Managing Research in the Great Barrier Reef Marine Park

10 January 2024

Objective: *To guide the consistent and effective management of scientific and other research in the Great Barrier Reef Marine Park.*

Target audience*: Great Barrier Reef Marine Park Authority officers assessing applications for permission, applicants for Marine Park permissions, researchers from accredited educational or research institutions, and interested members of the public.*

CONTENTS

1. PURPOSE

1. To outline the Great Barrier Reef Marine Park Authority's (the Reef Authority) approach to managing research activities in the Marine Park and specify key considerations and limitations in relation to research activities.

2. To guide development and assessment of applications for research permissions.

3. To guide an accredited educational or research institution ('accredited research institution') for limited impact research activities.

2. RELATED LEGISLATION / STANDARDS / POLICY

4. *Great Barrier Reef Marine Park Act 1975* (Cth) (the MP Act)
5. *Great Barrier Reef Marine Park Regulations 2019* (Cth) (the MP Regulations)
6. *Great Barrier Reef Marine Park Zoning Plan 2003* (Cth) (the Zoning Plan)
7. The Reef Authority's
   - Permission System Policy
   - Application for Joint Permissions Guidelines
   - Assessment and Decision Guidelines
   - Location Specific Assessment Guidelines
   - Maritime Cultural Heritage Protection SMA Assessment Guidelines
   - Photography, Filming and Sound Recording Activity Assessment Guidelines
   - Guidelines for impact assessment of various values (multiple documents) (Values Guidelines)
   - Policy: Managing Activities that Include the Direct Take of a Protected Species from the Great Barrier Reef Marine Park (Protected Species Policy)
   - Guidelines for Managing Visitation to Seabird Breeding Islands
   - Position Statement on Managing Access to the Restricted Access Special Management Areas Surrounding Raine Island, Moulter Cay and Maclennan Cay
   - Policy on Great Barrier Reef interventions
   - Restoration/adaptation guidelines
   - Translocation of species in the Great Barrier Reef Marine Park
   - Risk Assessment Procedure
   - Responsible Reef Practices
   - Science and Knowledge Needs for Management (2021)

3. CONTEXT

8. The Reef Authority is responsible for managing research in the Great Barrier Reef Marine Park (Marine Park) so that it is conducted appropriately. Permissions are a key tool to manage risks from a range of activities including research.

9. The 'Conducting research' section of the Application Guidelines provides pointers on determining whether an activity is considered research.

10. 'Research' generally includes biophysical, social and economic, and Indigenous cultural and historic heritage research. For decades, research in the Marine Park has concentrated on the Reef's natural values and processes (biophysical research). Biophysical research is therefore already a focus of specific requirements and allowances in the MP Act, MP Regulations and Zoning Plan, and of these Research Guidelines. More recently, strong growth has begun in other types of research, and management legislation and guidance is evolving in response.

11. The Zoning Plan and MP Regulations set out the way in which research activities are managed in the Marine Park. Limited impact research may be conducted by an accredited research institution without the need for a permit from the Reef Authority. All other research requires a permit for a permission from the Reef Authority.

12. The matters relating to joint permissions with Queensland described in the Reef Authority's Permission System Policy apply to consideration of research activities. They enable complementarity and efficiency in permission consideration processes.

13. The Reef Authority's Risk Assessment Procedure explains how risk is considered in decision-making on permissions.

14. A comprehensive and up-to-date understanding of the Great Barrier Reef (the Reef), its values, the processes that support it and the pressures affecting it is fundamental to its continued protection and understanding. Research of many kinds contributes greatly to this understanding and helps managers and the community make informed decisions on avoiding, mitigating and offsetting the pressures affecting the Reef.

15. The Reef Authority takes a proactive approach to setting the research agenda for management of the Marine Park. The Reef Authority's Science and Knowledge needs for management (2021)[1] summarises the science information needs of the Reef Authority, and is designed to be adaptive to accommodate emerging issues. Key knowledge and science themes will focus and prioritise collaboration opportunities with science and knowledge providers The management context outlines why each theme is important and how the scientific information generated will be applied. The Reef Authority may keep a register of detailed knowledge needs[2] to complement the themes and key science questions outlined in the strategy. The register will be regularly updated to address emerging issues and critical information needs for management. Insight is also provided by the Reef 2050 Long-term Sustainability Plan[3] and five-yearly Great Barrier Reef Outlook Reports (2009[6], 2014[6], 2019 [5] and beyond)[4].

4. GENERAL PRINCIPLES

16. **Valuing research** — The Reef Authority:
    - Is committed to ensuring that management decisions are based on the best scientific and other research information available.
    - Recognises that research may be commercial or non-commercial in nature.
    - Appreciates that most research, and the people who conduct it, contribute to the public good through building society's knowledge base.
    - Recognises the need to consider the research community's requirements in the context of a multiple-use Marine Park.
    - Expects the results from research activities in the Marine Park are either published or made available to management agencies through other mechanisms.
    - Engages with research by accessing relevant publications and datasets and by liaising with providers such as universities, research institutions and agencies, consultants, industries, Traditional Owners and the community.

17. **Ecologically sustainable use** — The Reef Authority conducts environmental assessment of research proposals in accordance with the MP Regulations and based on the precautionary principle[1].

18. **Cooperative approach** — The Reef Authority will continue to support cooperative approaches between Marine Park managers and the research community in relation to effective management of research.

[1] Under the Intergovernmental Agreement on the Environment (1992), the application of ***the precautionary principle*** in public and private decisions should be guided by (i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and (ii) an assessment of the risk-weighted consequences of various options. Similarly, under the *Great Barrier Reef Marine Park Act 1975* (Cth) subsection 3(1) the precautionary principle means *that lack of full scientific certainty should not be used as a reason for postponing a measure to prevent degradation of the environment where there are threats of serious or irreversible environmental damage.*

5. CATEGORY OF RESEARCH

19. In accordance with the Zoning Plan, research in the Great Barrier Reef Marine Park falls within two categories, characterised by whether a permission is required:

With Permission

Research where a permit granted by the Reef Authority is required and is:

a) undertaken by an a*ccredited research institution* but the research does not comply with sections 20–21 of the MP Regulations, and the research does meet the itemised limitations in those sections and the research proposes access in a zone other than the Scientific Research Zone; or

b) undertaken by any other researcher.

Without Permission

ii) *Limited impact research* where*:*

a) a letter of authorisation issued by the a*ccredited research institution* is required; and

b) undertaken by an a*ccredited research institution* where in compliance with sections 20–21 of the MP Regulations, including meeting the itemised limitations in those sections and the access restrictions under Part 2 of the Zoning Plan.

20. Table 1 outlines the required permission, user and other requirements for research in the Great Barrier Reef Marine Park.

Table 1: Category of research in the Great Barrier Reef Marine Park

Category (see Zoning Plan)	User	Activity/ permission	Access	Limitations apply
Without permission (letter of authorisation required)	***Accredited research institution***[2]	*Limited impact research* (extractive)[3]	Under a *research project*[4]	*Limited research sampling*[5]
		Limited impact research (non-extractive)[7]		*Minor research aid*[6]
With permission (permit required)	Other researchers	Other *Research*	In all zones, including Scientific Research Zone (specific conditions apply to Buffer Zone)	Nil
	Accredited educational or research institution[8]			

[2] s 13 MP Regulations.
[3] s 20 MP Regulations.
[4] s 5 MP Regulations.
[5] s 20(2), (3) and (4) MP Regulations.
[6] s 20(2) MP Regulations.
[7] s 21 MP Regulations.
[8] Where an activity does not comply with ss 20-21 of MP Regulations.

6. RESEARCH — GENERAL REQUIREMENTS

6.1 WHERE RESEARCH CAN OCCUR

21. The Zoning Plan and the MP Regulations defines where research activities may be allowed with permission (by grant of permit) or without permission (by letter of authorisation) depending on the zone and the research proposed.

22. Table 2 summarises the research permission requirements for each zone within the Marine Park.

- Permissions are provided to researchers in the form of 'permit' documents.
- Only accredited research institutions can conduct limited impact research. Definitions of ***limited impact research (extractive)*** and ***limited impact research (non-extractive)*** can be found in sections 20 and 21 of the MP Regulations. The meaning of 'take' is discussed further in these Research Guidelines.

Table 2: Permission (permit) requirements by zone

	Zone							
Research activity	General Use	Habitat Protection	Conservation Park	Scientific Research	Buffer	Marine National Park	Preservation	Commonwealth Island
Research (other than Limited impact research)	Permit required	Permit required	Permit required	Permit required	Permit required	Permit required	Permit required	Permit required
Limited impact research (extractive)	No permit required#	No permit required	No permit required	No permit required*	Permit required	Permit required	Permit required	Permit required
Limited impact research (non-extractive)	No permit required	No permit required	No permit required	No permit required*	No permit required	No permit required	Permit required	Permit required

A permit granted by the Reef Authority is not required. However, a letter of authorisation issued by an a*ccredited research institution* is required.

