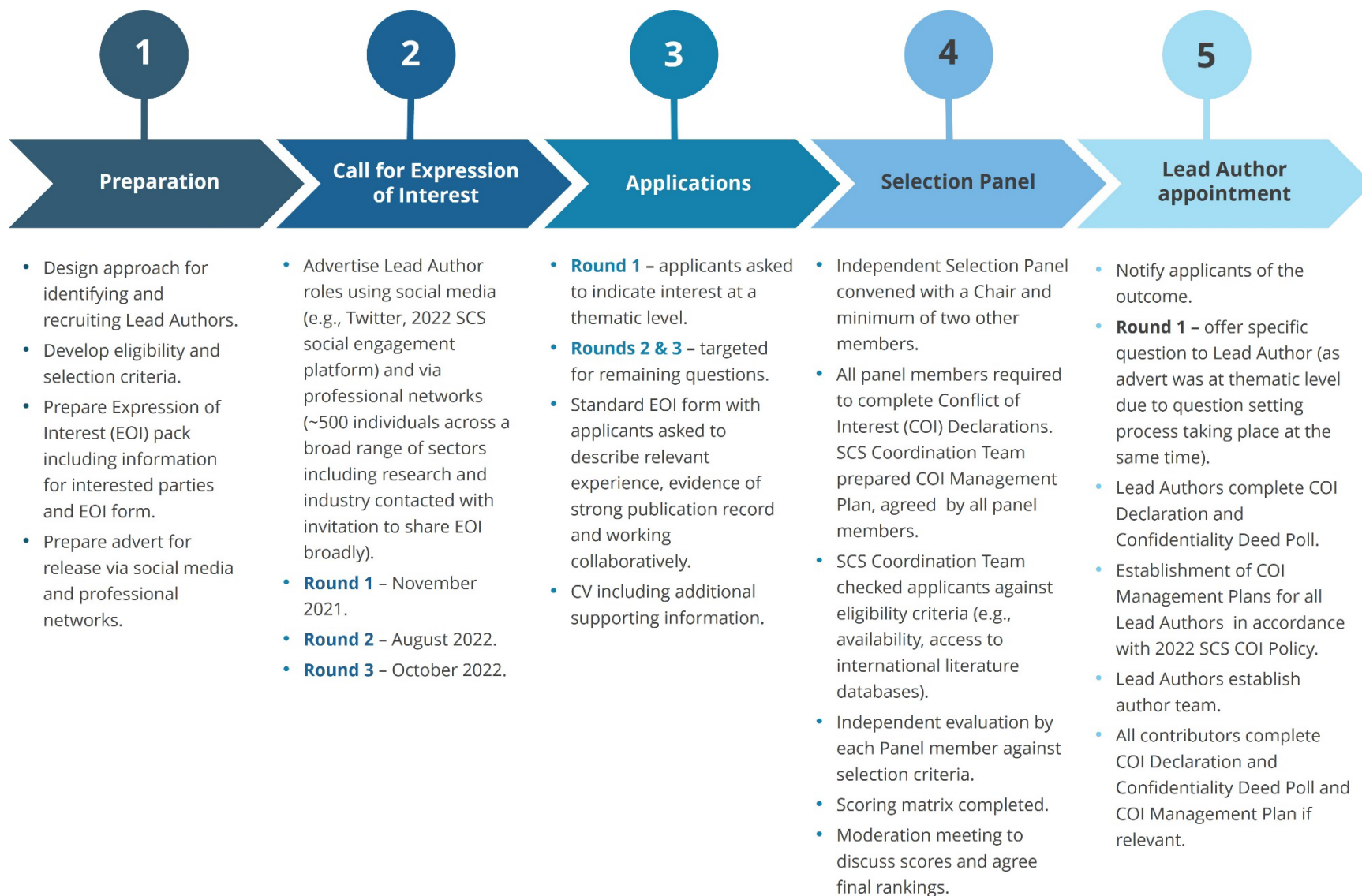
Figure 2. Detailed steps in the 2022 SCS author selection process.

1.2 2022 SCS guiding principles

A set of guiding principles were developed that underpin the delivery and implementation of all aspects of the 2022 SCS process. These principles were supported and endorsed by a variety of audiences, stakeholders and end users including Australia's Chief Scientist, the Reef Water Quality Independent Science Panel (ISP), Reef 2050 Plan Independent Expert Panel (IEP), and the Reef 2050 Advisory Committee. Steps to align the author selection process with the three most applicable guiding principles are described below.

1. **Demonstrated independence from end users in the synthesis of the evidence and review of the outputs**.
   - Non-governmental organisation (C$_2$O Consulting referred to as the SCS Coordination Team) responsible for advertising and appointing Lead Authors.
   - Independent Selection Panel established to assess prospective Lead Authors, chaired by C$_2$O Consulting scientist not involved in the evidence synthesis parts.
2. **Establish and use fit for purpose methods and processes, and engage fit for purpose experts.**
   - Formal eligibility and selection criteria defined to identify high calibre applicants.
   - Multiple rounds of advertising and selection to appoint suitable applicants.
   - Broad advertising campaign across multiple sectors to attract applicants.
3. **Increased transparency and robustness in design and delivery.**
   - A complete description of the design, development and implementation of the 2022 SCS author selection process is documented here and publicly available.
   - Eligibility and selection criteria defined for applicants.
   - Formal expression of interest process including a standardised EOI form.
   - Adherence to the 2022 SCS Conflict of Interest Policy in the appointment of the Selection Panel and Lead Authors.
   - Selection Panel followed structured process to evaluate and score applicants.
   - Assessment Report prepared for each EOI to detail applicants, scoring and selection.

2. Lead Author eligibility and selection criteria

To support the guiding principle of ensuring that the people involved in the development of the 2022 SCS were 'fit for purpose', a set of criteria were developed at the start of the author selection process to support the appointment of high calibre Lead Authors.

2.1 Stage 1 - Eligibility criteria

A number of essential eligibility criteria were identified for Lead Authors (Table 1). These were based on all aspects of the 2022 SCS project, including the use of formal synthesis of evidence methods that required a systematic approach to the identification of relevant literature and writing of the synthesis, and availability within the project timelines and method requirements. Three evidence synthesis methods were initially identified and allocated to different questions, each requiring a different time commitment, from 10 to 50 days of work. These were considered in the context of applicant availability: (1) Evidence Summary 10-15 days, (2) Evidence Review 25-30 days, and (3) Eco Evidence Analysis up to 50 days (Note: only the first two methods were ultimately used in the project). The same eligibility criteria were used in all author selection Rounds.

Table 1. Eligibility criteria for author selection.

Eligibility Criteria
All rounds: Access to international databases of scientific literature including those for biophysical and social sciences such as Scopus, Web of Science, JSTOR, Science Direct, Directory of Open Access Journals (DOAJ)
Round 1: Availability of between 10 to 50 days (depending on the evidence synthesis method) between December 2021 until October 2022. Round 2: Availability of at least 10 to 15 days for an Evidence Summary and 25 to 30 days for an Evidence Review between September 2022 and April 2023, with up to 5 additional days to participate in the consensus process from July to August 2023. Round 3: Availability of at least 10 to 15 days for an Evidence Summary and 25 to 30 days for an Evidence Review between November 2022 and April 2023 with up to 5 additional days to participate in the consensus process from July to August 2023.
Round 1: Availability to participate in author training sessions in early to mid-December 2021 and potentially January 2022. Round 2: Availability to participate in author training sessions in September 2022. Round 3: Availability to participate in author training sessions in November 2022.
All rounds: Applicant holds, is willing to hold, or is engaged through an organisation that fulfils the following insurance requirements for contractual engagement: • Workers compensation • Public Liability (minimum required: $10,000,000 per occurrence and not less than $20 million in aggregate) • Professional Indemnity Insurance (minimum required: $1 million per occurrence and not less than $2 million in aggregate)

2.2 Stage 2 - Assessment criteria

Several assessment criteria were established to provide a standardised framework to assess and compare applicants. These criteria were used by the independent Selection Panel for their evaluation. For **Round 1**, the following criteria were used:

1. Proven knowledge and experience, demonstrated by publication of recent and relevant peer reviewed products (including grey literature), in one or more of the topic fields in the Application Guidelines and/or experience in systematic evidence synthesis methods.

2. Proven ability to develop technically and scientifically sound written products and/or experience in systematic evidence synthesis methods.

3. Demonstrated experience and commitment to working in and/or managing a team using a collaborative approach.

4. The ability to work to tight timeframes.

5. Value for money.

For **Rounds 2 and 3** the criteria were slightly modified to:

1. Proven knowledge and experience in the specific area of expertise related to the nominated question, demonstrated by publication of recent and relevant peer reviewed products (including grey literature).

2. Proven experience in evidence synthesis methods.

3. Proven ability to develop technically and scientifically sound written products.

4. Demonstrated experience and commitment to working in and/or managing a team using a collaborative approach.

5. The ability to work to tight timeframes.

6. For question "4.3 What are the key drivers of the population outbreaks of crown-of-thorns starfish (COTS) in the Great Barrier Reef, and what is the evidence for the contribution of nutrients from land-runoff to these outbreaks?" there was a strong preference for applicants with demonstrated independence from active research on COTS in the GBR in the last five years.

For all three rounds, Criteria 1 was double-weighted due to the importance of proven knowledge and experience for the role of Lead Author.

