The MPA Guide
User Manual

Version 1 (2023)

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Oregon State University, IUCN World Commission on Protected Areas - Marine, Marine Conservation Institute, National Geographic Pristine Seas, and UN Environment Programme World Conservation Monitoring Centre (2023) *The MPA Guide User Manual, version 1*. https://mpa-guide.protectedplanet.net.

1. Welcome to ***The MPA Guide***

Dear User,

Hello! Thank you for your interest in *The MPA Guide*. Collaboration has always been at the heart of *The MPA Guide*, and it remains central to its ongoing use. We welcome you as a user and collaborator in the growing *MPA Guide* network.

Momentum to conserve the global ocean has never been greater. Multiple tools and approaches are needed to address the challenges facing ocean ecosystems and communities. Marine Protected Areas (MPAs) are a leading conservation tool to support healthy and resilient marine ecosystems and the benefits they provide to people. But not every MPA is the same. MPAs throughout the world can differ in many ways, including by size, how the area is established, the types and scales of activities that are allowed, and who manages the area. Even a single MPA can have many different zones within it that allow different activities. These different factors will produce different types of outcomes and different degrees of benefits for biodiversity and people.

Understanding the types of MPAs that currently exist can provide a clearer understanding of how much of the global ocean is effectively protected. This is especially important to understand progress towards global targets, such as Target 3 in the Kunming-Montreal Global Biodiversity Framework, which calls for effectively conserving and managing at least 30% of coastal and marine areas by 2030 in MPAs and Other Effective area-based Conservation Measures (OECMs). To ensure effectiveness, it is fundamental to understand what benefits different types of protection will bring for people and the environment.

To help answer these questions about MPAs as effective conservation tools, we need a common language and a clear way to discuss the expected outcomes of MPAs throughout the world. To achieve this, a group of 42 co-authors, including founding partners from UNEP-WCMC and Protected Planet, IUCN-Marine, Marine Conservation Institute's Marine Protection Atlas, National Geographic Pristine Seas, and Oregon State University, joined together to provide a broad range of expertise and perspectives. They considered science, policy, and management, and spoke with many other experts around the world. The result was published in 2021 as "*The MPA Guide: A framework to achieve global goals for the ocean*" in the peer-reviewed scientific journal Science.[1] This paper outlines the scientific basis and framework of *The MPA Guide*. Since its publication, this tool has been increasingly used around the world to identify the quality and quantity of MPAs.

The MPA Guide consists of four elements: Stage of Establishment (STAGE), Level of Protection (LEVEL), Enabling Conditions (CONDITIONS), and Expected Outcomes (OUTCOMES). *The Guide* defines these based on an MPA's management status, the activities that occur in the MPA or MPA zone, the impact of these activities, the presence of CONDITIONS for success, and the biodiversity OUTCOMES that would be expected from the area (see Section 3 for full definitions). Since 2021, *The MPA Guide* has been growing in use, allowing people to better understand what biodiversity OUTCOMES can be expected from existing MPAs using their STAGE and LEVEL. It can also help plan new MPAs. When decisions are being made about which activities to allow in an MPA, it can be useful to know how different activities lead to different LEVELs and different conservation OUTCOMES. The *Guide* has also been used for large-scale country or regional assessments and comparisons. For example, early assessments of STAGE and LEVEL have been conducted in Indonesia[2], the Mariana Islands[3], Canada[4], and the 50 largest MPAs in the United States.[5] This list continues to grow with assessments in other countries and regions in progress.

[1] Grorud-Colvert, K., Sullivan-Stack, J., Roberts, C., Constant, V., Costa, B. H. e, Pike, E. P., Kingston, N., Laffoley, D., Sala, E., Claudet, J., Friedlander, A. M., Gill, D. A., Lester, S. E., Day, J. C., Gonçalves, E. J., Ahmadia, G. N., Rand, M., Villagomez, A., Ban, N. C., … Lubchenco, J. (2021). *The MPA Guide:* A framework to achieve global goals for the ocean. Science. https://doi.org/10.1126/science.abf0861

Today, *The MPA Guide* continues to be a valuable tool for characterizing MPAs throughout the world using a common language and understanding of the expected OUTCOMES based on STAGE and LEVEL. *The MPA Guide* framework makes it possible to speak more clearly about the benefits MPAs can contribute to nature and people, if they are implemented accordingly. This brings people and organizations together to navigate complex conversations about MPAs, from meeting global targets to meeting the conservation goals of an individual new MPA.

This User Manual accompanies *The MPA Guide* so that users such as managers, researchers, non-governmental organizations, governmental agencies, Indigenous Peoples, local communities, and others can apply the framework. The goal is to allow users to better understand, plan, and communicate about MPAs. Section 3 of this User Manual describes the *Guide* and its four elements in detail. Section 4 discusses when the *Guide* should be used and its relationship to global databases and other MPA management effectiveness tools. Section 5 outlines the steps involved in an *MPA Guide* analysis and how to begin using the *Guide*. The Manual also provides examples of *MPA Guide* assessments, background information about the creation of the *Guide*, and additional resources. This User Manual is intended to be revised and updated over time. For more nuanced guidance we recommend that you read the Expanded Guidance on STAGE, LEVEL, and OUTCOMES, which are referenced throughout this User Manual.

It is our hope that this User Manual will serve you and help answer your questions as you implement *The MPA Guide* framework for your MPA. We encourage you to explore this Manual and to learn more at mpa-guide.protectedplanet.net. We are always eager to meet new partners and collaborators and encourage you to connect with us via *The MPA Guide* website or at TheMPAGuide@gmail.com.

Sincerely,
The MPA Guide Team

[2] Andradi-Brown, D. A., Estradivari, Amkieltiela, Fauzi, M. N., Lazuardi, M. E., Grorud-Colvert, K., Sullivan-Stack, J., Rusandi, A., Hakim, A., Saputra, D. E., Sapari, A., & Ahmadia, G. N. (2020). Applying *The MPA Guide* to Indonesia's Marine Protected Area Network. In Kementerian Kelautan dan Perikanan (Ed.), Management of Marine Protected Areas in Indonesia: Status and Challenges (pp. 269–312). Jakarta, Indonesia: Kementerian Kelautan dan Perikanan and Yayasan WWF Indonesia. DOI: 10.6084/m9.figshare.13341476

[3] Mana'oakamai Johnson, S., & Villagomez, A. O. (2022). Assessing the quantity and quality of marine protected areas in the Mariana Islands. Frontiers in Marine Science, 9. https://www.frontiersin.org/articles/10.3389/fmars.2022.1012815

[4] Canadian Parks and Wilderness Society. (2021). Assessing Canada's Marine Protected Areas. https://cpaws.org/our-work/ocean/

[5] Sullivan-Stack, J., Aburto-Oropeza, O., Brooks, C. M., Cabral, R. B., Caselle, J. E., Chan, F., Duffy, J. E., Dunn, D. C., Friedlander, A. M., Fulton-Bennett, H. K., Gaines, S. D., Gerber, L. R., Hines, E., Leslie, H. M., Lester, S. E., MacCarthy, J. M. C., Maxwell, S. M., Mayorga, J., McCauley, D. J., … Grorud-Colvert, K. (2022). A Scientific Synthesis of Marine Protected Areas in the United States: Status and Recommendations. Frontiers in Marine Science, 9. https://www.frontiersin.org/articles/10.3389/fmars.2022.849927

2. Acronyms and Abbreviations

- **CBD**: Convention on Biological Diversity
- **GD-PAME**: Global Database on Protected Area Management Effectiveness
- **IUCN**: International Union for Conservation of Nature
- **METT**: Management Effectiveness Tracking Tool
- **MPA**: Marine Protected Area
- **MPAtlas**: Marine Conservation Institute's Marine Protection Atlas
- **NGO**: Non-Governmental Organization
- **OECM**: Other Effective Area-based Conservation Measure
- **RBCS**: Regulation-Based Classification System
- **UN**: The United Nations
- **UNEP-WCMC**: United Nations Environment Programme World Conservation Monitoring Centre
- **WDPA**: World Database on Protected Areas

3. Introduction

SNAPSHOT: In this section you will learn about the background and creation of *The MPA Guide* and its four elements: STAGE, LEVEL, CONDITIONS, and OUTCOMES.