* If an approved Environmental Management Plan (EMP) is in place, research must be conducted in accordance with the approved EMP.

23. Some locations have specific limitations and objectives relevant to research activities, as outlined in these Research Guidelines (e.g. see the 'Research under permission' section), the Reef Authority's Location Guidelines, and other documents (see list of documents in section 3 of these Guidelines).

6.2 RESEARCH WITH ASSOCIATED EDUCATION OR TOURISM

24. Although the activities of a researcher and their staff are usually considered to be research, in certain situations other people helping conduct those activities are considered to be participating in education or tourism. In these cases, the researcher is conducting two activities being: (i) research; and (ii) tourism/ education — both activities need a permission (and grant of a permit) from the Reef Authority. Refer to the Application Guidelines for additional information.

25. Note, any component of the operation that is a tourism program will be subject to Environmental Management Charges (EMC).

26. Limited impact research does not involve tourists.

6.3 NON-COMMERCIAL, COMMERCIAL, AND GOVERNMENT RESEARCH

27. Non-commercial and commercial research are treated the same way in terms of assessing risk to the values of the Marine Park. The only difference is that commercial research, including for the purpose of biodiscovery, attracts a cost recovery assessment fee. For more guidance on whether a research project is commercial refer to the Applications for Joint Permissions Guidelines.

28. Specimens collected under research permissions cannot be sold or traded.

29. The Reef Authority website provides guidance on accessing biological resources for the purposes of biodiscovery. The Environment Protection and Biodiversity Conservation Regulations 2000 (Cth) (EPBC Regulations) require a permit for access to biological resources. Permissions granted by the Reef Authority suffice for the purpose of the EPBC Regulations to the effect that access to biological resources is exempt from requiring a permit under those regulations. However, applicants wishing to use biological resources for biodiscovery purposes will need to negotiate their own benefit sharing agreements with either the relevant Queensland department or the Commonwealth Department of the Environment and Energy, depending on sampling location.

30. All applicants for permissions will need to declare whether samples will be used for biodiscovery purposes.

31. Cost recovery arrangements are reviewed periodically. The Reef Authority may revise permission application and assessment fees for research in the future, subject to Australian Government policy. The Reef Authority will consult with the research community prior to changing fees.

6.4 Responsibility of permission holder(s)

32. A permit holder is responsible for all conduct that occurs under their permit. Permit conditions require the permit holder to inform any participants, employees, volunteers or sub-contractors of the limits and conditions that apply.

33. Accredited research institutions are likewise responsible in relation to all limited impact research activities conducted under their accreditation and letter of authorisation issued to third parties.

34. The Reef Authority expects all researchers to provide information about the ongoing storage location of data collected by the project within permit reports or institutional accreditation reports. For example, information (including metadata, datasets or GIS layers) might be held by a particular person or organisation or lodged in certain online repositories. Having a record of where data is held increases the likelihood that the Reef Authority can use these data for future management purposes.

6.5 Considering environmental conditions

35. The risk posed by collection or interference to species, habitats and the ecosystem can be increased if the system has received a recent impact or is in poor health generally. For example, elevated vulnerability can result from extreme weather, disease outbreaks, and cumulative impacts. Similarly, when coral habitats are stressed additional consideration must be given to the appropriateness of collecting or interfering with algal grazers and coral-associated species (particularly fish), and other activities such as boat anchoring.

36. Research (whether under an application for accreditation or a permission) may not be granted if the location or species is at elevated risk of stress due to recent or cumulative impacts in or near the study area — for example, if there has been extreme weather, coral bleaching, a crown-of-thorns starfish outbreak, or a marine pollution incident. The Reef Authority will take a conservative approach when considering whether to recommend permission be granted for research and in formulating permit conditions. This includes considering the cumulative impact of all activities occurring in an area, including potential conflict of use. In some circumstances it may be appropriate to allow research activities that specifically measure impact or recovery and therefore cannot be conducted elsewhere. However, take should still be minimised as much as possible.

37. Researchers (both permit holders or accredited research institutions) are expected to consider the condition of, and current risk to, species and habitats in the design and day-to-day conduct of their research. This means staying aware of chronic and acute events and avoiding stressed or at-risk locations and species as much as possible. We recognise some research is specifically designed to examine impact levels and responses, but even in these situations researchers should consider ways to limit the impact of their research.

For example,

- David wishes to conduct laboratory experiments on coral samples from reefs near Lizard Island. As this section of the Reef experienced significant bleaching in recent years reef recovery processes are of critical importance. The Reef Authority may decide to grant to David a permission that (i) precludes

collection during, and one month prior to, the annual coral spawning event and (ii) tightly limits total collection amounts and boat anchoring activity in bleaching-affected areas.

- Maria plans to do an extensive light shading experiment on a seagrass meadow that forms core feeding habitat for a large number of dugongs. The meadow is close to the mouth of a large river known for its chronic poor water quality and recent major flooding. Disturbance from vessels occurs from time to time. Several existing research programs have permission to extract large numbers of seagrass samples from the area. Given the stress already experienced by the seagrass in this meadow, the Reef Authority may decide not to grant Maria permission or the Reef Authority may encourage Maria to look at alternate locations for her research

- Hayley is coordinating a program of rapid impact assessment and recovery monitoring after a severe cyclone. Although the coral and seagrass habitats in the research locations are expected to be badly damaged, the Reef Authority may decide to grant Hayley permission because the work logically needs to be located where the impact occurred and will inform decisions on management actions to support recovery of the system.

- Raj plans to conduct coral research that involves take of coral and requires installation of numerous structures that will be visible. The research is proposed in areas frequented by tourism operators. The Reef Authority may require Raj to consult with existing users as part of the assessment process. The Reef Authority may also encourage Raj to look at alternate locations for his research if conflicts of use cannot be managed by conditions of the permission.

38. Permissions may include conditions that refer to threshold values or impact types and provide specific limits or required actions that are triggered when thresholds are exceeded or an impact of a particular type occurs.

39. The Reef Authority may modify the conditions of existing permissions to further restrict collections or activities if it believes, on reasonable grounds, that it is necessary to do so to protect the environment, or the living resources, of the Marine Park (section 128 of the MP Regulations).

6.6 Take, sampling intent, and secondary use of research specimens

40. Section 3 of the MP Act defines 'take'. For the purposes of the Zoning Plan, see also 'taking' an animal, plant or marine product has the meaning given by section 1.5 of the Zoning Plan and encompasses, among other things, 'interfering with'. The Reef Authority generally considers 'interfering with' an animal or plant to include actions such as touching, injuring, and (for animals) significantly influencing behaviour (even where no physical contact takes place).

41. Where research involves the temporary removal of specimens from the Marine Park, all researchers and the Reef Authority should consider the likelihood of disease or contamination exposure and the risk of specimens being used for purposes other than those intended (for example, specimens collected under research permissions being on sold). Specimens being returned to the Marine Park must be placed back as close as possible to the location where they were taken from and always within their accepted distribution, within the same genetic population, and not to areas with poorer parasite or disease status. The Position Statement on the Translocation of Species in the Great Barrier Reef Marine Park contains additional guidance.

42. It is an offence under the *Criminal Code Act 1995* to provide false information as part of an application or dealings with the Reef Authority in relation to permissions. Researchers should not artificially inflate the number or type of samples needed for their research project simply to service the sampling desires of a researcher working on a different project. The purposes of collection need to be consistent with the stated scope of the research.

For example,

- Neville and Kelly work in different departments at a university on unrelated research programs. Neville asks Kelly to collect some damselfish for his physiology project when she is out collecting for her anemone fish behavioural project, as he doesn't want the bother of applying for his own permission from the Reef Authority. Kelly may be committing fraud if she told the Reef Authority in her application for permission that she needed to collect damsel fish for her own project.

- Neville decides to switch his study animal to anemonefish. He asks Kelly to collect an extra 100 anemone fish so that he does not need to apply for his own permission from the Reef Authority. If Neville's research does not have the same objectives as Kelly's then Kelly could be committing fraud if

she allocates him 100 of her own fish or simply bumps up the sample figure in her application for permission to ask for an extra 100 fish without further explanation.

- However, if Neville and Kelly coordinate with each other before Kelly applies then she can ask for a permit that covers the needs of both of their projects. They must ensure that the objectives, methods and sampling needs of both projects are explained in the application to the Reef Authority.
  Note: if the permission is granted only to Kelly then she is wholly responsible for all activities and sampling conducted under the permission and she should be prepared to accept responsibility for Neville's conduct in the Marine Park.
- Neville and Kelly decide to jointly apply for permission that covers both their personal anemone fish projects. As they each also supervise a number of research students, the Reef Authority suggests they request an 'umbrella' style permit that can also cover the predicted sampling needs of the students over the next five years.