A scoring matrix was developed to use in the evaluation process. The interpretation of the scores is shown in Table 2.

Table 2. Interpretation of scores for each criterion in the selection process.

Score Assessment	
Score	**Interpretation**
0	**Unacceptable** – The applicant does not address the assessment criterion.
1 - 2	**Inadequate** – The applicant is considered inadequate as there are significant deficiencies in relation to the assessment criterion and fails to meet expectations.
3	**Acceptable** – The applicant is considered to be acceptable in relation to the assessment criterion.
4	**Superior** – The applicant is considered superior in relation to the assessment criterion and exceeds expectations in some aspects.
5	**Outstanding** – The applicant is considered to be outstanding in relation to the assessment criterion and exceeds expectations in all aspects.

3. Expression of Interest (EOI) process

The call for EOIs was conducted as an open and transparent process and was led by the SCS Coordination Team from C$_2$O Consulting.

3.1 Expression of Interest Guidelines for applicants and form

The call for expressions of interest (EOI) for Lead Authors for the 2022 SCS questions was accompanied by an '*Author Selection EOI Guidelines*' document prepared by the SCS Coordination Team (see *Appendix 1)*. These Guidelines contained details about:

- The 2022 SCS process
- Key dates of the EOI process
- Technical knowledge and experience required for the role
- Eligibility criteria
- Delivery rates
- Assessment process
- Notification of applicants
- How to prepare and submit an application
- Contact for queries about the role

The Guidelines accompanied the '*Author Selection EOI Application Form*' (see *Appendix 2*) where applicants were required to provide the following information:

- Applicant details
- Applicant experience including a brief CV
- Detailed response to all eligibility and assessment criteria

The Guidelines and the Application Form were reviewed and endorsed by the Reef Water Quality Independent Science Panel (ISP) through an out-of-session paper on 27 October 2021.

3.2 Advertising the call for EOIs

The 2022 SCS Lead Author EOI was advertised via several mechanisms to maximise circulation and increase the number of applicants from a diverse range of background. Recipients and audiences were encouraged to share widely among their networks. The call for EOIs was shared via:

- Email circulated to professional network of 500 individuals currently or historically involved in relevant fields from a range of sectors.
- Twitter (via the C$_2$O Consulting page) (Rounds 2 and 3).
- Facebook (via the C$_2$O Consulting page) (Rounds 2 and 3).
- Australian Marine Sciences Association (AMSA) e-News (Round 2).
- 2022 SCS social engagement platform.

3.3 Expression of Interest Round 1 - November 2021

The first EOI round was open from 4 to 18 November 2021. This relatively short turnaround was to align with the tight contractual timeframes for the initial design and planning phases of the 2022 SCS project. As a result, the Round 1 author selection process was undertaken in parallel with the process to define the 2022 SCS questions (see Waterhouse & Pineda, 2024 for more information on the question setting process). Applicants were invited to submit their EOI based on expertise and experience in topics related to land-based impacts on GBR water quality and ecosystem condition, as well as describe their experience in "systematic evidence synthesis" methods. The thematic topics were:

- Marine ecosystem interactions – coral reefs, seagrass, crown-of-thorns starfish, and other (benthic or pelagic) habitats – with land-based pollutants and water quality.
- Cumulative impacts from multiple stressors on GBR ecosystems with specific focus on water quality and climate change.
- Estuarine ecosystems – condition, threats, response.
- Wetland and freshwater ecosystems – condition, threats, response.
- Sediment dynamics – source, delivery, fate, impact, risk and interactions.
- Nutrient dynamics – source, delivery, fate, impact, risk and interactions.
- Pesticide or emerging contaminants dynamics – source, delivery, fate, impact, risk and interactions.
- Management options by industry – urban, industrial, cane, grazing, other crops.
- Wetland treatment systems – ecological, social, economic.
- Ecosystem restoration – gullies, wetlands, other landscapes.
- Factors influencing management adoption – social, economic.
- Delivery options – market-based instruments, incentives, regulation etc.
- Landscape processes and hydrology.
- Pollutant modelling – paddock, catchment, marine.

Applicants were invited to ask questions about the application process until 10 November 2021. A formal written response to all queries received was circulated to all applicants on 12 November 2021.

In Round 1, a total of 43 applications were received before the closing date. Of those, four applications included contributions from other researchers and were considered as a single but joint EOI. The 43 applications represented 23 different institutions/organisations, including James Cook University (JCU; 9 applications), Griffith University (5 applications), the Australian Institute of Marine Science (AIMS; 6 applications), Commonwealth Scientific and Industrial Research Organisation (CSIRO; 3 applications), University of Queensland (UQ; 2 applications) and others (18 applications).

Following the Round 1 process for author selection, Lead Authors had not been appointed to eight questions in the 2022 SCS. This was due to:

- No suitable applicant with the required expertise in the first call for Lead Authors.
- Some successful applicants declined to lead a question.
- Some successful applicants subsequently withdrew due to issues with availability as a result of the delayed project timelines.
- One instance where a sub-question was converted to a separate question due to the extent of the evidence review required.
- Additional expertise being required for emerging topics, e.g., in the case of the Traditional Owner question, the expertise was not included in the initial list of topics in Round 1.
- Applicants having potential or perceived COIs due to their roles in related advisory groups or positions of potential influence.

3.4 Expression of Interest Round 2 - August 2022

To select Lead Authors for the remaining eight questions (Table 3), a second EOI round was opened for three weeks, from 11 August to 1 September 2022. The process followed the same approach as Round 1, but instead of listing and seeking responses to general fields of technical knowledge and expertise, applicants were asked to nominate their interest against specific questions. An additional criterion regarding independence for two questions that were considered particularly complex – Questions 4.3 (COTS) and Question 4.7 (wetlands) – was added, as well as emphasis on previous experience in evidence synthesis methods. The Guidelines and Application Form from Round 1 were adapted to reflect these changes.

Table 3. 2022 SCS questions included in the Round 2 EOI, August-September 2022.

#	Question
1.2	What is the extent, condition and ecological function of GBR ecosystems?
2.2	What are the current and predicted impacts of climate change on GBR ecosystems (including spatial and temporal distribution of impacts)? **2.2.1:** How is climate change currently influencing water quality in coastal and marine areas of the GBR, and how is this predicted to change over time?
3.3	How much anthropogenic sediment and particulate nutrients are delivered to the GBR ecosystems (including the spatial and temporal variation in delivery), what are the most important characteristics of anthropogenic sediments and particulate nutrients, and what are the primary sources?

#	Question
3.4	What are the primary biophysical drivers of anthropogenic sediment and particulate nutrient loss to the GBR and how have these drivers changed over time? **3.4.1:** What evidence is there to link low groundcover, vegetation and tree clearing with poor water quality and runoff? **3.4.2:** What is the relationship between land condition and sediment and particulate nutrient runoff for management of GBR catchments?
4.3	What are the key drivers of the population outbreaks of crown-of-thorns starfish (COTS) in the GBR, and what is the evidence for the contribution of nutrients from land-runoff to these outbreaks?
4.4	How much anthropogenic nutrient (nitrogen and phosphorus species) is delivered to the GBR ecosystems (including the spatial and temporal variation in delivery), what are the most important characteristics of anthropogenic nutrients, and what are the primary sources?
4.7	What is the efficacy of natural/near natural wetlands, restored, treatment (constructed) wetlands and other treatment systems in GBR catchments in improving water quality (nutrients, fine sediments and pesticides)? **4.7.1:** What are the key factors that affect the efficacy of natural/near natural wetlands, restored, treatment (constructed) wetlands and other treatment systems in GBR catchments in improving water quality and how can these be addressed at scale to maximise water quality improvement?
7.3	What are the critical success factors for greater Indigenous involvement in water quality decision making in the GBR region?

In Round 2, the circulation list for the EOI was expanded to include additional individuals, such as leaders of water science related departments of Australian Universities (e.g., University of Western Australia Oceans Institute, Griffith Australian Rivers Institute, Blue Carbon Lab at Deakin University, Centre for Marine Socioecology, University of Tasmania) to fill specific expertise gaps. Social media platforms including Twitter, Facebook, LinkedIn, the 2022 SCS social engagement platform, and AMSA e-news were also used to broaden circulation.

Interested parties were invited to ask questions about the application process until 19 August 2022. A formal written response to all queries received was circulated to all applicants on 25 August 2022.

For Round 2, a total of six applications were received before the closing date, with some applicants expressing interest in multiple questions. Of those, one application included contributions from other researchers and was considered as a single but joint EOI.

Following the Round 2 process for author selection, Lead Authors had not been appointed to two questions in the 2022 SCS. This was due to:

- No suitable applicant with the required expertise.

3.5 Expression of Interest Round 3: October 2022

Following the Round 1 and 2 processes for author selection, two questions did not have Lead Authors and a further two withdrawals were received during this period. Therefore, Round 3 focused on the following four questions (Table 4).

Table 4. 2022 SCS questions included in the Round 3 EOI, October – November 2022.

#	Question
4.3	What are the key drivers of the population outbreaks of crown-of-thorns starfish (COTS) in the GBR, and what is the evidence for the contribution of nutrients from land-runoff to these outbreaks?
5.2	What are the primary sources of the pesticides that have been found in GBR ecosystems and what are the key factors that influence pesticide delivery from source to ecosystems?
Additional questions considered during EOI call (due to late author withdrawal)	
3.3	How much anthropogenic sediment and particulate nutrients are delivered to the GBR ecosystems (including the spatial and temporal variation in delivery), what are the most important characteristics of anthropogenic sediments and particulate nutrients, and what are the primary sources?
4.4	How much anthropogenic nutrient (nitrogen and phosphorus species) is delivered to the GBR ecosystems (including the spatial and temporal variation in delivery), what are the most important characteristics of anthropogenic nutrients, and what are the primary sources?