3. Introduction

Biodiversity and healthy ecosystems provide many benefits to people and nature. Marine Protected Areas (MPAs) are a primary ocean conservation tool to achieve healthy and resilient marine ecosystems. MPAs exist all over the world, but they are not all the same. MPAs can differ in many ways, including by size, how the area is established, the types and extent of activities that are allowed, and who manages the area. Even a single MPA can contain a variety of different zones where different activities are allowed. Some MPAs are operational and their management is active, while others only exist on paper. All these factors influence what outcomes the MPA will produce for nature and people. Many MPAs are not designed or functioning in a manner to achieve their stated goals. These inconsistencies and differences lead to confusion about how much of the ocean is actually "protected", and what outcomes to expect from that protection. To provide clarity and help answer these questions, *The MPA Guide* provides a common language, shared understanding, clear definitions, and expected outcomes to bring transparency and clarity to MPAs.

WHO IS *THE MPA GUIDE* TEAM?

*The MPA Guide i*s facilitated by its founding partners: International Union for Conservation of Nature (IUCN) - Marine, United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC) and Protected Planet, National Geographic Pristine Seas, Marine Conservation Institute's Marine Protection Atlas, and The MPA Project at Oregon State University.

The scientific paper "The MPA Guide: A framework to achieve global goals for the ocean" published in *Science*[1] in 2021, forms the basis of *The MPA Guide*. The publication was co-written by 42 MPA experts. The co-authors are from 14 countries across six continents. Many additional ocean experts from more than 45 countries, and counting, have generously shared their knowledge about MPAs during the process of creating, updating, and implementing the *Guide*. Today, a growing number of collaborators are applying the *Guide* around the globe.

Collaboration and inclusivity are at the heart of *The MPA Guide.* Please get in touch with us, and with others who are using the *Guide,* to collaborate and share lessons learned. Users are always welcome to connect with the *Guide* team (via https://mpa-guide.protectedplanet.net or TheMPAGuide@gmail.com) to share thoughts and experiences.

WHAT IS *THE MPA GUIDE*?

The MPA Guide is a science-based, policy-relevant framework to help understand, evaluate, and plan MPAs and link their expected outcomes for nature and people. *The MPA Guide* addresses the quality of MPAs by describing what conservation outcomes can be expected based on what is happening in an MPA or MPA zone. The *Guide* enables smart planning, design, and evaluation of new or existing MPAs by informing decisions about scientific, societal, and policy priorities.

The *MPA Guide* can be used to:

- Provide a common language about MPAs
- Evaluate existing MPAs
- Plan new, effective MPAs
- Improve existing MPAs
- Clarify expected outcomes from different types of MPAs
- Evaluate a system of MPAs and/or MPAs with many zones
- Compare MPAs across different countries or areas
- Track MPA effectiveness
- Better understand progress toward global protected area coverage

The MPA Guide organizes MPAs, or zones within multi-zone MPAs, according to their Stage of Establishment (STAGE) and Level of Protection (LEVEL). The *Guide* links STAGE and LEVEL to Expected Outcomes (OUTCOMES) and describes the Enabling Conditions (CONDITIONS) that should be in place for MPAs to be effective (Figure 1). The *Guide* does not rank MPAs or pass judgment about any MPA's STAGE or LEVEL, it simply describes what can be expected from different types of MPAs.

The MPA Guide uses the International Union for Conservation of Nature (IUCN) definition for a protected area when referring to MPAs:

> *A clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.*[6]

According to this definition, MPAs must prioritize the conservation of nature. If an area fits within this definition of an MPA, it will fit into one of the four STAGEs and LEVELs described in *The MPA Guide*. If biodiversity conservation is not the primary goal, the area might be considered an Other Effective Area-based Conservation Measure (OECM), if it meets the Convention on Biological Diversity (CBD) criteria. *The MPA Guide* was developed specifically for MPAs.

The MPA Guide complements the IUCN Protected Area Management Categories (IUCN categories) for management objectives and governance types. Please see the relationship map (Figure 5) in Section 4 to learn more about how the *Guide* relates to other MPA tools and frameworks.

The MPA Guide helps to provide a clearer understanding of how much of the ocean is protected. This helps to evaluate progress towards international conservation targets, such as the Kunming-Montreal Global Biodiversity Framework Target 3 for effectively conserving and managing at least 30% of the ocean in MPAs and OECMs by 2030. *The Guide* documents the quality of MPAs through STAGE and LEVEL, which can predict expected conservation OUTCOMES, depending on enabling CONDITIONS.

[6] IUCN and WCPA. (2018). Applying IUCN's Global Conservation Standards to Marine Protected Areas (MPA). Delivering effective conservation action through MPAs, to secure ocean health and sustainable development. Gland, Switzerland. https://www.dfo-mpo.gc.ca/oceans/documents/conservation/advisorypanel-comiteconseil/submissions-soumises/Woodley-Applying-MPA-Global-Standards-v120218-NK-v2.pdf