43. The Reef Authority recognises collections of research specimens obtained from the Marine Park provide a valuable resource to the scientific community when made available to secondary research projects. Deposition (for no value) of such specimens into public museum collections where they will be available to other researchers is encouraged. The Reef Authority considers additional research uses (a service) to be appropriate when the specimens (a good) were collected for the primary purpose of the original research project (under a permission or accredited research institution) and:

    - The specimens are not required to be returned to the Marine Park; and
    - The secondary uses will contribute to publicly available research findings; and
    - Specimens will be used for non-commercial purposes; and
    - Specimens are not sold (no commercial transaction occurs).

6.7 Protected species

44. All researchers are expected to report interactions with 'protected species' in accordance with the Policy: Managing activities that include the direct take of a protected species from the Great Barrier Reef Marine Park and the requirements of institutional agreements (refer definitions) or permission-related conditions and requirements. For instance, permission conditions generally specify that the permit holder must notify the Reef Authority within 72 hours if a protected species is adversely impacted, injured or killed during the permitted activities (other than where the permission allows that take).

45. Research proposals that wish to 'take' protected species must apply for permission from the Reef Authority.

6.8 Methods, equipment, and best environmental practice expectations

46. In these Research Guidelines, a requirement for equipment to be 'attended at all times' means the researcher must actively monitor the equipment (including keeping it within sight) and remain close enough to be able to take control of it within a few minutes. Additionally, the equipment cannot be left in place if the researcher leaves the water or moves to another site.

47. In general, extractive research should be avoided within a 50m radius of a permitted mooring unless the researcher receives written support from the mooring owner.

48. Marine debris and microplastic pollution are of growing concern worldwide. The use in research of plastic items that may easily be lost or disintegrate over time is discouraged in the Marine Park. This also includes plastics used in items such as concrete blocks.

49. The Reef Authority expects all researchers conducting research activities in the Marine Park to adopt best environmental practices in recognition of the area's environmental significance and World Heritage status.

50. 'Responsible Reef Practices' guidance has been prepared for a range of activities (e.g. anchoring and mooring, collecting, outboard engines, visiting islands and cays, fishing, snorkelling, waste, reef walking) and also apply to research activities.

6.9 *Communicating with other users*

51. The Marine Park is a multiple use marine park and as such a number of varied and potentially conflicting uses may occur side-by-side.

52. The Reef Authority encourages researchers to maximise opportunities to liaise and communicate with other users of the Marine Park in the areas in which they are undertaking field work, and more broadly. Good communication can minimise the potential for conflicts to occur, build greater public awareness and promote the outcomes of research relevant to the Marine Park.

53. Depending on the nature (sensitivity or risk) and scale of the research, it may be necessary for a researcher or accredited research institution to submit a communication plan to the Reef Authority outlining how the research program and activities will be communicated with other users of the Marine Park.

6.10 *Understanding and respecting Aboriginal and Torres Strait Islander connections and sites*

54. All researchers should have regard to the rights and interests of Aboriginal and Torres Strait Islander people who use, and live adjacent to, the Marine Park.

55. The Reef Authority strongly encourages all researchers working in the Marine Park to make contact and discuss their research with relevant registered native title claimant groups, Traditional Owners, and/or Native Title Representative Bodies. Recommended guidance for involving Traditional Owners includes Indigenous engagement and participation documents issued by the National Environmental Science Programme and its Tropical Water Quality Hub.
Note: Prior to the granting of permissions for use or entry of the Marine Park, the Reef Authority conducts Native Title Notification (see the Assessment Guidelines). Research activities that require a Public Environment Report or Environmental Impact Statement assessment approaches may be required to undertake targeted Traditional Owner consultation with details outlined in the Terms of Reference.

56. The Reef Authority encourages all researchers to continue to build their own knowledge about the cultural heritage of Aboriginal and Torres Strait Islander people, and to respect the values and many special sites of Traditional Owners throughout the Marine Park.

7. RESEARCH UNDER PERMISSION

57. A permission (and a permit) is required to conduct any research activities in the Marine Park, where:

    i) a person or entity is not an accredited research institution; or

    ii) an accredited research institution does not meet the requirements of limited impact research under sections 20 and 21 of the MP Regulations.

58. For example, a permission is required for research conducted by organisations (other than an accredited research institution) and/or where the research will involve take of more individual animals than is allowed under the definition of limited impact research (extractive). Permission is also required to undertake research activities in certain zones (see

59. Table 2).

60. Paragraph **69** below and Tables 1 and 2 in the Assessment and Decision Guidelines provide information on where research activities could be consistent with a particular zone's objectives (i.e. permission may be considered).

61. Research permission applications must:

- include the names of proposed taxa (to the lowest relevant taxonomic level) and sampling numbers; and
- include information on the relative abundance of the species or habitat and the species conservation status or vulnerability to over-collecting (including localised depletion); and
- describe the level of environmental impact (see the Risk Assessment Procedure and Values Guidelines) that may result from the research activity, including in the context of the state of the environment at the proposed sites.

62. Guidance on the minimum information required for permission applications (including for research) is provided in the Permit application checklists. Other relevant information is contained in the various guidelines that deal with impact assessment in the permission system.

7.1 'Umbrella' permits

63. Where permission is required, the Reef Authority encourages researchers to consider applying for a broader permission that can be granted as an 'umbrella' style permit for an overarching research program, rather than individual permissions for individual component projects that then need to be issued as multiple individual permits. Primary investigators (supervising researchers) may find the 'umbrella' approach helpful for enabling short-term research projects, such as those for Honours students.

For example,

- Professor Hamlin runs a large research group at a university. He has multiple honours and masters students already and plans to take on several more over the next five years. He intends to focus their projects on some specific aspects of coral ecology. Professor Hamlin applies for a permission that could be granted in the form of an umbrella permit — in his application he identifies a range of coral and associated invertebrate species and explains that he is requesting sample sizes that will encompass the needs of all the student's projects. He anticipates some projects will involve genetic techniques and others will use behavioural experimentation so he makes sure he provides information on these methods in his application.

64. Assessments of 'umbrella' style permission applications that include extractive activities will consider the scale and number of research programs intended to be covered.

7.2 Permission duration

65. The Reef Authority decision maker has discretion to determine the most appropriate permission term, considering the duration of the research program and a range of other factors. In most cases, research permissions will be granted for up to six (6) years.

66. The Reef Authority generally grants shorter permission terms for pilot/proof-of concept studies, the use of new research techniques, or research that may represent an unknown risk to the Marine Park.

67. Some activities may be granted permission for 10 years, e.g., long-term low risk monitoring.

7.3 Permission reporting requirements

68. Reporting of the research activities is usually a permission condition. Depending on risk, this reporting may be required only at the end of a research project or regularly throughout the project (annually or more often). For examples of common reporting conditions, search our public permit database for current research permissions. See also the expectation outlined earlier in these Research Guidelines regarding data storage locations.

7.4 Research in particular zones

69. The intention of the Scientific Research Zone is to provide opportunities for scientific research to occur in relatively undisturbed areas, while also keeping the area generally free from extractive activities and providing for the protection of natural integrity and values.

- For guidance on interpreting the expression 'generally free from' refer to the Reef Authority's Assessment and Decision Guidelines.
- Research is considered to be a pre-existing use of Scientific Research Zone areas.
- Research conducted under a permission, and limited impact research conducted by an accredited research institution, can be conducted in the Scientific Research Zone. To support research, the six major research facilities in the Marine Park each have Scientific Research Zone areas in waters within their vicinity.
- Extractive activities that are not for research purposes are generally considered inconsistent with the objective of the Scientific Research Zone.

70. Research that is purely observational in nature, does not significantly and detrimentally interfere with animal behaviour, and does not involve the deployment of any equipment (including quadrats or transects) may be appropriate in Buffer and Marine National Park Zone areas.

For example,
Research conducting fish counts on snorkel, coral visual surveys on SCUBA, or non-interfering observation of animal behaviour is usually considered low risk.

71. Proximity to a research station and ease or safety of access are not by themselves considered valid justification for use of Buffer, Marine National Park or Preservation zones.

72. For a research permission to be granted in the Buffer and Marine National Park zones it must meet at least one of the following conditions; for Preservation Zone both conditions must be met in accordance with the Zoning Plan.

    (i) The research is relevant to, and a priority for, the management of the Marine Park;

    The Reef Authority generally considers this to mean that the research:
    - must, by virtue of its scientific objectives and design, logically require work in the relevant zone; and
    - should address one or more of the Science for Management questions [2] that underpin the Reef Authority's Science and Knowledge needs for management (2021) [1] or address emerging priority information needs as identified by the Reef Authority; and
    - should generally have specific relevance and priority for the management of that particular type of zone.