A similar process as Round 2 was used for Round 3, where the EOI focused on the specific unallocated questions (see Table 4). The Guidelines and Application Form from Round 2 were adapted to reflect these changes.

Twitter, Facebook and the 2022 SCS social engagement platform were used to advertise the EOI call. In addition, the invitation was circulated to individuals currently or recently involved in relevant scientific fields as defined in the Guidelines, as well as individuals who were recommended by other Lead Authors and the contract managers to fill specific expertise gaps.

The EOI was open for two weeks, from 17 to 28 October 2022. In Round 3, a total of six applications were received before the closing date. Of those, three applications were for Question 4.3, two applications were for Question 5.2 and one application was for Questions 4.3 and 5.2. The Selection Panel also scored each applicant in Round 3 against Questions 3.3 and 4.4 as well as reviewing prior applicants from Rounds 1 and 2 with the intent that potentially suitable applicants could be approached to lead these two questions.

4. Assessment process for Lead Authors

4.1 Selection Panel Members

For the three rounds needed to identify and appoint Lead Authors to all 30 questions, an independent Selection Panel was convened with a Chair and at least two other members (see Table 5). The Selection Panel was Chaired by Dr Johanna Johnson from C_2O Consulting who was not involved in other aspects of the 2022 SCS delivery. The other members were research, investor or policy representatives. An independent evidence synthesis expert was added in Rounds 2 and 3 to reflect the complex nature of the remaining questions. Panel members were appointed on the basis of their knowledge of GBR issues, potential experience with experts in these fields and previous experience in the assessment of open application processes. Probity Declarations and Conflict of Interest forms were completed by all Panel members. For Round 1, the Panel was supported by the 2022 SCS Project Leader, Jane Waterhouse, acting in the capacity of probity advisor to the process and reviewing the recommendations from the Panel. In Rounds 2 and 3, the Panel was supported by an independent member of the SCS Coordination Team, Dr Bianca Molinari, acting in the capacity of

probity advisor to the process and following up on further information recommendations from the Panel. A Conflict of Interest Management Plan was prepared and agreed by all members of the Panel for each Round.

Table 5. Members of the 2022 SCS Author Selection Panel.

Round 1	
Name	**Organisation**
Johanna Johnson (Chair)	C$_2$O Consulting (independent of evidence synthesis parts)
Sheriden Morris	Reef & Rainforest Research Centre (research representative)
Greg Oliver	Great Barrier Reef Foundation (policy/investor representative)
Round 2	
Johanna Johnson (Chair)	C$_2$O Consulting (independent of evidence synthesis parts)
Sheriden Morris	Reef & Rainforest Research Centre (research/investor representative)
Adam Smith	Reef Ecologic (policy and applied research representative)
Rob Richards	Evidentiary (evidence synthesis expert)
Round 3	
Johanna Johnson (Chair)	C$_2$O Consulting (independent of evidence synthesis parts)
Greg Oliver	Great Barrier Reef Foundation (policy/investor representative)
Rob Richards	Evidentiary (evidence synthesis expert)

4.2 Stage 1 - Eligibility assessment

Each EOI was screened by the SCS Coordination Team to check that the applicant met the essential eligibility criteria. Applications that did not meet the eligibility requirements were documented and were not progressed to Stage 2. For Round 1, a total of 42 out of 43 applicants passed the Stage 1 screening for eligibility. For both Rounds 2 and 3, all applicants passed the Stage 1 screening for eligibility.

4.3 Stage 2 - Assessment against criteria

Reponses from the EOI Application Form were used by the Selection Panel to assess the technical knowledge and capability of individuals to support the delivery of the 2022 SCS. An '*Evaluation Assessor Guide'* (see *Appendix 3)* was developed by the SCS Coordination Team to provide guidance to the Selection Panel members on how to evaluate the applications. The Guide covered:

- The steps involved in the author selection process.
- Information about the materials to be reviewed.
- Details of the assessment criteria used to carry out the independent evaluation and scoring
- The purpose of the moderation meeting.
- Recommendations for author selection.
- Decision process for author selection.

The following documents were distributed to the Selection Panel members for evaluating and scoring applicants for each round:
- The Applicants' Register.
- The Evaluation Assessor Guide (see *Appendix 3*)[2].
- All EOI applications for those that passed Stage 1 eligibility screening.

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[2] The Evaluation Assessor Guide for each round was modified to accommodate the changes described in this document.

- An individual scoring sheet template.
- A Probity Declaration and Conflict of Interest declaration.

Rounds 2 and 3 included an additional briefing from the Chair to ensure that appropriate documentation was completed when scoring the applicants against the criteria (in line with DCCEEW probity requirements).

Eligible applications were evaluated independently by each Panel member against the pre-determined assessment criteria (see Section 2.2).

Where applicants had applied for multiple questions, they were evaluated individually for each question they applied for.

A scoring matrix was used to collate scores and mean scores were calculated. The interpretation of the scores is shown in Table 6. There was an additional column on the scoring sheet where the Panel members could add specific comments if clarification or additional notes were required.

A moderation meeting was held as part of each round for Panel members to discuss scores and agree on final rankings. Following each meeting, an Assessment Report was produced and shared with the SCS Coordination Team and Contract Managers (see *Appendix 4*).

Table 6. Interpretation of scores for each criterion in the selection process.

Score Assessment	
Score	**Interpretation**
0	**Unacceptable** – The applicant does not address the assessment criterion
1 - 2	**Inadequate** – The applicant is considered inadequate as it contains a range of significant deficiencies in relation to the assessment criterion and fails to meet expectations
3	**Acceptable** – The applicant is considered to be acceptable in relation to the assessment criterion
4	**Superior** – The applicant is considered superior in relation to the assessment criterion and exceeds expectations in some aspects
5	**Outstanding** – The applicant is considered to be outstanding in relation to the assessment criterion and exceeds expectations in all aspects

5. Allocation and engagement of Lead Authors to Questions

5.1 Round 1 allocation

After each Selection Panel member evaluated all applicants, a moderation meeting was held on 30 November 2021 for Panel members to discuss scores and agree on final rankings. Recommendations for suitable Lead Authors and potential questions that they could address were also made based on the draft list of questions available at that time. These recommendations took into account the Selection Criteria in addition to availability and any potential conflicts that applicants' may have had due to their current role.

The SCS Coordination Team considered the evaluations from the Selection Panel and input from the policy group and ISP to finalise the allocation of authors to individual questions. The following guiding principles were applied for the allocation of authors to questions:

- The top scoring applicants were allocated as a priority to areas most relevant to their expertise.

- Applicants were only considered for the areas of experience nominated in their EOI.
- Preferred allocation of one question per author unless there was a compelling case for allocation to multiple questions (e.g., questions were complementary).
- Allocation to primary questions only (not sub-questions separately).
- Level of experience in evidence synthesis methods (as demonstrated in the EOI).

Where a suitable applicant was not identified for a specific question, the question was left as 'unallocated' and advertised in the subsequent EOI rounds. Two applicants were not recommended because of potential conflicts of interest due to their roles in related advisory groups or positions of potential influence.

All applicants were notified by the SCS Coordination Team on the outcomes of the EOI process in the week of 20 December 2021. Two successful applicants did not accept the offer to be the Lead Author for specific questions and two successful applicants subsequently withdrew because of potential perceived conflicts of interest. These withdrawals were the result of a recommendation by Australia's Chief Scientist, Dr Foley, that the consultant's leading the development of the 2022 SCS should not be lead authors for questions to maintain independence.

5.2 Round 2 allocation

After each Selection Panel member evaluated all applicants, a moderation meeting was held on 12 September 2022 for Panel members to discuss scores and agree on final rankings. The results of the individual evaluations of the Panel members were collated and finalised. Applications were received for seven of the eight questions in the EOI, and the applicants were ranked for each question. The SCS Coordination Team considered the evaluations from the Selection Panel and following further clarification from applicants where required, Lead Authors were recommended for seven questions.

Following subsequent withdrawal of four recommended applicants from Round 2, eligible applicants from Round 1 were re-examined to determine their suitability for the remaining questions. However, there were not enough suitable applicants, so following discussion with Contract Managers, three of the questions were merged – previously Questions 1.2, 1.3 and 2.1 – into a single question that explored the status, condition, threats and drivers of GBR ecosystem health. A single applicant was allocated from Round 1 to lead this re-framed question.

5.3 Round 3 allocation

After each Selection Panel member evaluated all applicants, a moderation meeting was held on 3 November 2022 with all Panel members to discuss scores and agree on final rankings and allocation to questions. The results of the individual evaluations of the Panel members were collated and finalised following further clarification from applicants where required.

The SCS Coordination Team considered the evaluations from the Selection Panel and further input, and recommended Lead Authors for the final two questions that were the focus of the EOI. Two suitable applicants from Rounds 1 and 3 were also approached for the questions that had become available again following author withdrawals.

All applicants were notified by the Panel Chair on the outcomes of the EOI process.

The final list of author allocations is shown in Table 7.