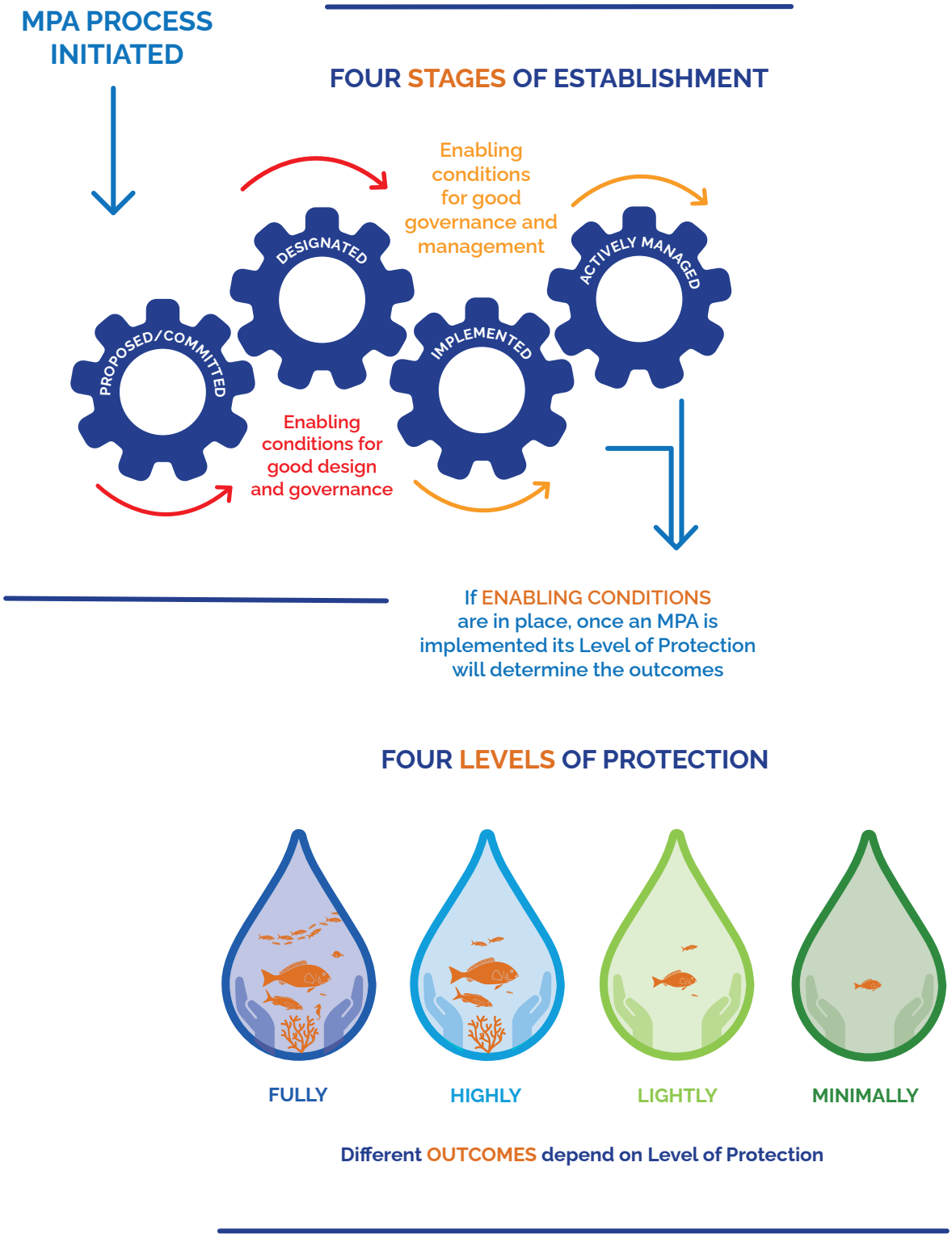


Figure 1. The MPA process as outlined by *The MPA Guide*.

ELEMENTS OF *THE MPA GUIDE*

The four elements of *The MPA Guide* (STAGE, LEVEL, CONDITIONS and OUTCOMES) define types of MPAs based on activities, conditions for success, and likely outcomes.

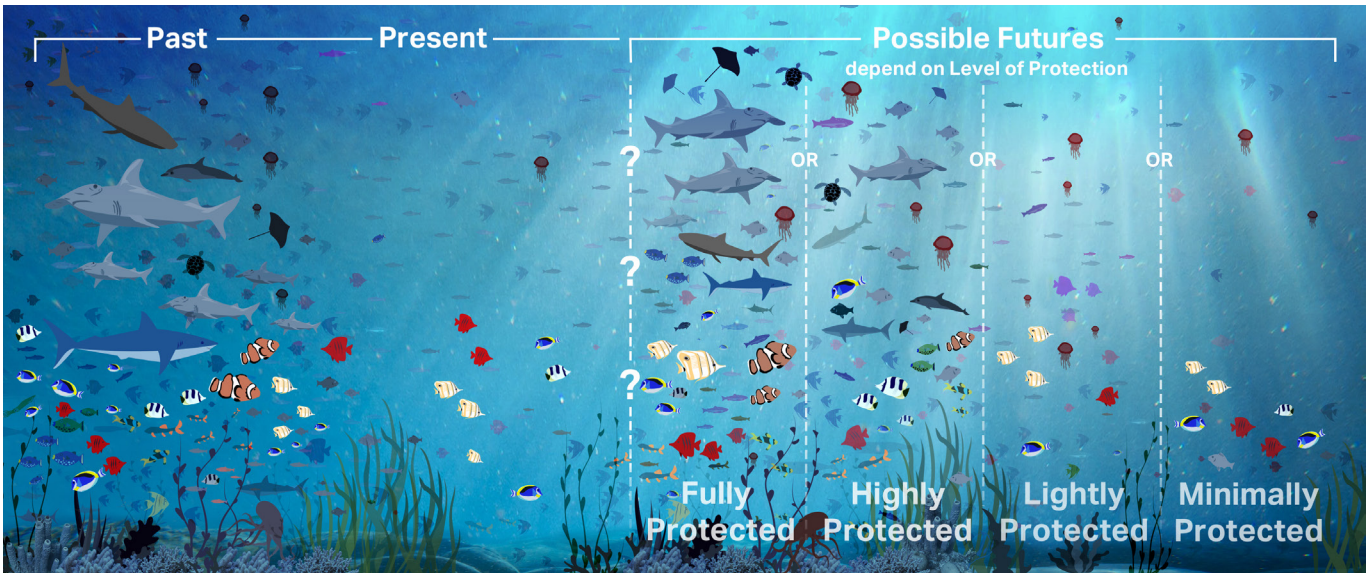


Figure 2. The LEVEL of Protection, and therefore the effectiveness of MPAs, will greatly influence the future state of the ocean. Past ocean ecosystems were abundant and diverse in species and habitats. Over time, expanded and intensified human activities have depleted and disrupted ocean ecosystems and reduced their services. MPAs, in conjunction with climate mitigation strategies and more sustainable use of the ocean, can conserve and restore biodiversity and the resilient ecosystems needed for human well-being. Different LEVELs will result in different OUTCOMES, if key CONDITIONS are satisfied. Figure from Grorud-Colvert et al., *Science*, 2021 (DOI: 10.1126/science.abf0861). Reprinted with permission, American Association for the Advancement of Science.

STAGEs of Establishment

Creating an MPA is often time-intensive and requires effort from all relevant governing bodies, rights holders, and stakeholders. The STAGE of Establishment (Figure 3) specifies the status that has been reached in the process of creating an MPA. Knowing the STAGE is important for determining what can be expected from an MPA because it clarifies whether or not the MPA is able to produce biodiversity benefits. There are many reasons why an MPA might be at one STAGE or another. The *Guide* can help describe and track the development of an MPA. Only when an MPA is Implemented will benefits begin to accrue.

There are four STAGEs of Establishment in *The MPA Guide*:

1. **Proposed/Committed** by a governing or other organizing body.
2. **Designated** by legal or other effective means.
3. **Implemented** with regulations active.
4. **Actively Managed** with ongoing monitoring and adaptive management.

More information about how to assign an MPA's STAGE can be found in the following Sections of this User Manual and in *The MPA Guide Expanded Guidance: Stage of Establishment*.

Figure 3. The four STAGES of Establishment of *The MPA Guide*.

LEVELs of Protection

The LEVEL of Protection (Figure 4) clarifies how well an MPA or MPA zone is protected from the seven most frequently occurring types of activities in MPAs. The LEVEL of an MPA is determined by the type of activities that occur and the intensity, scale, duration, and frequency of those activities within the site. The seven activities included in the *Guide* are: (1) mining, mineral, oil and/ or gas prospecting or exploitation; (2) dredging and dumping; (3) anchoring; (4) infrastructure; (5) aquaculture; (6) fishing; and (7) non-extractive activities such as recreation and cultural connections. *The MPA Guide* does not include every possible activity but provides best practices wherever possible. For more information, please see *The MPA Guide* Expanded Guidance: Level of Protection.

The LEVEL is directly related to the impact of the different activities occurring inside an MPA or zone. Impact from the seven different activities is described as "none", "low", "moderate", "high", or "incompatible with biodiversity conservation".

These LEVELs were created with guidance from the Regulation-Based Classification System for MPAs[7] and IUCN guidelines.[6,8,9] The four LEVELs of Protection are:

1. **Fully Protected:** No impact from extractive or destructive activities is allowed, and all abatable impacts are minimized.
2. **Highly Protected:** Only light extractive activities that have low total impact are allowed, and all other abatable impacts are minimized.
3. **Lightly Protected:** Some protection of biodiversity exists, but extractive or destructive activities that can have moderate to significant impact are allowed.
4. **Minimally Protected:** Extensive extraction and other activities with high total impact are allowed, but the site can still be considered an MPA under the IUCN protected area definition and provides some conservation benefit.

Some areas allow activities that have an impact so large that it is not compatible with the conservation of biodiversity, as defined by IUCN. Examples include oil and gas exploration, mining, and industrial fishing using vessels larger than 12 meters that use towed or dragged gear types (IUCN Resolution WCC-2020-Res-055-EN).[9] The *Guide* refers to areas that allow these activities as "incompatible with biodiversity conservation".

More information about how to assign the LEVEL of an MPA can be found in Section 5 and *The MPA Guide* Expanded Guidance: Level of Protection.