    (ii) The research cannot reasonably be conducted elsewhere;

    The Reef Authority generally considers this to mean that the research:
    - is part of a long-term ongoing monitoring program for which permission had been granted prior to 1 July 2004; or
    - is necessary as part of new monitoring program, incident response or emerging management information need that is considered of highest priority by the Reef Authority in assessing the condition or function of a particular zone or location.

73. In the Buffer, Marine National Park and Preservation zones, extractive activities are generally considered inconsistent with the objectives of the zone. However, exemptions may be considered on a case by case basis. It is unlikely that the delegate would grant permission for extractive activities within a Preservation zone.

74. In the Preservation Zone even non-extractive activities may be considered inconsistent because the zone has been established to provide for the preservation of the natural integrity and values of areas of the Marine Park, generally undisturbed by human activities.

75. The Reef Authority is unlikely to grant permission for research in the Conservation Park Zone (or more highly protected zones) that involves trawling or netting; or research in the Habitat Protection Zone that involves trawling. However, permission may be granted if the applicant can demonstrate that either condition (i) or (ii) of paragraph **72** is satisfied.

76. All researchers should consult the Science and Knowledge needs for management (2021)[1], Science for Management questions[2] and Reef 2050 Long-term Sustainability Plan[3] when determining the relevancy of their research for management of the Marine Park.

7.5 Special Management Areas and other locations with restrictions and requirements

77. Some locations may have additional restrictions or conditions that are additional to those described by the basic zoning rules. These additional conditions are made under Special Management Area arrangements which target specific issues or needs for the protection and conservation of reef values. Refer to the Location Specific Guidelines for an overview and links to additional information.

78. In Maritime Cultural Heritage Protection Special Management Areas, the Reef Authority can only grant permission for cultural heritage research (section 109 of the MP Regulations). No other types of research can be permitted in these areas. Refer to the Reef Authority's Maritime Cultural Heritage SMA Guidelines for more detail.

79. Restricted Access Special Management Areas occur within the Scientific Research Zone (SRZ) at One Tree Island Reef and adjacent to the Australian Institute of Marine Science's Townsville base. The intention of these areas is to allow for research to be carried out without disturbance of experiments by other users and to provide for the ongoing protection of important research infrastructure. Entry to these

areas requires written permission from the Reef Authority, with some exceptions as described by sections 47(2), 47(4) and 47(5) of the MP Regulations. In considering applications for entry to these Restricted Access SMAs, permission is unlikely to be granted unless the assessment indicates the activity is of acceptably low risk to current and future research projects and infrastructure. Consultation with the relevant research station operator is required.

80. Restricted Access Special Management Areas are also in place for the waters around Raine Island, Moulter Cay and Maclennan Cay. Specific requirements governing research access to these areas are outlined in the Position Statement on Managing access to the Restricted Access Special Management Areas surrounding Raine Island, Moulter Cay and Maclennan Cay. In considering applications, permission is unlikely to be granted unless the assessment indicates the activity meets these requirements.

7.6 Low risk research and research methods, equipment and sampling

81. Table 1 (Section 5 above) sets out the categories of research, being research that: (i) does not require a permission ('without permission' but requires a letter of authorisation); and (ii) requires a permission (and a permit). Research that requires an application for a permission may be deemed low risk.

82. This section of the Research Guidelines provides guidance applicants for research projects, including what is considered low risk research.

83. Applications for permissions to conduct research using methods that fall within the allowances of limited impact research, but which still require a permission because they are not being conducted by an accredited research institution, are likely to be considered low risk.

For example,
Hamish is a researcher who wants to conduct visual fish surveys on snorkel in an area of General Use Zone near Gladstone. Hamish's university is not an accredited research institution so he must apply to the Reef Authority for permission. However, because his research methods fall within the specifications in the MP Regulations and the Reef Authority's Research Guidelines for limited impact research (non-extractive), his application is likely to be successful.

84. Video or sound recording, photography, and the use of drones is considered low risk if it complies with the Photography, Filming and Sound Recording Activity Assessment Guidelines, including the section on 'Recording for the purpose of research', and additional guidance for drones and ROVs in Table 5 and Table 4 of these Research Guidelines.

85. Limits may be applied to the number of equipment items deployed per location per year. The limits may be more generous if the equipment is attended at all times by the researcher or the research is occurring in the Scientific Research Zone.

86. Although assessed on a case by case basis, the granting of a permission for use of nets for research purposes is more likely to be considered low risk where:

- Not used in dugong protection areas, net-free areas, waters where use of nets is prohibited, or other highly protected or sensitive areas; and
- Nets are not anchored, staked or fixed; and
- Seine nets do not exceed 16 metres in length, 3 metres in drop or have a mesh size greater than 28 millimetres and does not contain a bag, pocket or similar device; and
- No part of a net containing fish is out of the water other than to immediately remove fish for sampling or release; and
- Net use complies with the *Queensland Fisheries Regulation 2008* as in force from time to time as defined for the Zoning Plan by the MP Regulations, these Research Guidelines and other relevant best practice fishing documents.

87. Researchers granted permission to use nets for research purposes are expected to:

(i) remain in attendance at the net at all times while fishing so as to minimise harm to protected species and other species of conservation concern,

(ii) not deploy nets if megafauna such as dugong, dolphins, crocodiles, turtles, or large rays and sharks are seen in the immediate area (unless the permission allows take of those animals),

(iii) ensure all non-target and/or excess specimens are carefully removed and immediately released into water deep enough to allow them to escape, and

(iv) report all catch (non-target and target) and any protected species incidents to the Reef Authority as per the Take of Protected Species Policy.

7.7 Responsible coral sampling

88. Where research involves collection of coral, the Reef Authority encourages all researchers to follow the process below for making sampling decisions in the field. The process aims to help researchers spread coral sampling effort, minimise the risk of local over-collection, and generally promote sustainable coral sampling practices.

- **Step 1**: Undertake a Reef Health and Impact Survey (RHIS) or conduct a similar survey of an equivalent area (~80m^2):
  - If you find 30% or less live hard coral cover, you should not conduct any coral sampling in the survey area. You should move to a different area with more coral and do another survey. Continue this process until you find an area with coral cover above the 30% threshold.
  - If you find more than 30% live hard coral cover, you may conduct coral sampling within the survey area boundary.
- **Step 2**: If you are unable to meet all of your sampling needs in the first suitable area, sample what you can and then move to a new area and start from Step 1 again.

89. The Reef Authority encourages all researchers to submit to the Reef Authority any RHIS survey data generated through the above or other processes.

90. The Reef Authority will consider the following for applications involving take of coral:

i) Where an application for take of coral for a research purpose is more likely to be considered low risk if it falls within the sampling limits and guidance in Table 3.

ii) Where a proposed take of coral above the limits in Table 3 and does not use the RHIS-based guidance described in paragraph **88**, the Reef Authority is likely to ask the applicant to provide further justification that the research is a priority for management and more information about the condition of corals at the target locations.

91. In Table 3, 'research location' has the same meaning as in section 5 definitions of the MP Regulations; and 'site' means an area of 3000 square metres within a research location.

92. Compliance with Table 3 includes compliance with the Guidelines on Translocation of Species in the Great Barrier Reef Marine Park.

93. In Table 3, coral core holes must be capped with cement plugs. Note: taking one or a few whole coral colonies may present less risk than taking fragments from many different colonies as this reduces the number of colonies with injuries that expose them to disease and require energy to repair (i.e., impacts on growth rate, reproduction etc.). However, this option will only be suitable for some kinds of research and the cumulative effects of coral colony removal across multiple research projects should be considered.

94. Table 3, Table 4 and Table 5

Table 3: Coral sampling (take) limitations

Coral collection (annual)	Fragments (Total)	Species at a Location	Individual (%)	Cores (Total)	Cores	Each colony	Colony (Total)	No collection
RETAIN: coral fragments or nubbins and small cores								
Small coral cores	1000	100	< 10% as fragments and/or nubbins					

RETAIN: large coral cores[9]		10	< 10% of the colony diameter	500[10]	10/ species	1		
RETAIN: coral colonies[11]		10	< 10% colonies of any individual coral type within a site				100	Species that have < 5% abundance at that site
TEMPORARY: collection of coral colonies[12]		20					200	

7.8 REEF HEALTH

95. No coral sampling is permitted from reef sites, if any of the following apply:

    i) Where there are existing signs of significant coral stress such as moderate to severe coral bleaching, coral disease, coral predation or coral damage (or strong indications from predictive tools that this is the case, including bleaching thresholds). Limited exemptions may be considered where the purpose of the take is to research reef health impacts or recovery.

    ii) Known to have been significantly impacted by a cyclone, flood plume, outbreak of predators or coral bleaching/disease event within the last 12 months. Exemptions may be considered for existing permitted long-term studies, or where the purpose of the take is to research reef health impacts or recovery.

    iii) Where average coral cover is lower than 30 per cent. Limited exemptions may be considered where the purpose of the take is to research reef health impacts or recovery.