Table 7. List of questions and final author allocation for the 2022 SCS

#	Question	Lead Author Allocation *(Organisation)*
	Background (Themes 1-2): Values, Condition and Drivers of Health of the Great Barrier Reef	
1.1	What are the socio-ecological, cultural, economic and intrinsic values of the Great Barrier Reef?	Maxine Newlands *(James Cook University)*
1.2 /1.3 /2.1	What is the extent and condition of Great Barrier Reef ecosystems and what are the primary threats to their health?	Len McKenzie *(James Cook University)*
1.4	How are the GBR's key ecosystem processes connected from the catchment to the reef and what are the primary factors that influence these connections?	Aaron Davis and Richard Pearson *(James Cook University)*
2.2	What are the current and predicted impacts of climate change on GBR ecosystems (including spatial and temporal distribution of impacts)?	Katharina Fabricius *(Australian Institute of Marine Science)*
2.2.1	**Sub-question to 2.2:** How is climate change currently influencing water quality in coastal and marine areas of the GBR, and how is this predicted to change over time?	
2.3	What evidence is there for changes in land-based runoff from pre-development estimates in the GBR?	Stephen Lewis *(James Cook University)*
2.4	How do water quality and climate change interact to influence the health and resilience of GBR ecosystems?	Sven Uthicke *(Australian Institute of Marine Science)*
2.4.1	**Sub-question to 2.4:** How are the combined impacts of multiple stressors (including water quality) affecting the health and resilience of GBR coastal and inshore ecosystems?	
2.4.2	**Sub-question to 2.4:** Would improved water quality help ecosystems cope with multiple stressors including climate change impacts, and if so, in what way?	
	Theme 3: Sediments and particulate nutrients – catchment to reef	
3.1	What are the spatial and temporal distributions of terrigenous sediments and associated indicators within the GBR?	Stephen Lewis *(James Cook University)*
3.1.1	**Sub-question to 3.1:** What is the variability of turbidity and photic depth in coastal and marine areas of the GBR?	
3.2	What are the measured impacts of increased sediment and particulate nutrient loads on GBR ecosystems, what are the mechanism(s) for those impacts and where is there evidence of this occurring in the GBR?	Catherine Collier *(James Cook University)*
3.3	How much anthropogenic sediment and particulate nutrients are exported from GBR catchments (including the spatial and temporal variation in export), what are the most important characteristics of anthropogenic sediments and particulate nutrients, and what are the primary sources?	Ian Prosser *(Independent)*

#	Question	Lead Author Allocation (Organisation)
3.4	What are the primary biophysical drivers of anthropogenic sediment and particulate nutrient loss to the GBR and how have these drivers changed over time?	Scott Wilkinson (CSIRO)
3.4.1	**Sub-question to 3.4:** What evidence is there to link low groundcover, vegetation and tree clearing with poor water quality and runoff?	
3.4.2	**Sub-question to 3.4:** What is the relationship between land condition and sediment and particulate nutrient runoff for management of GBR catchments?	
3.5	What are the most effective management practices (all land uses) for reducing sediment and particulate nutrient loss from the GBR catchments, do these vary spatially or in different climatic conditions? What are the costs and cost-effectiveness of these practices, and does this vary spatially or in different climatic conditions? What are the production outcomes of these practices?	Rebecca Bartley (CSIRO)
3.6	What is the effectiveness of restoration works (e.g. gully and streambank) in reducing sediment and particulate nutrient loss from the GBR catchments, does this vary spatially or in different climatic conditions? What are the costs and cost-effectiveness of these works, and does this vary spatially or in different climatic conditions? What are the production outcomes of these practices?	Andrew Brooks (Griffith University)
3.6.1	**Sub-question to 3.6:** What is the benefit of vegetation restoration in 1) riparian zones and 2) hillslope and floodplain zones, in reducing sediment and particulate nutrient loss to the GBR?	
	Theme 4: Dissolved nutrients – catchment to reef	
4.1	What is the spatial and temporal distribution of nutrients and associated indicators within the GBR?	Barbara Robson (Australian Institute of Marine Science)
4.1.1	**Sub-question to 4.1:** What is the variability of nutrients in coastal and marine areas of the GBR?	
4.2	What are the measured impacts of nutrients on GBR ecosystems, what are the mechanism(s) for those impacts and where is there evidence of this occurring in the GBR?	Guillermo Diaz-Pulido (Griffith University)
4.3	What are the key drivers of the population outbreaks of Crown of Thorns Starfish (COTS) in the GBR, and what is the evidence for the contribution of nutrients from land-runoff to these outbreaks?	Ciemon Caballes (James Cook University)
4.4	How much anthropogenic dissolved nutrient (nitrogen and phosphorus species) is exported from GBR catchments (including the spatial and temporal variation in export), what are the most	Ian Prosser (Independent)

#	Question	Lead Author Allocation (Organisation)
	important characteristics of anthropogenic dissolved nutrients, and what are the primary sources?	
4.5	What are the primary biophysical drivers of anthropogenic dissolved nutrient loss to the GBR and how have these drivers changed over time?	Michele Burford (Griffith University)
4.5.1	**Sub-question 4.5:** What proportion of nutrient is lost by surface and sub-surface pathways?	
4.5.2	**Sub-question 4.5:** How do nutrients transform during the transport and delivery to the GBR lagoon (e.g. bioavailability of particulate nutrients)?	
4.6	What are the most effective management practices for reducing dissolved nutrient losses (all land uses) from the GBR catchments, and do these vary spatially or in different climatic conditions? What are the costs of the practices, and cost-effectiveness of these practices, and does this vary spatially or in different climatic conditions? What are the production outcomes of these practices?	Peter Thorburn (CSIRO)
4.6.1	**Sub-question to 4.6:** What is the potential of Enhanced-Efficiency-Fertilisers (EEFs) in reducing nitrogen runoff and what are the primary challenges in implementation?	
4.6.2	**Sub-question to 4.6:** What are the implications of mill mud application in influencing nitrogen losses and what are the primary challenges for implementation?	
4.6.3	**Sub-question to 4.6:** What are the primary factors that influence nutrient losses from irrigated areas and how can these be managed?	
4.7	What is the efficacy of natural/near natural wetlands, restored, treatment (constructed) wetlands and other treatment systems in GBR catchments in improving water quality (nutrients, fine sediments and pesticides)?	Nathan Waltham (James Cook University)
4.7.1	**Sub-question to 4.7:** What are the key factors that affect the efficacy of natural/near natural wetlands, restored, treatment (constructed) wetlands and other treatment systems in GBR catchments in improving water quality and how can these be addressed at scale to maximise water quality improvement?)	
4.8	What are the measured costs, and cost drivers associated with the use of natural/near natural wetlands, restored, treatment (constructed) wetlands and other treatment systems in GBR catchments in improving water quality?	Megan Star (Independent)
4.9	What role do Natural/ Near Natural wetlands play in the provision of ecosystem services and how is the service of water quality treatment compatible or at odds with other services (e.g. habitat, carbon sequestration)?	Nathan Waltham (James Cook University)

#	Question	Lead Author Allocation (*Organisation*)
	Theme 5: Pesticides – catchment to reef	
5.1	What is the spatial and temporal distribution of pesticides across GBR ecosystems, what are the (potential or observed) ecological impacts in these ecosystems and what evidence is there for pesticide risk?	Andrew Negri (*Australian Institute of Marine Science*)
5.2	What are the primary sources of the pesticides that have been found in GBR ecosystems and what are the key factors that influence pesticide delivery from source to ecosystems?	Michelle Templeman (*James Cook University*)
5.3	What are the most effective management practices for reducing pesticide risk (all land uses) from the GBR catchments, and do these vary spatially or in different climatic conditions? What are the costs of the practices, and cost-effectiveness of these practices, and does this vary spatially or in different climatic conditions? What are the production outcomes of these practices?	Aaron Davis (*James Cook University*)
	Theme 6: Other pollutants – catchment to reef	
6.1	What is the spatial and temporal distribution and risk of other pollutants in GBR ecosystems, and what are the primary sources?	Anthony Chariton (*Macquarie University*)
	Theme 7: Human dimensions of water quality improvement	
7.1	What is the mix of programs and instruments (collectively and individually) used in the GBR catchments to drive improved land management actions for GBR water quality benefits and how effective are they?	Anthea Coggan (*CSIRO*)
7.2	What are the behavioural (attitudinal), economic, social and cultural factors that hinder or enable the uptake of management practices that aim to improve water quality outcomes for the GBR?	Roy Murray-Prior (*Independent*)
7.2.1	**Sub-question to 7.2:** What factors influence disadoption of management practices in agricultural industries and are there examples from elsewhere on how to address it?	
7.3	What are the critical success factors for greater Indigenous involvement in water quality decision making in the GBR region?	Tom Espinoza (*Burnett Mary Regional Group*)
8	**Theme 8: Future directions and emerging science**	
8.1	What are the co-benefits e.g., biodiversity, carbon, productivity, climate change, and drought resilience, of land management to improve water quality outcomes for the GBR?	Iain Gordon (*Independent*)
8.2	What are the key attributes of successful M&E programs to support coastal and marine water quality management, and what examples are there of innovative M&E frameworks, methods and approaches that are applicable to the GBR?	Michelle Devlin (*Independent*)

6. Building author teams

Once Lead Authors were appointed, they were responsible for assembling an author team to support the delivery of their question. This included support staff to assist with the systematic literature searches, and other individuals that could contribute specific expertise to addressing the question. The composition of these author teams, in terms of number of contributors and their expertise, was at the full discretion of the Lead Author.