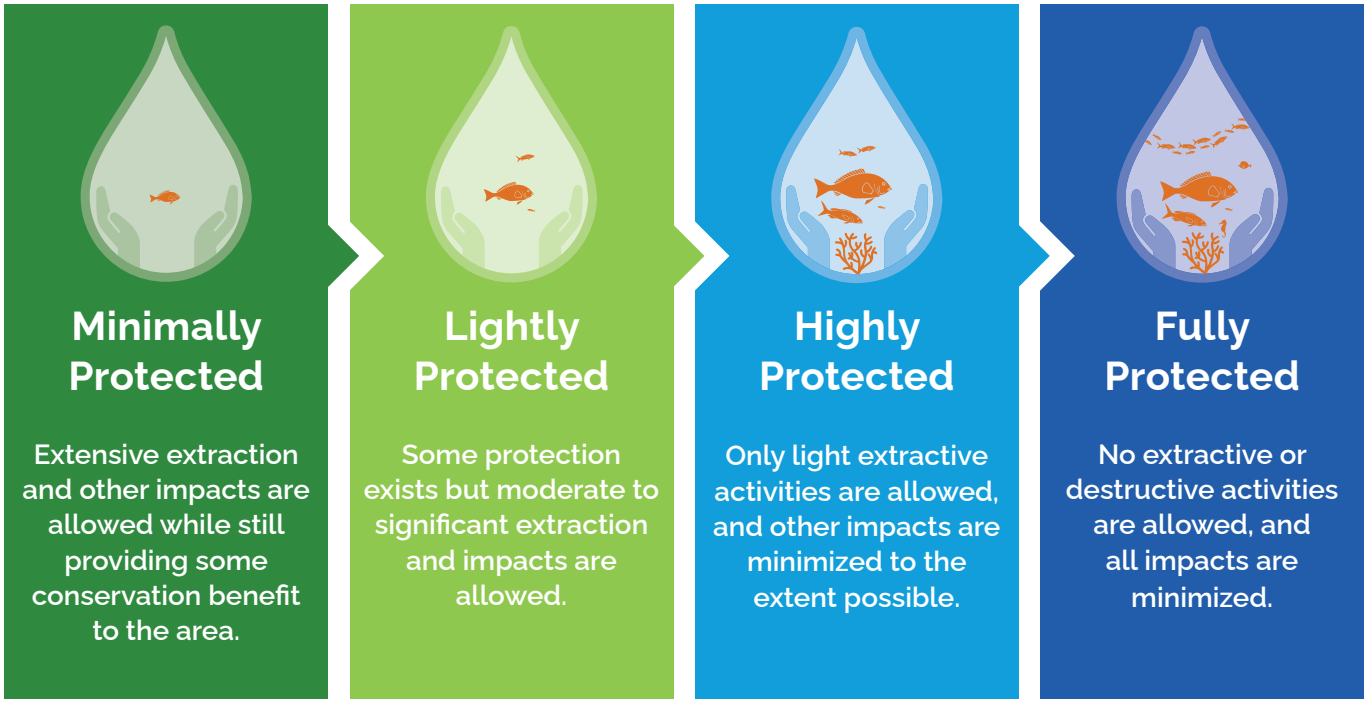


Figure 4. The four LEVELs of Protection in *The MPA Guide*.

[7] Horta e Costa, B., J. M. dos S. Gonçalves, G. Franco, K. Erzini, R. Furtado, C. Mateus, E. Cadeireiro, and E. J. Gonçalves. 2019. Categorizing ocean conservation targets to avoid a potential false sense of protection to society: Portugal as a case-study. Marine Policy: 103553.https://doi.org/10.1016/j.marpol.2019.103553

[8] IUCN, "Guidelines for applying the IUCN protected area management categories to marine protected areas" (IUCN, ed. 2, 2019); www.iucn.org/content/guidelines-applying-iucn-protected-area-management-categories-marine-protected-areas

[9] IUCN, "Resolution WCC-2020-Res-055-EN." Guidance to identify industrial fishing incompatible with protected areas" (2020); https://portals.iucn.org/library/node/49194

Enabling CONDITIONS

Enabling CONDITIONS (Table 1) are the principal processes and specific considerations by which an MPA is planned, designed, implemented, and managed. For an MPA to be successful in delivering OUTCOMES for biodiversity and people, specific CONDITIONS must be in place, based on research and knowledge from MPAs around the world.[1]

Enabling Conditions across all stages of establishment

- Clearly defined vision and objectives
- Long-term political will and commitment
- Sustainable financing
- Public participation with contextual and procedural fairness
- Evidence-based decision-making
- Knowledge integration, e.g., across academic disciplines, local, Indigenous, practitioner domains
- Coordination with related governance institutions
- Collaboration across jurisdictions
- Transparency and communication
- Upward and downward accountability to legal mandate and to stakeholders
- Recognition and support of existing governance by Indigenous peoples and local rights-holders, including sovereignty, self-determination, and rights of access, use, and management
- Conflict resolution mechanisms

Enabling Conditions from Proposed/ Committed to Designated

All the Enabling Conditions above, plus:

Ecological design principles:

- Viability based on MPA location, size, spacing, shape, and permanence
- Representativeness and replication of habitats
- Incorporation of habitats and species of unique conservation value
- Design for connectivity and resilience
- Precautionary approach considering current and emerging threats
- Consideration of existing threats and mitigation

Social design principles:

- Inclusion of social objectives for multi-dimensional human well-being
- Recognition of pre-existing rights, tenure, uses: extractive and non-extractive
- Consideration of pre-existing resource use and socio-economic status
- Accounting for unequal costs and benefits to different social groups
- Impact- and benefit-sharing with distributional fairness"

Enabling Conditions from Designated to Implemented

All the Enabling Conditions above, plus:

- Sufficient and properly organized staffing and funding
- Appropriate and adequate administrative structures and processes
- Stakeholder engagement plan
- Compliance and enforcement (including graduated sanctioning)
- Education and outreach initiatives
- Clarity of rules, rights, and boundaries

Enabling Conditions from Implemented to Actively Managed

All the Enabling Conditions above, plus:

- Ongoing monitoring, evaluation, and knowledge sharing
- Adaptive management
- Support for livelihoods, e.g. development programs, capacity building, hiring
- Effective management of broader seascape and external pressures
- Ongoing efforts to build trust, strong local leadership, partnerships with local users
- Local collaboration in monitoring, enforcement, and management
- Ongoing consideration of cultural values, traditions, and activities in site management

Table 1. Enabling CONDITIONS for effective MPAs. These CONDITIONS may vary in their importance during the process of achieving each of the four STAGES. Table from Grorud-Colvert et al., Science, 2021 (DOI: 10.1126/science.abf0861). Reprinted with permission, American Association for the Advancement of Science.

An MPA should be established and sustained through CONDITIONS for effective and equitable MPA planning, design, governance, and management. Not all CONDITIONS are required, but *The MPA Guide* recognizes that an MPA is more likely to achieve its conservation objectives when key CONDITIONS exist. Some CONDITIONS may be more or less important at some sites than others.

CONDITIONS are to be considered throughout all STAGES. Twelve overarching CONDITIONS apply across all STAGEs of Establishment, plus there are particular CONDITIONS that are important for progressing an MPA from one STAGE to the next. As an MPA advances to a higher STAGE, the OUTCOMES expected from that STAGE assume that key CONDITIONS are being met. For example, advancing from the Proposed/Committed STAGE to the Designated STAGE considers the 12 overarching CONDITIONS as well as 9 other CONDITIONS for ecological and social design.

OUTCOMES

The ecological and social OUTCOMES of an MPA for species, habitats, and human communities depend directly on its STAGE, LEVEL, and CONDITIONS. Only when an MPA or MPA zone is at the Implemented or Actively Managed STAGE, with key Enabling CONDITIONS in place, are conservation OUTCOMES expected to begin to accrue according to the zone's LEVEL. OUTCOMES assume that CONDITIONS have been met, key threats are preventable, and the system has had sufficient time to recover from a degraded state. It can take time for many ecological and social OUTCOMES to accrue after an MPA is Implemented.