96. Any temporarily collected coral fragments or colonies showing signs of stress and/or disease must not be returned to the Marine Park.

8. RESEARCH UNDER ACCREDITATION

8.1 LIMITED IMPACT RESEARCH

97. The Zoning Plan provides for limited impact research to be conducted in certain zones of the Marine Park without written permission of the Reef Authority provided certain conditions are satisfied. One condition is that the research being undertaken is a component of a research project conducted by an accredited research institution (refer section 13 of MP Regulations).

98. In accordance with section 13 of the MP Regulations, the Reef Authority may accredit a research institution to conduct one or more of the following under an institutional agreement:
    - limited impact research (extractive) as defined within section 20 of the MP Regulations;
    - limited impact research (non-extractive) as defined within section 21 of the MP Regulations;

    if it is satisfied that the institution:
    - has adopted appropriate environmental practices and standards (including instruction and training of personnel); and
    - has an ongoing commitment to improve those practices and standards.

99. These Research Guidelines outline important standards, limitations and considerations regarding limited impact research (extractive) and limited impact research (non-extractive) by accredited educational or research institutions. The MP Regulations and Zoning Plan contain additional detail and information.

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9 Greater than 5 centimetres in diameter.

10 Only from massive growth-form corals that have a minimum diameter of 1 metre.

11 Whole and no larger than 30 centimetres in diameter.

12 Expected to be returned to the Marine Park alive.

100. Limited impact research (extractive) not undertaken in accordance with these Research Guidelines may result in a review of the accreditation at the Reef Authority's discretion. Consideration may be taken of whether the non-compliance was reported in accordance with requirements of any agreement entered into between the Reef Authority and the accredited research institution.

8.2 Environmental awareness

101. Researchers undertaking limited impact research are expected to consider the state of the local environment at the time they intend to conduct their activities and adjust them where possible to alleviate risk to stressed habitats and species.

For example,
A hot summer brings severe coral bleaching to one of PhD student Katie's field sites. She decides to delay her sampling of herbivorous fish to support reef recovery.

8.3 Environmental Management Plans

102. Accredited research institutions operating research stations facilitating research within parts of the Scientific Research Zone (SRZ) are encouraged to prepare Environmental Management Plans (EMPs) that provide site-based guidelines and codes of conduct for research. Incorporation of consideration of changing environmental conditions and risks is encouraged. The Assessment Guidelines contain information about the content and requirements of EMPs generally. Appendix 1 provides additional guidance in relation to EMPs for research stations.

103. Under legislation (section 20(1)(c) and 21(1)(c) of the MP Regulations) researchers conducting limited impact research field work in Scientific Research Zones must abide by the Reef Authority approved EMPs where they are relevant. Researchers operating under permissions are subject to conditions around liaison with research stations and abiding by resulting guidance on work within the local SRZ.

104. Research station operators are encouraged to liaise with users accessing areas adjacent to the local SRZ.

8.4 Methods and equipment for limited impact research (extractive)

105. Sampling may be ***limited research sampling*** if taking is done, in accordance with these Research Guidelines:
- by hand; or
- by the use of a hand-held implement that is not motorised and not pneumatically or hydraulically operated; or
- by the use of a 'minor research aid'.

Examples of hand-held implements considered to be acceptable for limited impact research (extractive) include measuring callipers, weighing scales, small dip nets, and sediment sieves.

106. Section 5 of the MP Regulations contains a definition of the ***'minor research aids'*** that can be used for limited impact research (extractive). These include:

- Apparatus, or equipment, authorised under Queensland fisheries legislation for recreational use;
- A data logger
- A water sampling device
- A sediment sampling device
- Passive acoustic monitoring or survey equipment
- Equipment for conducting an underwater video survey
- A tag
- A stake
- A non-fixed plankton net
- A sub-surface marker buoy

- A surface marker buoy
- A non-fixed transect tape or quadrat
- Clove oil in solution
- Equipment used for fastening anything described above.

107. Limitations on the use of these minor research aids are specified in section 20(1) and 20(2) and these Research Guidelines, including Table 4.

108. Where minor research aids have the potential to impact on the amenity/aesthetics of a high-use tourism site, the Reef Authority expects accredited research institutions to consult with operators who conduct activities within the proposed study area.

109. Any minor research aids left unattended (where this is allowed, see Table 4) in the Marine Park must display the institution name and unique identifier number of the relevant institutional agreement.

110. All installed minor research aids must be removed from the Marine Park as soon as is practical before or at the completion of the research project. A summary of equipment installation, losses, and removals is to be reported annually to the Reef Authority by the accredited research institution.

Table 4: Limited impact research (extractive) — Limitations on 'minor research aids'

Minor research aid	**Table 4: Limited Impact Research (Extractive) Limitations use**	**Additional guidance**
(a) Apparatus, or equipment, authorised under Queensland fisheries legislation for recreational use	Must be used in accordance with the *Queensland Fisheries Regulation 2008* as defined for the Zoning Plan by the MP Regulations.	Limitations on the apparatus and equipment authorised under Queensland fisheries legislation can be found through the world wide web, at the time of publication: 'Recreational fishing rules and regulations – fishing equipment'.
(b) Data loggers	Data loggers (including any associated sensors) must be: • continuously carried on the researcher's body; or • attended at all times; or • attached and deployed by means described within section 20(1) and (2) of the MP Regulations and further specified at minor research aids (i), (j) and (k) of this Table 4. This includes when attached to an ROV or towboard. To be considered minor research aids data loggers must not be greater than 500 millimetres in their longest dimension and only used with sensors that do not emit significant electrical signals, sound, or light into the environment (e.g., Secchi discs, digital thermometers, light meters, and pH, dissolved oxygen and salinity meters). Data loggers may contain a sealed battery and small electrical parts.	Sensors may be integrated within the same outer casing as the data logger or separate and connected via leads.
(c) Water and sediment sampling devices	Water and sediment sampling devices must be: • attended at all times, or attached and deployed by means prescribed within section 20(1) and (2) of the MP Regulations and further specified at	Note that in the MP Regulations: • s 20(2)(c) limits take of seawater to 100 litres per calendar year per research project.

Minor research aid	Table 4: Limited Impact Research (Extractive) Limitations use	Additional guidance
	minor research aids (i), (j) and (k) of this Table 4; and • used in accordance with the best practice guidance in the Queensland Water Monitoring and Sampling Manual; and • not motorised or pneumatically or hydraulically operated other than they may: ○ contain a sealed battery; and ○ have small electrical or motorised parts such as timers and gears; and ○ incorporate small water pumps with water flow rates of less than 25 litres per minute. Water and sediment sampling devices that may spill hydraulic fluid, oil, fuel or other chemicals (e.g., if faulty or damaged) or that produce more than extremely minimal airborne and underwater noise and vibration are not allowed.	• s 20(2)(b) limits wet sediment take to 20 litres per calendar year per research project. An example of an acceptable small water pump is a water quality auto-sampler or a passive sampler with a 12 volt bilge pump generating a 25 litres per minute flow past the sampling mechanism. If take of seawater will exceed these parameters, a permission will be required.
(d) Passive acoustic monitoring and survey equipment	Portable hydrophones are allowed only when attended at all times (as per limited impact research (non-extractive)). Passive acoustic recorders and receivers must be attached and deployed by means prescribed within section 20(1) and (2), further specified at minor research aids (i), (j) and (k) of this Table 4, in such a way that limits damage to the benthos (particularly corals). Acoustic recorders and receivers must not be installed less than 50 metres apart. Acoustic monitoring and survey equipment may contain a sealed battery and have small electrical or motorised parts such as timers or gears. Tag readers that use sound or particle motion (e.g., a radio signal) are not allowed because these are classed as active acoustic devices. For example, hand-held passive integrated transponder (PIT) tag readers cannot be used. Acoustic locator and positioning beacons are not allowed, including ultra-short baseline (USBL) beacons used with ROVs.	Although the Reef Authority's Great Barrier Reef Underwater Noise Guidelines Discussion and Options Paper[15] does not discuss acoustic locator beacons in detail, as they are generally not anticipated to pose significant risk to marine animals, the beacons are not considered appropriate equipment for limited impact research because their use and specifications can vary quite widely, some could pose risk, and new versions of the technology are being developed all the time. Acoustic beacons are sometimes used to allow precise positioning of ROVs. Multiple beacons are laid out on the seabed and a receiver is attached to the ROV. The beacons emit a 'ping'. Many operate at high frequencies but there are also long range beacons that produce lower frequencies.
(e) Equipment for conducting underwater video surveys	Towed or fixed video cameras are allowed if the 'low impact recording' and other limits provided in the Reef Authority's Recording Guidelines are followed. Where fixed, video cameras must be attached and deployed by means prescribed within section 20(1) and (2) of the MP Regulations and further specified at minor research aids (i), (j) and (k) of this Table 4in such a way that limits damage to the benthos (particularly corals) to an absolute minimum. Baited remote underwater video cameras (BRUVs) are allowed as long as: • deployment is no longer than four hours before retrieval, and;	A precautionary approach should be taken when considering installation of equipment for conducting underwater video surveys if risk is elevated due to other cumulative impacts in the study area (e.g., extreme weather, marine pollution incident). * Note under sections 20(1)(c) and 21(1)(c) of the MP Regulations, all limited impact research occurring in an area of the Scientific Research Zone associated with a research station must be conducted in