7. Managing potential conflicts of interest

Once selected, all Lead Authors and their nominated contributors were required to complete and sign a Conflict of Interest Declaration form. The form was developed by the SCS Coordination Team in accordance with the 2022 SCS Conflict of Interest Policy, and approved by DCCEEW and an independent probity advisor. All authors were required to declare their interest (whether financial or non-financial) or an affiliation that was affecting, would affect, or could be perceived to affect, the participant's ability to perform the services or work associated with the services fairly and independently. A Conflict of Interest Management Plan was also prepared by the SCS Coordination Team under the guidance of DCCEEW, the independent probity advisor and DESI, to define acceptable management actions for any declared conflict of interests in the project. The Conflict of Interest Management Plans specify how the SCS Coordination Team and the Lead Authors and contributors would work to manage any potential or perceived conflicts. The Management Plan was required to be signed by the participant in the presence of a witness. A Conflict of Interest Register was established and maintained for the duration of the 2022 SCS process to track any mitigating actions identified in the Conflict of Interest Management Plans.

A Confidentiality Deed Poll was also used to establish a confidential relationship between parties involved in the 2022 SCS, including Lead Authors and contributors, and to protect confidential information from being disclosed to third parties.

8. References

Richards R, Pineda M-C, Sambrook K, Waterhouse J (2023) 2022 Scientific Consensus Statement: Methods for the Synthesis of Evidence. Published by C$_2$O Consulting, Townsville, Queensland. 42pp.

Waterhouse J, Pineda M-C (2024) 2022 Scientific Consensus Statement: Approach to Question Setting. Published by C$_2$O Consulting, Townsville, Queensland. 24pp.

2022 Scientific Consensus Statement

Author Selection Process

Expression of Interest Guidelines

Issued 4 November 2021

1. About the Scientific Consensus Statement 2022 process

- The Reef 2050 Water Quality Improvement Plan (WQIP) is a joint commitment of the Australian and Queensland governments. The WQIP is a collaborative program of coordinated projects and partnerships designed to improve the quality of water flowing to the Great Barrier Reef (GBR).

- The 2022 Scientific Consensus Statement (SCS) is a foundational document which provides the scientific underpinning of Reef 2050 WQIP design and implementation.

- The 2022 SCS is prepared by a multidisciplinary group of scientists with expertise in GBR water quality. Oversight will be provided by the Reef Water Quality Independent Science Panel (ISP).

- C_2O Consulting coasts|climate|oceans has been appointed by the Australian Department of Agriculture, Water and the Environment, in collaboration with the Queensland Department of Environment and Science to lead and coordinate the next SCS, in collaboration with scientists across a range of organisations (including AIMS, CSIRO, James Cook University, Central Queensland University, University of Queensland, Griffith University and scientists from the Queensland Government, private consultants and individuals).

- Questions that form the basis of the evidence synthesis process will be identified and prioritised by policy and management representatives relevant to management of GBR water quality.

- To address these questions, several evidence synthesis processes will be applied; examples are summarised in **Attachment 1**. Guidance will be provided from an expert in evidence synthesis to assist lead authors and contributors in the process, including question framing, protocol development and undertaking the synthesis reviews.

- The intent of this EOI process is to identify suitable lead authors to address the prioritised questions between December 2021 and October 2022. Lead authors will contribute to delivering a range of evidence synthesis products using the best available science and develop points of scientific consensus on land use impacts on GBR water quality and ecosystem condition and management.

- Lead authors will be responsible for identifying and collaborating with suitable contributors to deliver the final outputs. Outputs will be peer-reviewed, with final review by the ISP.

2. About this Expression of Interest

This expression of interest (EOI) is to identify, via an open and transparent process, suitably qualified scientific experts as lead authors to contribute to the 2022 Scientific Consensus Statement (SCS) on land-based impacts on Great Barrier Reef water quality and ecosystem condition.

The information provided in response to this EOI will allow C_2O Consulting to assess the technical knowledge and capability of individuals to support the delivery of the 2022 SCS.

Potential applicants should read these Guidelines before completing the EOI Application Form.

3. Key dates

Call for Expressions of Interest open	4 November 2021
Submission of written questions regarding this EOI	Close 10 November 2021 (COB)
Response to written questions	12 November 2021
Call for Expressions of Interest close	18 November 2021
Assessment against criteria and applicants advised if their application has satisfied the criteria	Early December 2021
Successful applicants engaged	December 2021 / January 2022

4. Technical knowledge and experience

Expressions of interest are invited from scientific experts with knowledge, experience and peer-reviewed publication records in relation to land-based impacts on Great Barrier Reef (GBR) water quality and ecosystem condition, in one or more of the following fields:

- Marine ecosystem interactions – coral reefs, seagrass, crown-of-thorns starfish, and other (benthic or pelagic) - with land-based pollutants and water quality.
- Cumulative impacts from multiple stressors on GBR ecosystems with specific focus on water quality and climate change
- Estuarine ecosystems - condition, threats, response
- Wetland and freshwater ecosystems – condition, threats, response
- Sediment dynamics – source, delivery, fate, impact, risk and interactions
- Nutrient dynamics – source, delivery, fate, impact, risk and interactions
- Pesticide or emerging contaminants dynamics – source, delivery, fate, impact, risk and interactions
- Management options by industry – urban, industrial, cane, grazing, other crops
- Wetland treatment systems – ecological, social, economic
- Ecosystem landscape restoration – gullies, wetlands, other landscapes
- Factors influencing management adoption – social, economic
- Delivery options – market-based instruments, incentives, regulation etc.
- Landscape processes and hydrology
- Pollutant modelling – paddock, catchment, marine
- Experience in "systematic evidence synthesis" methods

The following experience is considered essential:
- Proven ability to develop technically and scientifically sound written products and/or experience in systematic evidence synthesis methods.
- Demonstrated experience and commitment to working in a team using a collaborative approach.
- The ability to work to tight timeframes.

5. Who can apply?

To be eligible to submit an EOI, applicants need to meet the following requirements:

- Have access to international databases of scientific literature including those for biophysical and social sciences such as Scopus, Web of Science, JSTOR, Science Direct, Directory of Open Access Journals (DOAJ)
- Availability of ~10 to 50 days (depending on the evidence synthesis method) between December 2021 until October 2022.
- Availability to participate in author training sessions in early to mid-December 2021 and potentially January 2022.
- Ability to be engaged under a contract with specific requirements, including being covered by a registered Business Number, public liability insurance and professional indemnity, or engaged through an organisation that fulfils these requirements.

6. Rates

Applicants are required to submit a schedule of fees, noting that there may be an upper limit on rates of AU$1,400 per day (excluding GST) based on the approved budget under the current contract with the Department of Agriculture, Water and the Environment. In-kind contributions from applicants or their organisations may be used to cover any difference between the applicant's rate and the accorded fee for service.

7. How the Expression of Interest will be assessed

This EOI is a scientific expertise-based, competitive process, and it relates explicitly to individual's experiences and capabilities, not organisational capabilities.

EOIs will be assessed as follows:

Stage 1 – Eligibility assessment
Each EOI will be screened to check that the applicant is eligible to apply (Item 5). Applications that do not meet the eligibility requirements will not be progressed to Stage 2.

Stage 2 – Assessment against criteria

Eligible applications will be assessed against the following selection criteria for each expert:

- Proven knowledge and experience, demonstrated by publication of recent and relevant peer-reviewed products (including grey literature), in one or more of the topic fields in Item 4 and/or experience in systematic evidence synthesis methods.
- Proven ability to develop technically and scientifically sound written products and/or experience in systematic evidence synthesis methods.
- Demonstrated experience and commitment to working in and/or managing a team using a collaborative approach.
- The ability to work to tight timeframes.
- Value for money.

Stage 3 – Engagement of scientific experts
Where an applicant has been assessed as meeting the minimum requirements as part of the Stage 2 assessment, C$_2$O Consulting will invite the most suitable applicants as a lead author for specific questions. Lead authors will be responsible for identifying and collaborating with suitable contributors to deliver the final outputs.

All lead authors and contributors will be engaged by C$_2$O Consulting to complete specific deliverables for an agreed amount. The scope of work and terms of any engagement will be agreed at the time of the engagement.

8. Notification of applicants

Applicants will be informed in writing whether or not their EOI has satisfied the assessment requirements and they have been selected as a lead author following the completion of Stage 2.

C$_2$O Consulting will keep all information confidential about the applicants that is obtained as part of the application process. However, C$_2$O Consulting may disclose confidential information to its sub-contractors or advisors for the purposes of administering this process; or as required by law.

9. Developing an Expression of Interest
Applicants should take into consideration the guidance and rules provided in these Guidelines when completing the EOI Application Form.

Applicants may submit written questions regarding this EOI process by **10 November 2021** to 2022scs@c2o.net.au. A response to written questions will be provided by 12 November 2021.

10. Submitting an application

Applications **open on Thursday 4 November 2021 and close on Thursday 18 November 2021 at 11.45pm AEST**. Applications must include a fully complete EOI Application Form and a detailed CV, and must be submitted online to: 2022scs@c2o.net.au

Applications should be submitted in PDF form and named using the following nomenclature:

[2022SCS]_[Applicant name)]_DATE ; *For example: 2022SCS_Applicant name_10112021.pdf*

Applications that are incomplete; do not include the requested documentation; or do not address the assessment criteria may be deemed ineligible. Late applications will not be accepted.