The majority of studies on MPA OUTCOMES have been ecological in approach and focus. The social OUTCOMES of MPAs are less well-studied, but this is now a growing area of focus for western science, other forms of knowledge, and decision-making. Many social OUTCOMES are not a direct result of an MPA's LEVEL. However, the direct effect of the LEVEL on ecological OUTCOMES can affect social OUTCOMES.

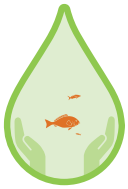
Many social OUTCOMES are directly tied to CONDITIONS. This is because certain CONDITIONS direct MPA management to consider factors beyond ecology. For example, along with ecological design principles such as MPA size and spacing, there are CONDITIONS based on social design principles such as impact- and benefit-sharing and the inclusion of social objectives (Table 1).

Minimally Protected areas are unlikely to deliver beneficial social or ecological OUTCOMES that are substantial. Sites that are Actively Managed and Fully Protected have the greatest potential to protect and restore species, habitats, ecosystem functioning, and resilience (i.e., ability to recover after a disturbance), and to provide the benefits of healthy ecosystems to people.

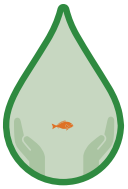
The benefits outlined here are specific OUTCOMES that can be expected at each LEVEL (Table 2). More detailed information about OUTCOMES for biodiversity conservation – including for exploited species, water quality, and climate – can be found in the Expanded Guidance: Ecological Outcomes.

Fully Protected: Fully Protected areas have the greatest potential to restore and protect biodiverse and healthy ecosystems, and the benefits they provide to people. Long-term recovery of species, habitats, ecosystem functioning, and resilience is most likely in Fully Protected areas. Population replenishment and high reproductive rates inside a Fully Protected MPA can lead to greater benefits to populations outside the area through spillover of adults, eggs, and larvae. Spillover of targeted species can also benefit nearby fisheries, leading to increased catch, profit, and long-term sustainability of the fishery. Fully Protected MPAs can also help provide climate solutions such as enhancing carbon sequestration and safeguarding carbon storage in sediments, enhancing productivity, mitigating local acidification, and providing coastal protection.

Highly Protected: Highly Protected areas have a high likelihood of restoring and protecting biodiverse and healthy ecosystems, and delivering benefits similar to those described for Fully Protected areas. However, the OUTCOMES for any species that are still exploited or adversely impacted by activities in the MPA will likely be lower than with Full Protection. Highly Protected areas may also provide cultural and subsistence benefits by supporting specific, limited take for traditional or cultural reasons, using specific gears, and by certain user groups. Highly Protected MPA zones are often areas where resources have been managed by Indigenous Peoples and/or Local Communities, in some cases for thousands of years. Protection can enhance these values through recovery of habitats and species and by providing opportunities for the continuation of sustainable cultural practices. Highly Protected MPAs may include infrequent fishing with highly selective, low-impact gear types, which can provide cultural, recreational, and subsistence benefits through fishing activities. Highly Protected areas can promote species and ecosystem recovery and thus enhance the sustainability of cultural, recreational, and subsistence benefits.



Lightly Protected: Lightly Protected areas can benefit species that are given specific protections, potentially leading to larger population and body sizes, biomass, reproductive output, and genetic diversity. However, any exploited or impacted species may not experience OUTCOMES that are different from unprotected areas. Likewise, overall species diversity is unlikely to increase, except in the case of species given specific protections. Recovery of ecosystem functioning and resilience is likely to be limited and incomplete. Lightly Protected areas are therefore unlikely to broadly deliver the benefits that healthy ecosystems provide to people, including recovery and spillover of exploited species, climate change mitigation, adaptation and resilience, and water quality improvement.



Minimally Protected: Minimally Protected areas are unlikely to deliver significant OUTCOMES for species, habitats, or human communities. It is likely that extractive and/or destructive activities in these areas will result in the continued decline of species and habitats, altered ecosystem functioning, and lowered ecosystem resilience. Minimally Protected areas are unlikely to deliver other benefits that are expected from an MPA, such as for water quality, climate resilience, or recovery of exploited species.

	Outcome	Level of Protection			
		Fully	Highly	Lightly	Minimally
Biodiversity conservation	Abundance	●	●	●	●
	Population age structure	●	●	●	●
	Biomass	●	●	●	●
	Species richness (no. of species)	●	●	●	●
	Reproductive output and replenishment	●	●	●	●
	Connectivity of populations	●	●	●	●
	Rare and endangered species protected	●	●	●	●
	Genetic diversity	●	●	●	●
	Habitats	●	●	●	●
	Ecosystem functioning	●	●	●	●
	Ecosystem resilience (ability to recover after disturbance)	●	●	●	●
Effects on exploited species	Spillover	●	●	●	●
	Larval export	●	●	●	●
	Insurance against management failure or stock collapse	●	●	●	●
	Protection of vulnerable life stages	●	●	●	●
Water quality	Eutrophication .	●	●	●	●
	Pathogens and pollutants	●	●	●	●
	Suspended sediment	●	●	●	●
Climate resilience	Carbon	●	●	●	●
	Acidification	●	●	●	●
	Productivity	●	●	●	●
	Coastal protection	●	●	●	●

Table 2. Ecological OUTCOMES of MPAs as a result of LEVEL of protection. The OUTCOMES discussed here assume that best practices in CONDITIONS have been met and that the system has had time to progress from a degraded state to one with relatively few fluctuations. Not all OUTCOMES can be expected from all MPAs because they vary by habitat type, oceanographic conditions, and previous state of degradation. Levels of confidence are indicated by the shaded circles; the darker the circle, the higher the confidence, divided into high, moderate, or low confidence. Confidence level represents expert judgements based on the quantity and quality of research available. Citations are available in the Supplemental Materials of *The MPA Guide: A framework to achieve global goals for the ocean*.[1] Table from Grorud-Colvert et al., Science, 2021 (DOI: 10.1126/science.abf0861). Reprinted with permission, American Association for the Advancement of Science.

4. Why Should I Use *The MPA Guide*?

SNAPSHOT: This section discusses why, when, and by whom *The MPA Guide* can be used, and how *The MPA Guide* relates to other MPA assessment tools and global MPA databases.

4. Why Should I Use *The MPA Guide*?

WHO SHOULD USE *THE MPA GUIDE*?

If you are interested in finding out what benefits for people and nature can be expected from an MPA, then *The MPA Guide* is for you. Examples of users who have previously implemented *The MPA Guide* are local managers, academics, government scientists, and non-governmental organizations (NGOs). *The MPA Guide* is designed to be accessible and available to anyone who wants to clarify expectations of an MPA. This can be useful for planning protections for a new MPA, as well as for reviewing protections already in place in an existing MPA. Section 5 explains how to use *The MPA Guide* to clarify expectations and to help plan MPAs.

WHAT *THE MPA GUIDE* CAN DO AND WHAT IT CAN'T DO

The MPA Guide states concisely what OUTCOMES for people and biodiversity and people can be expected from an MPA or MPA zone based on its STAGE and LEVEL. Because not all MPAs are the same, the language provided by the *Guide* clarifies what protection means at different sites and in different contexts around the globe, based on STAGE and LEVEL. *The MPA Guide* does not rank or pass value judgments based on STAGE or LEVEL.

The MPA Guide can be used to plan new MPAs as well as to better align existing MPAs with their goals. Information on STAGE, LEVEL, and CONDITIONS can be used to inform MPA management decisions to improve effectiveness. For example, a user (e.g., an MPA manager or other decision-maker) could start with the desired OUTCOMES outlined by *The MPA Guide* and then work to determine what LEVEL, or combination of LEVELs in different MPA zones, are appropriate to achieve those OUTCOMES.