Minor research aid	Table 4: Limited Impact Research (Extractive) Limitations use	Additional guidance
	• they are attached and deployed by means prescribed within section 20(1) and (2), detailed at minor research aid (k) of this Table 4in such a way that limits damage to the benthos (particularly corals) to an absolute minimum; and • when used in an area of the Scientific Research Zone associated with a research station, site selection advice from the research station manager is sought and considered.* Equipment for conducting underwater video surveys may contain a sealed battery and have small electrical or motorised parts such as timers or gears. Remotely operated vehicles (ROVs) are allowed if the 'low impact recording' and other limits provided in the Reef Authority's Recording Guidelines are followed. However, acoustic locator beacons used for high precision positioning of ROVs (e.g., ultra-short-baseline systems) are not allowed. Autonomous underwater vehicles (AUVs) are not allowed. Equipment that uses radar or sonar is not allowed, other than recreational depth sounders as specified in Table 5(a).	accordance with that research station's Environmental Management Plan if one is in place and has been approved by the Reef Authority.
(f) Tags	Tagging is considered 'take' and therefore must be conducted according to the regulated limits (see paragraph **111** of these Research Guidelines for more information). Chemical and genetic tags are not allowed as part of limited impact research. Plastic tags exposed to sunlight must be made of UV stabilised material. Acoustic tags are allowed only if they meet the conditions below, they may contain a sealed battery and small electrical parts. Sealed radio-frequency identification (RFID) tags (also known as passive integrated transponder tags) are allowed only if less than 50 millimetres in length. Tags used on marine products (e.g., on rocks) are to be removed when the research project ceases if the marine product will be returned to, or left in, the Marine Park. Tags used on plants must allow for growth to occur and not put the plant at risk of significant injury or death. Tags must be applied in accordance with best-practice standards and guidelines for the particular taxa or marine product being sampled. It is the responsibility of the researcher to be informed and aware of the most current best-practice standards and guidelines and to apply them.	In general, metal tags are preferred over plastic tags to reduce the risk of plastic pollution. Carefully consider the additional risks that external attachments of tags to soft body surfaces and internal attachments requiring surgery pose for animals. For example, external attachments can cause problems for some fish and sharks and in these cases internal placement may be more appropriate. Winter[11] suggests that the weight of acoustic transmitters (acoustic tags) for fish should be less than 1.25 per cent of the fish body weight (in water) or 2 per cent in air in order to have no negative effect on growth and health. This recommendation has been subject to much debate with it being suggested that it is both species and age dependent (Thorstad[12], Jepsen *et al*.)[13]. The American Use of Fishes in Research Committee [14] provides general guidelines for the use of fish in research that includes information on tagging.

Minor research aid	Table 4: Limited Impact Research (Extractive) Limitations use	Additional guidance
	In accordance with best practice, a tag must be of appropriate size, weight and (for acoustic tags) acoustic signal properties for the species and age class it is being applied to. The attachment method and positioning must be selected so as to reduce risk to the animal or plant as far as reasonably possible. Attachment of tags must be done by researchers with reasonable experienced in the procedures involved in the application of tags, or under the direct supervision of such a person. The use of tags on animals as a minor research aid must only occur following approval by the accredited educational or research institution's ethics committee whose responsibility it is to assess and approve proposed research programs which manipulate animals.	
(g) Stakes	Stakes may be used as attachment points for minor research aids (a), (b), (f), (g), and (h) of this Table 4 if the attachment is done in accordance with minor research aid (i). Round metal rods are allowed but must be no greater than 2400 millimetres in length and 12 millimetres in diameter. Metal star pickets are allowed but must be no greater than 2400 millimetres in length and 50 millimetres in diameter. To reduce the risk of micro and macro plastic pollution, plastic stakes (e.g. pegs) are not allowed. Researchers proposing to use plastic stakes are required to submit a permission application to the Reef Authority. No more than 40 stakes can be used at any one site (an area of 3000 square metres) within a 'research location'. Stakes must only be installed on bare sand, mud or rock. As coral cannot be 'taken' under limited impact research, stakes cannot be embedded in coral colonies, including encrusting coral growing over other substrate. Due care and attention must be applied during the transport and installation of stakes, especially in and around coral reef habitats, so that damage to the benthos does not occur.	As defined in section 5 of the MP Regulations a 'research location' means a discrete, identified reef; or a continuous non-reef area of up to 1,000 hectares.
(h) Non-fixed plankton nets	Non-fixed plankton nets must: • be attended by the researcher at all times; and • have a widest net mouth dimension of no more than 500 millimetres; and • be securely attached to a vessel while being towed, unless its widest mouth dimension is 300 millimetres or less (in which case it can be hand-held); and • only be used for tow times of 15 minutes or less.	Extra care must be taken when using plankton nets in reef habitats to avoid entanglement and damage to coral and other species. Securing to a vessel is recommended because if the net is pulled out of the researcher's hands (e.g., by an animal hitting or entering the net) it becomes a free-floating net assembly, potentially with an entangled animal. Risks of

Minor research aid	Table 4: Limited Impact Research (Extractive) Limitations use	Additional guidance
		not securing the net include difficulty or inability of the researcher to retrieve the net leading to distress/injury to animals (including drowning of air-breathers) and potential for the net to become entangled in reef habitats. Use of plankton nets in areas where there is a high risk of entanglement or capture of species of conservation concern is not recommended, e.g., close to turtle nesting beaches during hatchling season (particularly at night).
(i) Sub-surface marker buoys, surface marker buoys	Sub-surface or surface marker buoys may only have minor research aids (a), (b), (f), (g), and (h) of this Table 4 attached to them if the attachment is done in accordance with minor research aid (i) of this Table 4. Marker buoys, both surface and sub-surface, and mooring lines must be the smallest size possible to achieve floatation of the marker and any minor research aids being supporting. To reduce the risk of micro and macro plastic pollution, plastic-based marine rope used for mooring lines must be non-fraying, abrasion-resistant, and UV stabilised. No more than 10 surface marker buoys may be used at any one site (an area of 3000 square metres) within a 'research location'. No more than 20 sub-surface marker buoys may be used at any one site (an area of 3000 square metres) within a 'research location'. Surface and sub-surface marker buoys must be moored with lines by: • fastening the line directly to the substrate only if the load will not cause loss or damage to the substrate either due to the length of exposure or due to the force of the load or both; or • fastening the line to an inverted u-shaped metal rod less than or equal to 12 millimetres in diameter driven into sand; or • fastening the line to a single weight per buoy rig of no more than dimensions 400 x 200 x 200 millimetres. Metal chain or wire of a gauge less than or equal to 8 millimetres may be used to secure the line to the weight if necessary. The chain length should be just long enough to fasten the line to the weight. Where surface or subsurface marker buoys are left unattended, they must:	As defined in section 5 of the MP Regulations a 'research location' means a discrete, identified reef, or a continuous non-reef area of up to 1,000 hectares.