All applications should:

- be submitted using the prescribed EOI Application Form,
- be complete and contain all the information that is relevant to, and necessary, for the assessment,
- include a detailed CV,
- provide current and accurate information, and
- only contain attachments that are directly relevant, are concise and clearly labelled, not contain information that is false or misleading (applications considered to contain false or misleading information may be excluded from further assessment).

C$_2$O Consulting may request verification of any information contained in the EOI Application Form during the assessment process.

11. Queries

Applicants may submit written questions regarding this EOI process by **10 November 2021** to 2022scs@c2o.net.au. A response to written questions will be provided by 12 November 2021.

Attachment 1: Scientific Consensus Statement 2022 Update: Evidence products

Four evidence-based products are proposed to meet the 2022 Scientific Consensus Statement (SCS) objectives of assisting policy and management decisions in developing the updated Reef 2050 Water Quality Improvement Plan and the associated delivery and implementation of this plan. These are more formal evidence synthesis products (EcoEvidence causal criteria analysis and Evidentiary Synthesis), summaries of evidence contained within the existing Mendeley evidence library (from past SCS's) and updating (for prioritised folders) and re-structuring the existing SCS evidence library. The products will vary in the resources required to develop them which will directly influence the risk of bias and confidence in the output of the product. This will be matched to the product need where possible.

Given the time and resources available within the project, rapid systematic review methods will be used. Compared to a full Systematic Review, this may entail reducing effort used in a) the search for evidence, b) the data extracted, c) the criteria used for relevance and quality assessment, and d) the synthesis method used, the products will greatly enhance the transparency, rigor, organisation and accessibility of evidence and evidence-based conclusions used in the 2022 SCS. There is flexibility within some products to be able to tailor the approach used to meet the question needs.

Below is a summary of the key criteria for each evidence product.

Criteria	Evidence Synthesis		Evidence Summary	Evidence Organisation
Evidence product	Eco Evidence causal criteria analysis (Norris et al 2012)[3]	Evidentiary Synthesis	Evidence Library Summary	Evidence Library re-structure and update
Primary purpose	To evaluate evidence drawn from the primary scientific literature for how something works (causality i.e. does this cause that) and what contextual factors influence this. Used for specific and prioritised topics of contested science that requires evidence to test hypothesis with very	To understand how something works (causality) and what contextual factors influence this. Synthesis is largely qualitative narrative and quality assessment is variable. Confidence is high in conclusions.	Provide a structured summary of existing and new evidence (within Mendeley evidence base) related to a conceptual model for priority topics identified for a) informing policy and management decisions guiding development of the 2022 SCS and b) respond to Senate Enquiry claims	Structure the existing Mendeley evidence library to reflect the domain of knowledge currently held within the database and to underpin the conceptual framework and models used for the development of the 2022 SCS.

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[3] R.H. Norris, J.A. Webb, S.J. Nichols, M.J. Stewardson, E.T. Harrison (2012). Analysing cause and effect in environmental assessments: using weighted evidence from the literature. Freshwater Science, 2012, 31(1): 5–21.

Criteria	Evidence Synthesis		Evidence Summary	Evidence Organisation
	high confidence in the conclusions.		regarding areas of more "settled science"	
Question type	Specific cause and effect	Cause and effect, Effectiveness	Describing the state, condition, trend or status of something	N/A
Evidence type	Analytical/experimental – evidence drawn from primary scientific research literature that tests a hypothesis regarding a cause/stressor and the effect.	Analytical – cause and effect, method	Descriptive – Status, Numerical, Spatial/temporal	All
Transparency	Very high	Very high	High	Very high
Confidence	Very high	High	Medium	Medium
Evidence weighting	Yes	No	No	No
Quality assessment	Yes	Yes - variable	Yes - variable	Input to evidence base
How is conflicting evidence handled?	Scored within the weighted assessment	Narratively described and considered in findings	N/A	N/A
Tools used to develop the synthesis	Conceptual model(s) – detailed causal relationships Electronic Evidence database	Conceptual model – detailed causal relationships	Conceptual model + or - detailed causal relationships	Library architecture
Supporting products	Software will output a report outlining the evidence for and against a specific hypothesis, evidence stored in online database.	Synthesis Protocol, Evidence library, data extraction spreadsheet, + or - quality assessment spreadsheet	Evidence library, + or – quality assessment spreadsheet	Evidence library structure
Published guidance	Eco Evidence method, software and Evidence database	Limited	Limited	Limited
Effort to produce	Min 2 reviewers (+ peer review) and 2 -3 months	Min 2 reviewers (+ peer review) and 2 months	1 reviewer + peer review and 4-6 weeks	2 staff

2022 Scientific Consensus Statement

Author Selection Process

Expression of Interest Application Form

Issued 4 November 2021

1. Applicant Details

Applicant	Name	
	Position and Organisation	
	Business Number (if applicable)	
	Legal status	☐ Individual ☐ Company ☐ Partnership ☐ Overseas Inc. Company ☐ Trust ☐ Other – please specify
Street address		
Postal address		
Website		

2. Applicant Experience

Please select area(s) of expertise from the list below and provide a short capability statement (300 words maximum) clearly identifying the extent and nature of your recent and relevant experience in the selected field(s) and/or experience in systematic evidence synthesis methods.

Please attach a brief CV to this Application including a list of relevant publications.

☐ *Marine ecosystem interactions – coral reefs, seagrass and other (benthic or pelagic) - with land-based pollutants and water quality*
☐ *Cumulative impacts from multiple stressors on GBR ecosystems with specific focus on water quality and climate change*
☐ *Estuarine ecosystems - condition, threats, response*
☐ *Wetland and freshwater ecosystems – condition, threats, risk and response*
☐ *Sediment dynamics – source, delivery, fate, impact, risk and interactions*
☐ *Nutrient dynamics – source, delivery, fate, impact, risk and interactions*
☐ *Pesticide or emerging contaminant dynamics – source, delivery, fate, impact, risk and interactions*
☐ *Management options by industry – urban, cane, grazing, other crops*
☐ *Wetland treatment systems – ecological, social, economic*
☐ *Ecosystem landscape restoration – gullies, wetlands, other landscapes*
☐ *Factors influencing management adoption – social, economic*
☐ *Delivery options – market-based instruments, incentives, regulation etc.*
☐ *Landscape processes and hydrology*
☐ *Pollutant modelling – paddock, catchment, marine*
☐ *Experience in 'systematic evidence synthesis' methods*

Please enter response here.

3. Eligibility and Assessment Criteria

The Applicant should state whether they comply with the following eligibility criteria and provide a brief explanation.

Eligibility Criteria	Yes/No and explanation
Access to international databases of scientific literature including those for biophysical and social sciences such as Scopus, Web of Science, JSTOR, Science Direct, Directory of Open Access Journals (DOAJ)	
Availability of between 10 and 50 days (depending on the evidence synthesis method) between December 2021 until October 2022. Please provide an estimate of your availability in this period.	
Availability to participate in author training sessions in early December and/or January 2022.	
Applicant holds, is willing to hold, or is engaged through an organisation that fulfils the insurance requirements for contractual engagement. As a guide, the following insurances may be required: • Workers compensation • Public Liability (minimum required: $10,000,000 per occurrence and not less than $20 million in aggregate) • Professional Indemnity Insurance (minimum required: $1 million per occurrence and not less than $2 million in aggregate)	
Assessment criteria	**Brief explanation and link to relevant documents**
Proven knowledge and experience in the specific area of expertise demonstrated by publication of recent and relevant peer-reviewed products (including grey literature), in one or more of the topic fields in Item 4 and/or experience in systematic evidence synthesis methods.	
Proven ability to develop technically and scientifically sound written products and/or experience in systematic evidence synthesis methods.	
Demonstrated experience and commitment to working in and/or managing a team using a collaborative approach.	
The ability to work to tight timeframes.	
Value for money.	

4. Schedule of Rates

Note that there may be an upper limit on rates of AU$1,400 per day (excluding GST) based on the approved budget under the current contract with the Department of Agriculture, Water and the Environment. In-kind contributions from Applicants or their organisations may be used to cover any difference between the Applicant's rate and the accorded fee for service.

Final rates will be negotiated with successful Applicants as part of the engagement process.

Please indicate your current rates for this application:

Daily rate (AU$):

Potential in-kind contribution (AU$) (if known at this time):

5. Applicant Execution

The Applicant:

(a) acknowledges that the information provided by C$_2$O Consulting was provided for the convenience of Applicants, and that C$_2$O Consulting will not be liable for any information provided or for any errors or omissions form such information.

(b) ensures that all the information contained in the Applicant's offer is complete, accurate, up to date and not misleading in any way.

(c) agrees to contact C$_2$O Consulting immediately if any information provided in this application changes or is incorrect.

(d) consents that information provided in this application may be provided to C$_2$O Consulting's project partners, including Australian and Queensland Government agencies.

(e) represents that the signatories below are authorised to execute this Application Form on behalf of the Applicant.