The MPA Guide cannot be used to undertake a comprehensive assessment of an MPA's actual OUTCOMES based on monitoring data. This is because the *Guide* was designed to draw from decades of research and knowledge to provide a means for evaluating expected OUTCOMES for a broad range of MPA types.

The MPA Guide can be consulted any time there are questions about the expected OUTCOMES of an MPA. Here are some examples:

(1) During the planning phases of an MPA, *The MPA Guide* can advise on the types of activities that would be compatible at the site based on the intended OUTCOMES of the MPA.
(2) When an MPA is not yielding the desired benefits, *The MPA Guide* can be consulted to examine the STAGE and LEVEL, and what benefits they typically provide, so that changes can be made to achieve the desired OUTCOMES.
(3) *The MPA Guide* can help compare MPAs in different places in the world using a standardized approach and language.
(4) *The MPA Guide* can track and clarify real progress towards conservation targets by identifying MPAs that have been set up to achieve the OUTCOMES that motivate these targets.

THE MPA GUIDE'S RELATIONSHIP TO GLOBAL REPORTING DATABASES

The two major global databases for MPAs are (1) the World Database on Protected Areas (WDPA) and (2) the Marine Protection Atlas (MPAtlas), which uses data from the WDPA to further examine MPAs. *The MPA Guide* works with these two databases to give a clear picture of MPA protection globally. Descriptions of each database and clarification of their complementary relationship to each other are given below.

The World Database on Protected Areas (WDPA)

The WDPA (www.protectedplanet.net) is the most authoritative and comprehensive global database on terrestrial and marine protected areas. It comprises both spatial data (i.e., boundaries) and attribute data (i.e., descriptive information). The mandate for the database dates from 1959, when the United Nations (UN) Economic and Social Council called for a list of national parks and equivalent reserves (Resolution 713 (XXVIII)). The first UN List of Protected Areas, as it became known, was published in 1962, and this subsequently evolved into the WDPA. Today, the WDPA is a joint product of the UN Environment Programme (UNEP) and IUCN, managed by UNEP-WCMC. The WDPA is used by a wide range of groups, including governments, scientists, NGOs, private sector organizations, and international bodies. It is also used to generate indicators to track progress towards globally agreed targets (e.g., the headline indicator for Target 3 of the Kunming-Montreal Global Biodiversity Framework, and indicators for UN Sustainable Development Goals 14 and 15).

The WDPA is a compilation of information about protected areas provided primarily by the governments of 244 countries and territories, with additional data from private actors, Indigenous Peoples, and local communities. At a minimum, a site submission must include the protected area's name, designation, location, area, status and status year. Additional information including spatial boundaries, IUCN management category, no-take status, governance type, and management authority can also be submitted. However, these data points are not mandatory, and their inclusion in the WDPA is variable across submissions.

The IUCN management categories are an internationally recognized protected area categorization system based on the primary objectives of the area as determined by the authoritative governing body. As such, they indicate the intended purpose and conservation outcomes of a site. The categories are:

Ia: Strict Nature Reserve
Ib: Wilderness Area
II: National Park
III: National Monument or Feature
IV: Habitat/Species Management Area
V: Protected Landscape/Seascape
VI: Protected area with sustainable use of natural resources

Although providing information on IUCN protected area categories to the WDPA is recommended, and encouraged by various convention decisions, it is not mandatory and therefore not always reported by governments.

The WDPA can be combined with the Global Database on Protected Area Management Effectiveness (GD-PAME) to understand whether protected areas have been assessed for their management effectiveness. Expanding this database to provide more meaningful data on effectiveness (encompassing the quality of governance, management, and conservation outcomes) is an active area of work for UNEP-WCMC and its partners.

If you are interested in contributing information about an MPA to the WDPA, please reach out to UNEP-WCMC at protectedareas@unep-wcmc.org

The Marine Protection Atlas (MPAtlas)

The Marine Conservation Institute's Marine Protection Atlas (www.mpatlas.org) was established in 2012 to provide third-party, independent vetting of the MPAs reported to the WDPA. MPAtlas combines the self-reported WDPA data submitted by countries with standardized, science-based assessments that categorize MPA zones in terms of expected outcomes and conservation benefits. The MPAtlas now provides a more nuanced view of global marine protection by using the *Guide* framework to consistently identify and report MPAs with the strongest regulations on human extraction (i.e., Fully and Highly Protected LEVELs) that are delivering conservation benefits (i.e., Implemented and Actively Managed STAGEs).

The MPA Guide framework is fully integrated into the MPAtlas, which is actively working to grow their database of assessments that use *The MPA Guide* STAGEs and LEVELs to characterize global marine protection. The MPAtlas houses a data entry portal to help assess and contribute *MPA Guide* assessments to track progress towards national and global protection targets. It also incorporates information on MPA regulations using the Regulation-Based Classification System (RBCS).[7]

If you are interested in contributing information about an MPA to the MPAtlas, please reach out to the MPAtlas Team at info@mpatlas.org

How are the WDPA and the MPAtlas related and complementary?

The WDPA is mandated by the UN and the Convention on Biological Diversity (CBD) to compile protected area data as reported by Member States. To provide indicators against global targets for marine protection, UNEP-WCMC analyzes the data provided by governments to calculate the percentage coverage of protected areas in both national waters and the global ocean, and uses this information to determine other statistics, such as coverage of important areas for biodiversity. The WDPA guidelines require that all MPAs submitted meet the IUCN or CBD definition of an MPA, which assert that an MPA's objective should be "the long-term conservation of nature with associated ecosystem services and cultural values" (IUCN) or "specific conservation objectives" (CBD).[10] However, the WDPA is mandated to report all MPAs submitted by governments, and include all designated sites, whether or not they are Implemented and actively contributing to conservation objectives.

The MPAtlas Team currently partners with experts to independently review the WDPA's MPA data against *the MPA Guide* framework for inclusion in the MPAtlas database. Percentage coverage indicators derived from the WDPA include sites that are legally designated or established through other effective means, whereas the MPAtlas only reports MPAs that are considered to be Implemented and Actively Managed.

Due to these differences, global numbers vary between the WDPA and MPAtlas. Each database plays a key role in tracking and reporting MPA coverage globally. Currently, *MPA Guide* STAGE and LEVEL are reported by the MPAtlas where assessments exist, and this database is growing. In the future, there may be opportunities to streamline reporting of the STAGE and LEVEL of *The MPA Guide* to the WDPA, alongside the IUCN management categories and other reported data.

[10] UNEP-WCMC. User Manual for the World Database on Protected Areas and world database on other effective area-based conservation measures: 1.6. http://wcmc.io/WDPA_Manual (2019).