Minor research aid	Table 4: Limited Impact Research (Extractive) Limitations use	Additional guidance
	• display the institution name and unique identifier number of the institutional agreement the project is operating under; and • not be in a location where they pose a hazard to regular navigation; and • not be in a location where their line poses a likely entanglement hazard to fauna (such as cetaceans, seabirds and marine turtles); and • not be likely to drag the mooring mechanism along the substrate or become tangled on rocks or reef; and • not unreasonably impact the visual amenity of areas that are under high use by other types of Marine Park users.	
(j) Transect tapes and quadrats	Non-fixed transect tapes and quadrats must be used in accordance with the guidance in **Table 5** for non-limited impact research (extractive).	
(k) Clove oil in solution (COS)	A solution of clove oil (COS) consists of clove oil (eugenol), ethanol and/or seawater. Confined-aggregation collection methods using COS (e.g., enclosure tents or use in tide pools or other small, enclosed areas) are not allowed. Use of COS to capture unconfined fish must be in accordance with the following conditions: • only concentrations of up to 15 per cent COS are allowed; and • the COS must be dispersed from a hand-held spray bottle, with no more than 1000 millilitres of COS to be carried on a person at a time while undertaking research sampling; and • the total amount of COS of maximum concentration allowed to be carried on a research vessel is equivalent to 2000 ml per person per planned dive; and • the person using the COS must have demonstrated underwater field experience and competency; and • researchers using COS must take into account the potential for COS-associated impacts on corals and other organisms, as well as target and non-target fish species, and minimise the risks of harm including through the use of practical controls such as: o the diver should remain in-situ for at least five minutes following application of the COS to ensure that any affected non-target species are allowed to recover and do not become exposed to predation (building time for this activity into dive planning is advised). o fish capture using COS should generally occur at an isolated coral colony where focus and non-focus animals are visible and	COS is a useful fish capture tool but needs to be used carefully. Especially as it can be lethal to coral and other taxa. COS should be applied at approximately 10 millilitres per dose, preferably at a concentration lower than 15 per cent that has been determined by trials to be appropriate for the target species. If the application of the COS is well-planned and well-targeted, the specified quantities should allow for the anaesthetisation and capture of approximately 50 specimens per diver, with a reserve for capture of a further 100 specimens per excursion. However, this capture quantity is unlikely in practice as it would be expected that not all applications will hit their targets. In locations of high-current where the target fish are highly agile, it has been noted to take up to 500 millilitres of 10 per cent clove oil in alcohol to capture 11 target specimens (juvenile wrasse living in anemones) (Arvedlund[7]). The results of any new species-specific minimum concentration trials conducted are expected to be reported to the Reef Authority. Appendix 2 contains recommendations on what might be considered best practice trials to determine appropriate use of COS in

Minor research aid	Table 4: Limited Impact Research (Extractive) Limitations use	Additional guidance
	the desired specimen is easy to target and capture; and ○ for coral-associated species, specimen(s) taken should, where possible, be returned to the coral colony where captured; and ○ if there has been a recent environmental perturbation in the proposed study area (e.g., high levels of thermal stress, cyclone, disease outbreak) the use of COS may need to be avoided or restricted. For COS application to be considered use of a minor research aid, researchers are expected to apply the most up-to-date and currently available best-practice standards and guidelines for the use of COS in the marine environment, within the allowances of these Research Guidelines. Attempting to capture fish in a complex bommie habitat is not considered best practice due to the difficulty in targeting and capturing individual specimens.	terms of species-specific minimum concentrations and dosages. There is some information in the literature regarding effects of COS on non-target taxa. For example, Frisch *et al.*[8] found that in-field application of 9:1 alcohol to clove oil solution (10 per cent) had no noticeable effect on coral health unless applied in large quantities (100 millilitres) into the centre of a tight matrix of a coral colony. Boyer *et al.*[9] noticed coral colouration and growth reduction for clove oil mixed with alcohol at concentrations greater than or equal to 14 per cent. Robertson and Smith-Vaniz[10] note there are three main kinds of clove oil solution usage in the field — capture of unconfined fish, confined-aggregation capture in open water, and confined-aggregation capture in tide pools. Only the first is considered appropriate under limited impact research.
(l) Equipment for fastening minor research aids	Wire, bolts, screws and other fasteners are allowed as long as they are made of metals that will not create toxicity issues if they corrode. In keeping with efforts to reduce the risk of plastic pollution, plastic fasteners (such as cable ties) are not allowed. Researchers proposing to use plastic fasteners are required to submit a permission application to the Reef Authority. Dive weights may be attached to minor research aids as long as the least weight necessary for submersion is used. A minor research aid (other than clove oil in solution and anything required to be 'non-fixed' or carried by hand) can be attached to another minor research aid where this can be done without creating a large structure, an unacceptable entanglement risk for fauna or people, or a hazard to navigation. Attachment of a minor research aid to a living organism is not allowed other than use of tags as specified at minor research aid (f) of this Table 4.	An example of an acceptable attachment between two minor research aids is a small temperature logger tied with metal wire to a stake, dive weight or marker buoy.

8.5 Sampling (take) limits for limited impact research (extractive)

111. Section 20 of the MP Regulations prescribes limitations around sampling methods and extent of take. Section 20(3) and (4) restrict the number of individual animals of different species that can be sampled (taken) during limited impact research.

112. A 'limited impact' sampling limit for animal taxa that are not mentioned in section 19(3) is provided in section 20(4). Marine plants (seagrass, algae, mangroves etc.) are dealt with in section 20(2)(d) and (e).

113. If a species or group is mentioned in multiple parts of section 20(3) the higher level of protection always applies. Any animal that falls into the section 20(3)(a) no take list is excluded from limited impact research. This includes all species that are protected species under section 30 of the MP Regulations.

For example,
As soon as a species gains *Environment Biodiversity Protection and Conservation Act 1999* (Cth) threatened or migratory species listing it becomes excluded from limited impact research take in the Marine Park section 20(3)(a) even if the table at the end of section 20(3) of the MP Regulations has not yet been updated.

114. Research projects involving sample numbers greater than those specified in section 20 are not limited impact research and a permission is required. For 'no take' taxa, including coral and protected species, permissions are always required if the research involves 'take'.

115. When determining whether a research project can be conducted under section 20, the Reef Authority expects research institutions to consider not only the intentional or target species that will be 'taken' (e.g., caught or interfered with) but also the likelihood of non-target species being incidentally or accidentally 'taken'.

- The maximum per calendar year sample (take) numbers in section 20 represent a total and must therefore encompass both target samples and any incidental 'bycatch' of non-target samples, i.e., all sexes, size classes and species taken must be included in sample number calculations.
- Often, any incidental bycatch of non-target species or marine product that occurs during a project will be absorbable under the existing sampling allowances. However, if the research project could reasonably be expected to exceed the total take limits in section 20(3) and (4) then a permission should be sought instead of conducting the project under the institution's accreditation.

For example,
- Peter is trying to capture 50 female and 50 male gobies at his project site in the first year of his project. Under the limited impact sampling limits he can collect 100 gobies in total at the site for the year. On his first field trip he catches 70 female and 20 male gobies. Even though he caught more females than he needed and let the extras go immediately, he must count all of them against the sampling limit. He can now only catch 10 more gobies for the year.
- Honours student Sonia needs burrowing crabs for her project but the capture method she's proposing to use will likely collect large numbers of molluscs at the same time. Her supervisor decides there's a very real chance she will go over the allowable 'take' of molluscs outlined in section 20. The supervisor knows he could apply for a research permission from the Reef Authority to cover the extra take, but decides it is better to reduce the impact of the research by helping Sonia choose a capture method with lower bycatch rates.

116. The Reef Authority expects researchers conducting limited impact research sampling to:

- Take reasonable steps to minimise incidental by-catch of non-target species (such as through sampling design and selection of equipment); and
- Return incidental by-catch to its habitat as quickly as practical and in a manner that maximises its chances for survival; and
- Keep records of incidental by-catch that is not successfully returned to the habitat immediately (for example: killed or seriously injured during sampling or retained for a short period to photograph or measure).

8.6 Methods and equipment for limited impact research (non-extractive)

117. Only certain types of research are allowed under Section 21 definition of limited impact research (non-extractive) in the MP Regulations. 'Take' of animals, plants or marine products is generally not allowed (see the discussion of the definition of 'take' in paragraph **40**).

118. The Reef Authority generally considers that the use of certain research methods and equipment will fall within the definition of limited impact research (non-extractive) in the MP Regulations when applied in accordance with the limitations specified in Table 5.

Table 5: Limited impact research (non-extractive) — Limitations on research equipment (including methods used)

Method or equipment	Table 5: Limited impact research (non-extractive) Limitations on use
(a) Common low-impact data collection equipment	Small, passive items that support data collection may be used as part of limited impact research (non-extractive), provided they meet these conditions: • items must be easily carried by one person with little risk of knocking into and damaging surrounding species, habitat or artefacts; and • items must be non-fixed (not attached to the substrate or a fixed structure); and • items must be carried continuously on a person's body or attended at all times; and • items may contain a sealed battery and have small electrical or motorised parts such as timers or gears; and • items must be used in a manner that does not harm the environment. Acceptable items include: • underwater slates and pencils • taxa ID cards • watches and timers • global positioning devices (GPS) • data loggers as described in Table 4(a) excluding attachment and deployment (i.e., they must be non-fixed) • sensors that do not emit significant electrical signals, sound, or light into the environment (e.g., Secchi discs, digital thermometers, light meters, and pH, dissolved oxygen and salinity meters). • portable hydrophones • standard, low power, recreational fish-finders and depth sounders when affixed to research boats (other equipment that uses radar or sonar is not allowed). The following are not allowed for limited impact research (non-extractive) (but may, in certain circumstances, be allowed under limited impact research (extractive)): • Callipers, sediment sieves or other equipment that interferes with animals, plants or marine products when in use (and therefore involves 'take' of animal, plant, or marine product). • Test kits that involve mixing animal, plant, or marine product samples from the Marine Park with chemicals – as this involves 'take'.
(b) Transect tapes and quadrats	Non-fixed transect tapes and quadrats are allowed only for use in visual surveys (as per section 21(a)(iii) of the MP Regulations) and provided they are attended at all times while in use. Such tapes and quadrats must be: • only used if they can easily be carried by one person with little risk of knocking into and damaging surrounding species, habitat or artefacts; • removed from the Marine Park following each use; and • used in a manner that does not harm the environment. There is no limit to the dimensions or quantities of quadrats that can be used at a single site or location, provided the above conditions are met.
(c) Cameras	Small still and video cameras may be used provided they are:

Method or equipment	**Table 5: Limited impact research (non-extractive)** **Limitations on use**
	• used in accordance with the 'low impact recording' and other limits in the Recording Guidelines (including the section on 'Recording for the purpose of research'); and • non-fixed (not attached to the substrate or a fixed structure); and • attended at all times; and • removed from the Marine Park following each use; and • used in a manner which does not harm the environment.
(d) Visual and passive acoustic survey methods	Towboards may be used to assist observers to move through the water during visual surveys. Visual surveys of cetaceans are to be carried out in accordance with Part 4A of the MP Regulations. Remotely piloted aircraft (e.g., drones) and remotely operated vehicles (ROVs) can be used for visual surveys and passive acoustic surveys as long as researchers: • abide by the 'low impact recording' and other limits in the Recording Guidelines (including the section on 'Recording for the purpose of research'); and • abide by the access limitations for areas identified in the Location Guidelines; and • do not use acoustic positioning beacons. A drone flying according to a pre-programmed route may be considered to be an autonomous vehicle. Despite the limitations on 'autonomous vehicles' in the Recording Guidelines, researchers may use pre-programming functions for drones and ROVs during limited impact research if the researcher has the ability (equipment and skill) to take back immediate and direct control of the vehicle at any given time. For example, If an easily disturbed species enters an area where the drone is working, the researcher must be able to override the automatic flight path and adjust or abort the flight to reduce the risk of impacting the animal(s). Autonomous underwater vehicles (AUVs) are not allowed.

9. IMPLEMENTATION

119. These guidelines will be implemented, for the most part, through the Reef Authority's permission system and accreditation processes.

120. These guidelines are intended to be reviewed every five years or more frequently if needed.

10. DEFINITIONS

Accredited educational or research institution ('accredited research institution')

Means a research institution accredited pursuant to section 13 of the MP Regulations and the Zoning Plan.

Institutional agreement

Means an agreement (such as a Memorandum of Understanding) entered into between the Reef Authority and an accredited research institution in order to satisfy the Reef Authority that the institution has adopted practices and standards described in section 13(2) of the MP Regulations and has a commitment described in that regulation.

Letter of authorisation

Means a written document issued to a person by an accredited research institute authorising that person to conduct research under and in accordance with the accreditation.

Limited impact research

Means both *limited impact research (extractive)* (s 20(1) MP Regulations) and *limited impact research (non-extractive)* (s 21 MP Regulations).

Permit

A written document issued by the Reef Authority that contains one or more permissions and any conditions attached to such permission(s).

Pilot study

means a small-scale preliminary study conducted in the field in order to evaluate feasibility, time, cost, adverse impacts, and to gain knowledge and recommendations prior to making decisions on any larger-scale activity.

Proof-of-concept study

means evidence, typically deriving from an experiment or pilot project as well as literature reviews and scientific papers, which demonstrates that an activity is feasible, sustainable and causes minimal harm along all dimensions (e.g. ecological, social, cultural, economic), geographic and temporal scales beyond the scale of deployment.

Research location

Has the meaning given in section 5 of the MP Regulations being: *research location* means a discrete, identified reef; or a continuous non-reef area of up to 1,000 hectares.

Site

'Site' means an area of 3,000 square metres within a *research location*.

Take

Has the meaning given in Section 3 of the MP Act (see also section 1.5 of the Zoning Plan) and encompasses, among other things, 'interfering with'.

Temporary mean no longer than 12 months, with longer-term temporary collection usually considered equivalent to retained collection.

Coral rubble means dead coral skeleton or reef rock pieces that have fractured and been liberated by mechanical or chemical means and are larger in size fraction than sand (greater than two (2) mm).

Reef rock means consolidated in situ skeletal rock produced through organic cementation.

Plankton means small and microscopic organisms (often less than one inch) drifting or floating in the sea, consisting chiefly of diatoms, protozoans, small crustaceans and the eggs and larval stages of larger animals.

Fixing or fastening equipment means equipment used to hold things together or to securely attach them to the seafloor, not including anchors.

Short-term use means the use of permitted equipment for no more than 30 days in total during the period which the relevant permit remains in force.

Medium-term use means the use of permitted equipment for no more than 180 days in total during the period which the relevant permit remains in force.

long-term use means the use of permitted equipment for no more than 365 days in total during the period which the relevant permit remains in force.

Retained taking means a form of taking which is for the purpose of permanently removing an animal, plant or marine product from the Marine Parks.

Temporary take means a form of taking which is limited to removing an animal, plant or marine product from the Marine Parks for no more than a specified time and returning the animal, plant or marine product alive to the original site that it was taken from in the Marine Park.

In situ handling means to temporarily touch or manipulate an animal or plant by hand where it was found.

11. SUPPORTING INFORMATION

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17. Marking, L.L. and Meyer, F.P. 1985, Are better anaesthetics needed in fisheries? *Fisheries* 10(6): 2-5.

12. FURTHER INFORMATION

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Appendix 1 – Guidance for Research Station Environmental Management Plans

Environmental Management Plans (EMPs) for research stations should be assessed against the following elements to determine their suitability for approval by the Reef Authority.

Aim

- A Research Station Environmental Management Plan is established to provide site-based guidelines and codes of conduct for research to occur in parts of the Scientific Research Zone adjacent to research facilities/stations.
- The EMP should establish roles and responsibilities and a clear reporting framework for the research facility/station manager and the Reef Authority.

Environmental elements

- Site information (general description)
- Identification of surrounding uses
- Identification of potential impacts on:
  - values of the marine park (including biodiversity, heritage, social and economic values)
  - local areas or resources (overuse)
  - other users of the area (including amenity & conflict of use)
  - other researchers or research programs
  - consideration of future impacts (e.g. extreme weather) and how impacts act cumulatively to affect the area

Performance objectives and indicators

- What are the performance outcomes that the research station aims to achieve
- Criteria against which the implementation of the actions and the level of achievement of the performance objectives will be measured

Management actions and strategies

- The actions to be undertaken to achieve the performance objective, including any necessary approvals, applications and consultation
- Adaptive management actions that can appropriately respond to future impacts and the cumulative nature of multiple impacts
- Notification requirements before accessing area, who will be notified and how (e.g. email, SMS, telephone)
- Other notification requirements – in what situations will the research station notify the Reef Authority (e.g., incidents or works)
- Researchers required to sign EMP, stating they understand the terms and conditions of operating in the Scientific Research Zone
- Education handouts, induction procedure at research facility

Monitoring / Reporting

- A monitoring and reporting framework must be developed to determine and report on the effectiveness of the EMP

Corrective action and review

- Compliance – who would be responsible
- Procedure for managing non-compliance
- Ensuring researchers are from an accredited educational or research institution
- Formal annual audit to allow review and modification of EMP

APPENDIX 2 – DETERMINING MINIMUM CONCENTRATIONS AND DOSAGES OF CLOVE OIL IN SOLUTION (COS)

Using Robertson and Smith-Vaniz[10] as a guide, best practice trials to determine appropriate use of clove oil in solution (COS) should look to establish minimum concentrations for effective collecting of live unconfined fishes in the field. Research has shown these concentrations to be species specific (Griffiths[16]).

If there is no empirical evidence for optimal minimum concentrations with respect to the target species, this should be attempted to be established at the start of the proposed research project.

- In a study by Griffiths[16] fish were applied with a solution of clove oil and then monitored continuously and induction time to anaesthesia was measured.

At the start of a project, the researcher should first employ a two per cent solution to the species and observe the response. If there is induction, the time to recovery should be estimated. If there is not, the concentration should be increased by five per cent increments until induction occurs, up to the maximum concentration of 15 per cent clove oil.

- Successful induction is when total loss of equilibrium first becomes evident (i.e. when the fish can no longer swim or maintain a vertical position in the water).
- Recovery is when the fish regains equilibrium (i.e., maintains a vertical position). A time of less than five minutes is considered desirable (Marking & Meyer[17]).

Concentrations and dosages that are used to collect live unconfined fish will likely vary, with small, slow species that are strongly attached to small areas requiring less and weaker COS than larger, more agile and mobile species.

Usage of the minimum concentrations and dosages should be adopted as ‘best practice’, based on knowledge of the behavioural characteristics and relative mobility of the target species and the objectives of the research.