Date:_____

EXECUTED for and on behalf of:)
)
_____   ) _____
Name of Applicant   ) Signature of authorised representative
by its authorised representative, in   ) By executing this offer the signatory warrants
the presence of:) that the signatory is duly authorised to submit
) this offer on behalf of the Applicant
_____   )
Signature of witness   ) _____
) Name of authorised representative (block
) letters)
_____   )
Name of witness (block letters)   )
                                             _____
                                             Position of authorised representative

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2022 Scientific Consensus Statement

Author Selection Process

Evaluation Assessor Guide

Issued 16 November 2021

Overview

You have been invited to join the Selection Panel for the call for interest related to 2022 Scientific Consensus Statement author selection process. The intention of this selection process is to identify suitable lead authors who will contribute to delivering a range of evidence synthesis products using the best available science and develop points of scientific consensus on land use impacts on GBR water quality and ecosystem condition and management.

Applications will be assessed through the following stages:

Stage 1 – application screening (completed by C_2O Consulting)

Stage 2 – assessment against criteria

Stage 3 – selection of successful applicants

This Guide been developed primarily to guide the Selection Panel in assessing applications as part of the Stage 2 process.

The Selection Panel comprises the following members:

- Sheriden Morris, Reef & Rainforest Research Centre (RRRC)
- Greg Oliver, Great Barrier Reef Foundation
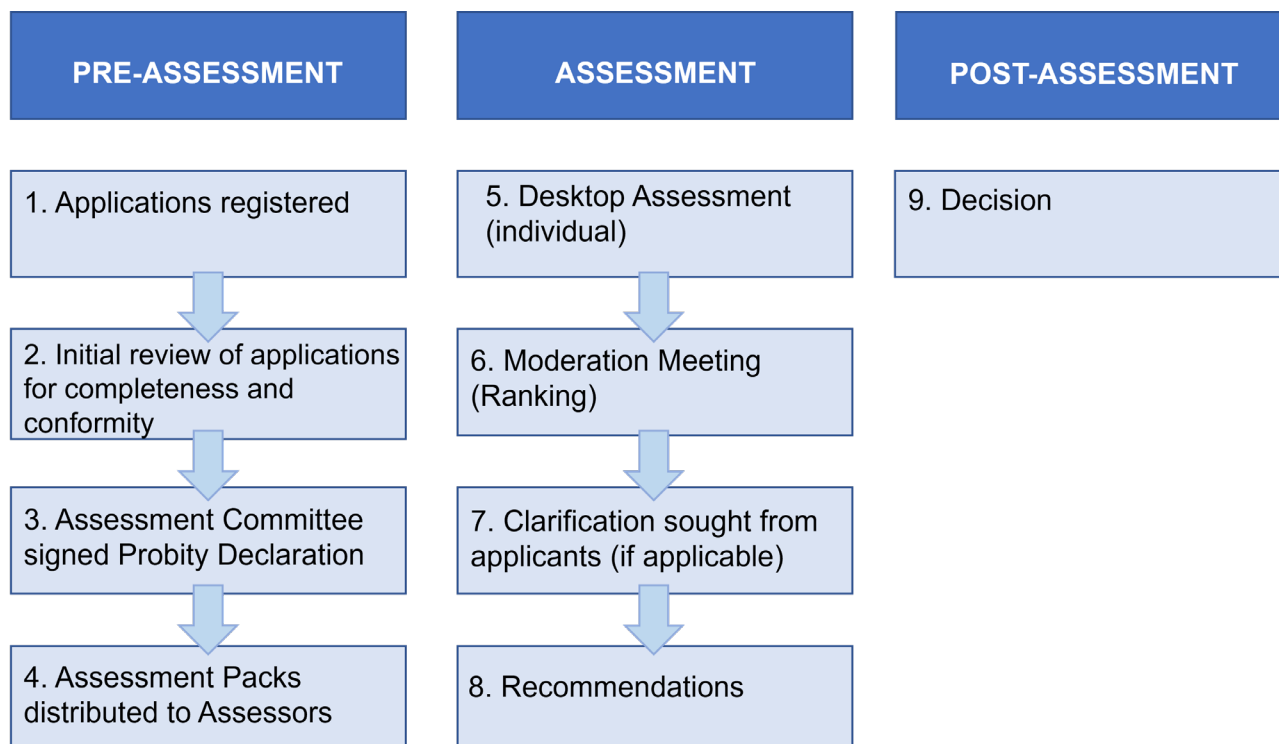- Johanna Johnson, C_2O Consulting (Panel Chair)

Assessment timeline

The indicative timeframe for the Stage 2 assessment is outlined below:

Activity	Date
Applications and assessment pack distributed	22 November 2021
Selection Panel assessment (individual assessors)	22 – 26 November 2021
Selection Panel meeting (general discussion and score comparison; final ranking)	30 November 2021 (TBC)
Recommendations (preparation of assessment report)	By 3 December 2021

Process

To assist the Selection Panel in evaluating the applicants, the following overview of the process is provided:

PRE-ASSESSMENT	ASSESSMENT	POST-ASSESSMENT
1. Applications registered	5. Desktop Assessment (individual)	9. Decision
2. Initial review of applications for completeness and conformity	6. Moderation Meeting (Ranking)	
3. Assessment Committee signed Probity Declaration	7. Clarification sought from applicants (if applicable)	
4. Assessment Packs distributed to Assessors	8. Recommendations	

1. Applications registered

All applicant submissions are downloaded from the dedicated SCS email address for receiving the Expression of Interest applications. Closing on 18 November 2021, all applications are registered by C_2O Consulting and the Assessment Packs compiled for the Panel by 22 November 2021.

2. Initial review (Stage 1)

An initial review of applications is undertaken by C_2O Consulting to ensure that each application is complete and conforms to the eligibility requirements (Application screening – Stage 1). Applications assessed as not meeting the minimum Stage 1 requirements are set aside as ineligible and will not be progressed to Stage 2.

3. Probity Declaration

A Probity Declaration is signed by each member of the Selection Panel and any C_2O Consulting personnel involved in processing the applications. C_2O Consulting will review the Probity Declarations and actual, perceived, or potential conflicts of interest will be considered by an independent C_2O Consulting member. Where appropriate, a plan will be put in place to manage

any conflict, or in the event of a significant conflict, the Assessor will be excluded from assessing that specific application.

4. Assessment packs

Assessment packs with all eligible applications are distributed to the Selection Panel and the Stage 2 assessment phase begins in accordance with the *Assessment timeline* section of this document. The assessment pack includes:

- a copy of the Author Selection Guidelines and blank Grant Application Form for reference purposes,
- the Application Register, which shows the total number of applications,
- the Assessor's Guide (this document),
- all eligible applications for scoring, and
- an electronic scoring sheet to assess all eligible applications.

5. Desktop assessment

Assessors will review and score how the applications comply with the five (5) assessment criteria:

I. Proven knowledge and experience, demonstrated by publication of recent and relevant peer-reviewed products (including grey literature), in one or more of the topic fields in Item 4 and/or experience in systematic evidence synthesis methods.

II. Proven ability to develop technically and scientifically sound written products and/or experience in systematic evidence synthesis methods.

III. Demonstrated experience and commitment to working in and/or managing a team using a collaborative approach.

IV. The ability to work to tight timeframes.

V. Value for money.

Assessors will assign a score (see table below) to reflect the degree to which the applicants meet the assessment criteria. Note that scores do not need to be whole numbers (e.g. 3.5, 4.5 etc. are acceptable).

Score Assessment	
Score	**Interpretation**
0	Unacceptable -The applicant does not address the assessment criterion
1 - 2	Inadequate - The applicant is considered inadequate as it contains a range of significant deficiencies in relation to the assessment criterion and fails to meet expectations
3	Acceptable - The applicant is considered to be acceptable in relation to the assessment criterion
4	Superior- The applicant is considered superior in relation to the assessment criterion and exceeds expectations in some aspects
5	Outstanding - The applicant is considered to be outstanding in relation to the assessment criterion and exceeds expectations in all aspects

There is also an additional column at the right side of the scoring sheet where the Assessor can add specific comments if clarification or additional notes are required.

After the Assessor has completed the initial assessment, the scoring sheet should be sent to the Selection Panel Chair who will aggregate scores and distribute to the Panel prior to the moderation meeting.

If at any stage of the assessment an Assessor comes across a potential conflict of interest that was not initially identified when completing the Probity Declaration, then the Assessor should immediately inform the Chair about that potential conflict.

6. Moderation and assessment meeting

A moderation meeting of the full Selection Panel will occur in which Assessors discuss their scoring of applicants and reach agreed scores as far as possible (which will be based on an average score from all members). While each Selection Panel member retains their own independent judgment, an average agreed score will be used to rank the applicants. A Panel member will not be forced to change his/her score at any time, and an average of the scores provided by each individual member will be used. Each member of the Panel will have an equal weighting attributed to their score.

7. Clarification sought from applicants (if applicable)

In some cases, information provided by an applicant may not be clear, and the Panel may decide to request more information (clarifications) from the applicant. Requests for additional information will be co-ordinated by the Panel Chair and documented by email.

Clarifications are not an opportunity for applicants to submit an amended application that might be perceived as introducing unfairness into the assessment process; rather, the purpose is only to clarify the initial submission where there is ambiguity.

8. Recommendations

The Selection Panel will make its recommendation on author selection. While the final evaluation rankings will be the primary basis for making its recommendation, the Panel may recommend another applicant where there are clear and sound reasons for doing so. This could apply, for example, where the Panel determines that the scoring process has resulted in a perverse outcome, or where the Panel considers that there are unacceptable risks associated with a highly ranked applicant.