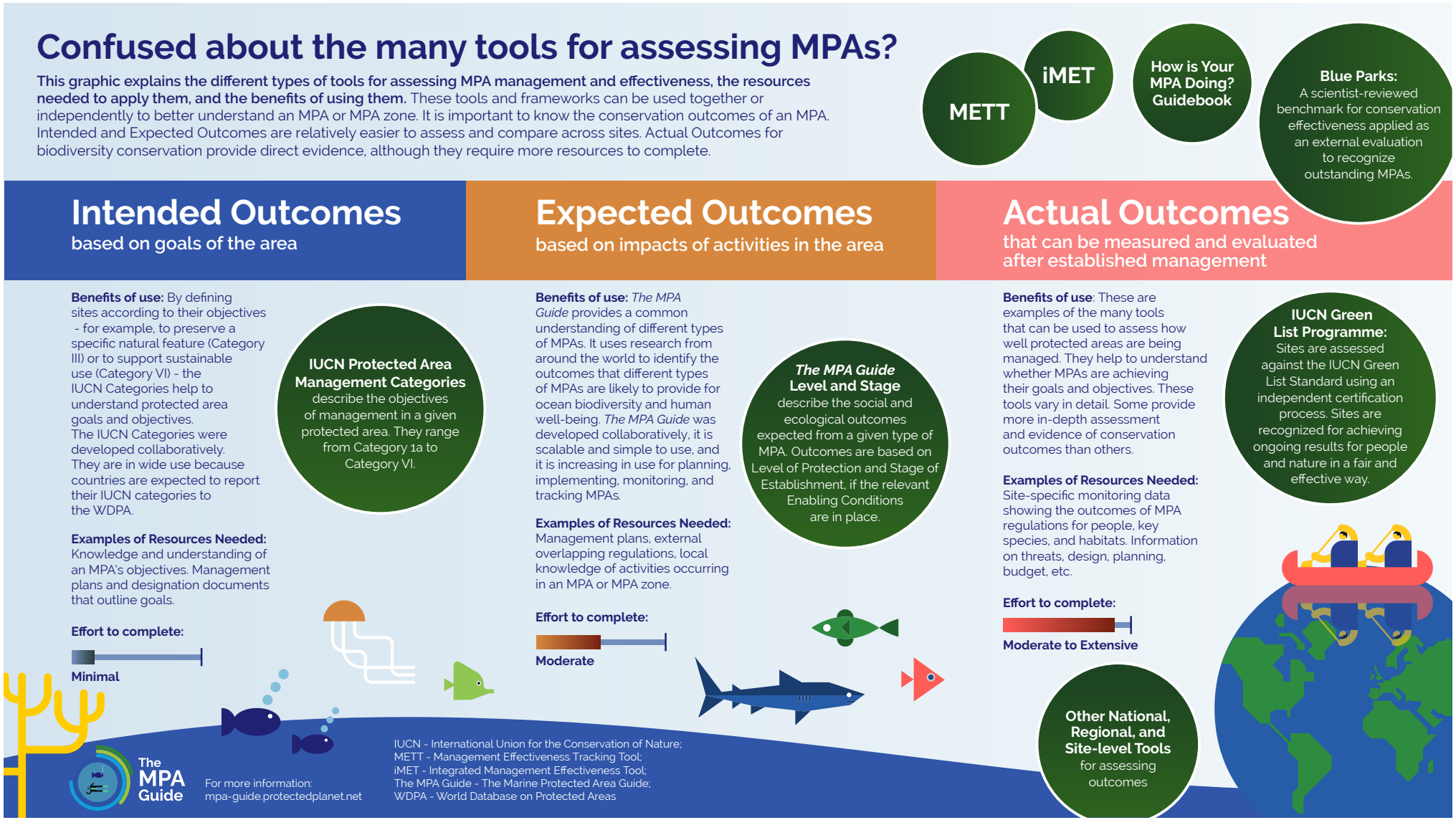


Figure 5. Relationship Map of *The MPA Guide* and other tools for assessing MPAs. This relationship map illustrates the many types of tools for assessing MPA management and effectiveness, the resources needed to apply them, and the benefits of using them. Combining these tools creates a better understanding of the intended, expected, and actual OUTCOMES of an MPA. These tools can be used in MPA planning, design, and evaluation.

THE MPA GUIDE'S RELATIONSHIP WITH OTHER ASSESSMENT TOOLS

There are many tools available to assess MPAs and their OUTCOMES. These tools can be used either independently or together to better understand an MPA or MPA zone. Using a combination of tools provides complementary information about the intended, expected, and actual OUTCOMES of an MPA. Together, this information helps to show whether the MPA is achieving its desired OUTCOMES for biodiversity conservation and its benefits to people and nature.

Some frameworks, like the IUCN Protected Area Management Categories, provide guidance about the intended OUTCOMES of an area by outlining the objectives of the area's management. Other tools are more time-intensive and involve an assessment of the actual conservation OUTCOMES the area is achieving using monitoring data and/or other evidence. Evaluating the actual OUTCOMES of MPAs requires intensive effort, and evidence for many OUTCOMES will not show up until an MPA has been Implemented, and ideally Actively Managed, for a number of years.

The MPA Guide is unique because it helps to understand what OUTCOMES can be expected from an MPA based on STAGE and LEVEL. This is because the *Guide* uses published research from decades of data on MPAs globally to look at the trends in OUTCOMES from MPAs at different STAGEs and LEVELs. Because it builds on existing data and significant trends, the *Guide* can be used to indicate expected OUTCOMES from an MPA at a particular STAGE and LEVEL. *MPA Guide* assessments can be completed quickly because the assessments do not require extensive direct evidence, such as monitoring data from a site. The *Guide* can be used in the absence of direct monitoring data to understand the expected OUTCOMES of an MPA. For example, before the MPA is Implemented, the *Guide* can be used for planning and designing an MPA. After the MPA is Implemented, the *Guide* can be used to better align its goals and OUTCOMES. Ideally, an *MPA Guide* assessment is followed by a further assessment using direct monitoring data of actual OUTCOMES to verify that the expected OUTCOMES are being achieved (Figure 5).

To understand MPAs globally, multiple assessments, databases, and tools can be used together with *The MPA Guide*. The relationship map (Figure 5) illustrates how these tools work together to better understand MPAs. *The MPA Guide* is not a data-heavy assessment that will evaluate how an MPA has performed. There are other assessments such, as the Management Effectiveness Tracking Tool (METT), that evaluate an MPA's actual performance. There are also independent certification and award systems, such as Marine Conservation Institute's Blue Parks Awards and the IUCN Green List Programme. These programs recognize outstanding protected areas that provide significant benefits to biodiversity using evidence of actual results. In contrast, *The MPA Guide* provides a broad understanding of expected outcomes from different types of MPAs. This is a solution that can be applied to all the 18,000+ MPAs globally (as of 2023) due to its simple approach. *The MPA Guide* can also be used to identify sites that are good candidates for more time- and resource-intensive evaluations, like the Green List and Blue Parks Award. It can also be used to evaluate expected OUTCOMES and actual OUTCOMES together, with tools like the METT.