An Assessment Report will be prepared to document in detail the assessment process undertaken, and the recommendations made by the Panel, including the list of suitable applicants that satisfied the assessment criteria and that will be considered in the subsequent design phase (short-listed applicants). The Assessment Report may incorporate various attachments including individual and aggregate scoring sheets, moderated scores, and minutes of the moderation meeting. The Assessment Report will be circulated to members of the Selection Panel for approval prior to submission to the Contract Managers (DAWE and DES) for approval.

If a minority of the Selection Panel members do not agree with the Assessment Report, this will be noted in the report but will not preclude the majority of the Selection Panel making a recommendation.

Successful applications are recorded in the minutes of the moderation meeting.

9. Decision

C_2O Consulting, having considered the recommendations from the Selection Panel, will decide which applications will be successful. All applicants will be notified by C_2O Consulting on the outcomes of the application process.

Attachment 1

Fields related to land-based impacts on Great Barrier Reef (GBR) water quality and ecosystem condition considered in this assessment and their abbreviations.

Abrev.	Knowledge/ Experience topics
MEI	Marine ecosystem interactions – coral reefs, seagrass, crown-of-thorns starfish, and other (benthic or pelagic) - with land-based pollutants and water quality.
CI	Cumulative impacts from multiple stressors on GBR ecosystems with specific focus on water quality and climate change
EE	Estuarine ecosystems - condition, threats, response
WF	Wetland and freshwater ecosystems – condition, threats, response
SD	Sediment dynamics – source, delivery, fate, impact, risk and interactions
ND	Nutrient dynamics – source, delivery, fate, impact, risk and interactions
PC	Pesticide or emerging contaminants dynamics – source, delivery, fate, impact, risk and interactions
M	Management options by industry – urban, industrial, cane, grazing, other crops
WTS	Wetland treatment systems – ecological, social, economic
ER	Ecosystem restoration – gullies, wetlands, other landscapes
FIMA	Factors influencing management adoption – social, economic
DO	Delivery options – market-based instruments, incentives, regulation etc.
LP	Landscape processes and hydrology
PM	Pollutant modelling – paddock, catchment, marine
SED	Experience in "systematic evidence synthesis" methods

Example Assessment Report

2022 Scientific Consensus Statement: Lead Author Selection

Background

The Reef 2050 Water Quality Improvement Plan (WQIP) is a joint commitment of the Australian and Queensland governments. The WQIP is a collaborative program of coordinated projects and partnerships designed to improve the quality of water flowing to the Great Barrier Reef (GBR). The 2022 Scientific Consensus Statement (SCS) is a foundational document which provides the scientific underpinning of Reef 2050 WQIP design and implementation.

The 2022 SCS will be prepared by a multidisciplinary group of scientists with expertise in GBR water quality and ecosystem health and the management options for reducing the impact of poor water quality from land-based runoff to the GBR. Oversight for the 2022 SCS will be provided by the Reef Water Quality Independent Science Panel (ISP) which has 9 members with multi-disciplinary expertise.

C_2O Consulting has been appointed by the Australian Department of Agriculture, Water and the Environment (DAWE) in collaboration with the Queensland Department of Environment and Science (DES) to lead and coordinate the 2022 SCS. The outputs will be prepared in collaboration with scientists across a range of organisations (including AIMS, CSIRO, James Cook University, Central Queensland University, University of Queensland, Griffith University and scientists from the Queensland Government, and private consultants).

Questions that form the basis of the evidence synthesis process have been identified and prioritised by policy and management representatives relevant to management of GBR water quality. There are presently 33 questions across a range of topics, with a number of sub-questions. To address these questions, several evidence synthesis methods have been tailored to accommodate this broad scope of the 2022 SCS. Each question will be assigned a lead author, and a method depending on the scope of the question and the degree to which it is necessary to demonstrate confidence in the evidence. Guidance will be provided to lead authors by an expert in evidence synthesis and contributors in the process, including provision of advice on question framing, protocol development and undertaking the synthesis reviews.

To identify a pool of suitable lead authors, an Expression of Interest (EOI) process was open from 4 to 18 November 2021. Lead authors will contribute to delivering a range of evidence synthesis products using the best available science and develop points of scientific consensus on range of topics associated with land use impacts on GBR water quality and ecosystem condition and management.

Lead authors will be responsible for identifying and collaborating with suitable contributors to deliver the final outputs by October 2022. Outputs will be peer-reviewed, with final review by the ISP.

Application Process

The EOI was conducted as an open and transparent process and was led by C_2O Consulting as the overall Coordination and Leadership Team for the 2022 SCS. The invitation was circulated to almost 500 individuals currently or historically involved in relevant fields as defined in the Application Guidelines, and was forwarded by these individuals to an unknown number of additional people.

The Application Guidelines (including the Eligibility Criteria and Selection Criteria in Attachment 1) clearly defined the requirements for the process, and applicants completed an EOI Application Form which was submitted with their curriculum vitae. The Application Form contained the information required by the Assessment Panel to assess the technical knowledge and capability of individuals to support the delivery of the 2022 SCS.

Assessment Process

An Assessment Panel was Chaired by C$_2$O Consulting, with a policy/investor representative and a research representative listed in Table 1.

Table 1. Members of the 2022 SCS Author Selection Panel.

Name	Organisation
Johanna Johnson (chair)	C$_2$O Consulting
Sheriden Morris	Reef & Rainforest Research Centre (research representative)
Greg Oliver	Great Barrier Reef Foundation (policy/investor representative)

Probity Declarations and Conflict of Interest forms were completed by all members.

The following documents were distributed to the Panel members for assessing and scoring applicants, along with the Assessment Pack, including:

- the Applicants' Register,
- the Evaluation Assessor Guide,
- all EOI applications for those that passed Stage 1 eligibility screening, and
- an individual scoring sheet.

A total of 43 applications were received before the closing date. Of those, four applications included contributions from other researchers and were considered as a single but joint EOI.

Stage 1 – Eligibility assessment
Each EOI was screened by C$_2$O Consulting to check that the applicant met the eligibility criteria (see Attachment 1). Applications that did not meet the eligibility requirements were not be progressed to Stage 2. **A total of 42 applicants passed the Stage 1 screening for eligibility**.

Stage 2 – Assessment against criteria
Eligible applications were assessed independently by each Panel member against the following selection criteria:

6. Proven knowledge and experience, demonstrated by publication of recent and relevant peer-reviewed products (including grey literature), in one or more of the topic fields in the Application Guidelines and/or experience in systematic evidence synthesis methods.
7. Proven ability to develop technically and scientifically sound written products and/or experience in systematic evidence synthesis methods.
8. Demonstrated experience and commitment to working in and/or managing a team using a collaborative approach.
9. The ability to work to tight timeframes.
10. Value for money.

A scoring matrix was used to collate scores and mean scores were calculated. The maximum score possible was 30 with criteria 1 (publication record) double-weighted due to the importance of this criteria (maximum possible score 10), and all other criteria had a maximum possible score of 5. The interpretation of the scores is shown in Table 2. There was also an additional column on the scoring sheet where the Panel members could add specific comments if clarification or additional notes were required.

Table 2. Interpretation of scores for each criteria.

Score Assessment	
Score	**Interpretation**
0	Unacceptable - The applicant does not address the assessment criterion
1 - 2	Inadequate - The applicant is considered inadequate as it contains a range of significant deficiencies in relation to the assessment criterion and fails to meet expectations
3	Acceptable - The applicant is considered to be acceptable in relation to the assessment crit
4	Superior - The applicant is considered superior in relation to the assessment criterion and exceeds expectations in some aspects
5	Outstanding - The applicant is considered to be outstanding in relation to the assessment criterion and exceeds expectations in all aspects

A moderation meeting was held on 30 November 2021 for Panel members to discuss scores and agree on final rankings. Recommendations for suitable lead authors and potential questions that they could address were also made based on the draft proposed list of questions available at that time. These recommendations took into account availability and any potential conflicts that applicants' may have due to their current role. Since this assessment, the question list was further reviewed by a policy reference group and ISP (due to time constraints requiring the processes to run in parallel).

Two applicants were not recommended due to potential conflicts of interest:

The Panel was supported by the SCS Science Coordinator, Jane Waterhouse, acting in the capacity of probity advisor to the process and reviewing the recommendations from the Panel.

Assessment Panel Conflicts of Interest

Conflicts of Interest and probity were managed by the Panel Chair and SCS Science Coordinator as follows:

- <Intentionally blank>

Outcomes of the Assessment

As defined in the Evaluation Assessor Guide (Attachment 2), the Assessment Panel evaluated all applicants and provided a ranked list of potential lead authors for addressing priority questions. While the final evaluation rankings were the primary basis for selecting lead authors, the SCS Science Coordinator, policy group and ISP also considered how best to match lead authors' expertise with questions, the relevance of their recent publication record, and avoided allocating (where possible) more than one question to each selected author.

Ranking, scores and summary comments from the Panel on the assessment of all applications are shown in Attachment 3. The applicant scores ranged from 20 to 27 (maximum possible is 30).

This Assessment Report will be submitted to the Contract Managers (DAWE and DES) for acceptance. C_2O Consulting, having considered the evaluations from the Assessment Panel and input from the policy group and ISP, will decide which lead authors will be selected. All applicants will be notified by C_2O Consulting on the outcomes of the application process.

Panel Approval

This report was unanimously approved by the Assessment Panel.