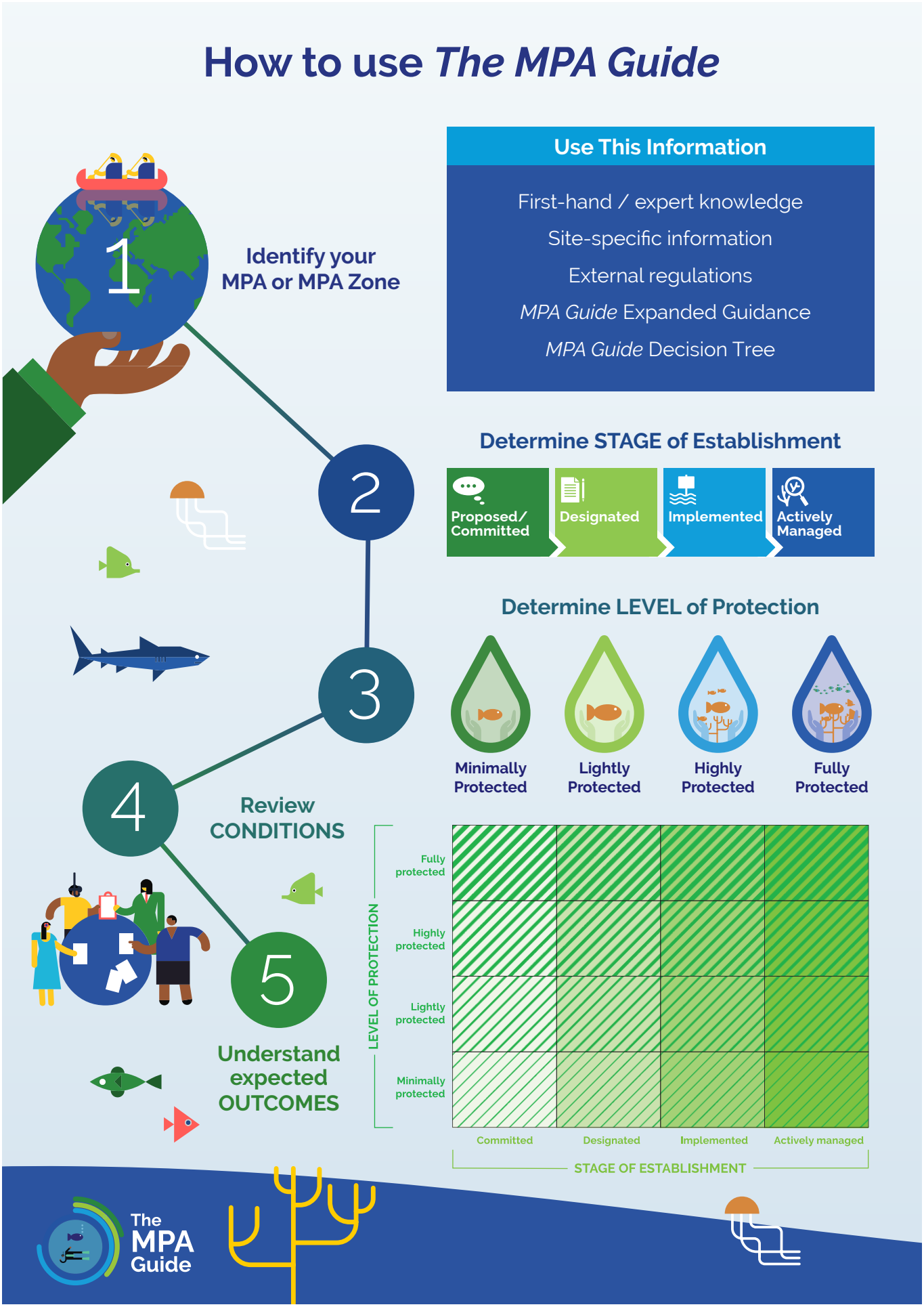


Figure 6. How to use *The MPA Guide*. This graphic illustration outlines examples of information needed, steps, and process of using *The MPA Guide*.

5. How Do I Use *The MPA Guide*?

SNAPSHOT: Learn how to assess an MPA or MPA zone by STAGE and LEVEL using *The MPA Guide*.

5. How Do I Use *The MPA Guide*?

The MPA Guide can be used to assess an MPA or MPA zone by STAGE of Establishment and LEVEL of Protection to better understand the expected OUTCOMES of the area, when key Enabling CONDITIONS are in place.

Below is an overview of how to use *The MPA Guide*. More complete information on criteria and best practices for assessing STAGE and LEVEL can be found in the Expanded Guidance documents for STAGE and LEVEL. The Expanded Guidance for OUTCOMES provides detailed information about ecological OUTCOMES that are directly linked to each LEVEL, such as species abundance, population structure, biomass, and more.

STEPS FOR USING *THE MPA GUIDE*

This is a stepwise example of how you might use the *Guide* to assess an MPA or MPA zone. When using *The MPA Guide*, it is key to engage with MPA Guide colleagues, the local community, and local decision-makers from the start, to promote a more efficient, well informed, and useful process.

1. **Identify your MPA or MPA zone of interest.** Is this an MPA you work with closely? Then you likely have most, if not all, of the knowledge needed to complete an MPA Guide assessment. Is this MPA or MPA zone already included in existing databases? Check the WDPA and the MPAtlas. These databases may already include information on boundaries, regulations, and existing uses for a given MPA or zone. If these records are not readily accessible and you do not have first-hand knowledge, you will need to locate the plans for the MPA's management, information about activities happening there, and ideally verify the information with a local expert.

2. **Determine the STAGE of Establishment for each MPA zone.** Information on each STAGE can be found below. More detailed guidance on criteria and best practices is online at *The MPA Guide* Expanded Guidance: Stage of Establishment or in Appendix D of this Manual.

    a. To begin a STAGE assessment, use your first-hand knowledge and/or find relevant information on the management of the area. If you are not directly involved in the management of the site, a good place to start is the MPA website, if one exists, where you should find a management plan for the MPA. You should also consult other external and overlapping regulations, such as those found on government websites. Best practice is to always confirm your findings and collaborate with a local expert who is familiar with the MPA.

    b. In many cases, an MPA is at one STAGE even if it has multiple zones with different LEVELs. This is because the zones in a single MPA are usually determined at the same time and implemented at the same time.

3. **Determine the LEVEL of Protection of each zone within the MPA.** LEVEL can be determined for an MPA or MPA zone where the STAGE is Implemented or Actively Managed. If an MPA or MPA zone's STAGE is Proposed/Committed or Designated, you may not be able to assess its LEVEL since there are no regulations yet in practice. If you are familiar with the activities and impacts occurring at the site, using *The MPA Guide* to assess the LEVEL of this zone should be a relatively straightforward and quick process. If you are less familiar, this process will involve more research and external consultation.

    A good place to start when assigning a LEVEL is by working through the Decision Tree below (Figure 8). This relies on knowledge of the activities happening in the MPA. More detailed guidance on criteria and best practices is online at *The MPA Guide* Expanded Guidance: Level of Protection and below in Appendix E of this Manual.

a. Information on the activities occurring in an MPA zone can often be determined by your first-hand knowledge if you are familiar with the area, and/or first-hand knowledge from local people who know the area. Other resources include management plans, other external and overlapping regulations such as those found on government websites, or the Protected Seas Navigator for fishing regulations. In some cases, a management plan may not explicitly mention a particular use. This may be because it is covered by external regulations or not relevant in the area. If you are not directly involved in the management of the site, best practice is to always confirm your findings and collaborate with a local expert who is familiar with the MPA.

b. The impact of the activities is the most important factor for assigning LEVEL. Since it is the current activities that influence the degree to which an MPA is protecting biodiversity at a given point in time, the assessment of MPA LEVEL should reflect the activities *actually* occurring in the site at the time of reporting. This is true whether or not the activities are explicitly stated in the management plans. In these circumstances, an assessment can use first-hand knowledge of whether or not that activity occurs.

4. **Review the CONDITIONS** and consider which have been included in the MPA process, which could be improved in a particular MPA or zone, and how this could lead to better management and effectiveness. A more comprehensive framework for evaluating the CONDITIONS is currently in development. Contact TheMPAGuide@gmail.com if you would like to learn more.

5. **Review the OUTCOMES** that may be expected from an Implemented or Actively Managed MPA based on its LEVEL. If you are looking across MPAs in a given country or region, you can present a summary of the area or number of zones at each STAGE and LEVEL as a matrix (Figure 7). This can help people to understand and communicate the range of STAGEs and LEVELs, along with the OUTCOMES that are expected from the MPA coverage.

STAGE	LEVEL	CONDITIONS	OUTCOMES
***The MPA Guide* Quick Reference Summary** ***The MPA Guide* publication in Science**			
Definitions for STAGE User Manual Sections 3, 5, and 7	**Definitions for LEVEL** User Manual Sections 3, 5, and 7	**Enabling CONDITIONS for effective MPAs** User Manual Section 3; Enabling Conditions	**Ecological OUTCOMES of MPAs as a result of LEVEL** User Manual Section 3; OUTCOMES
Expanded Guidance: STAGE Appendix D	**Decision Tree for LEVEL** User Manual Section 5; Decision Tree Decision Tree Examples in Section 6		**Expanded Guidance:** OUTCOMES Appendix F
	Expanded Guidance: LEVEL Appendix E		

Table 3. Quick reference for more information about *The MPA Guide's* four elements. These and other resources are also available online at https://mpa-guide.protectedplanet.net.

WHICH STAGE OF ESTABLISHMENT BEST DESCRIBES THE SITE?

The establishment of MPAs generally occurs as a series of steps taken by governing or other authorities. *The MPA Guide* outlines minimum criteria for an MPA to progress through the STAGEs – from being Proposed to being Actively Managed in the water – and provides guidelines for best practices. For more detailed information about assigning a STAGE, please see the Expanded Guidance: Stage of Establishment.

The MPA Guide recognizes four STAGEs of Establishment:

- **Proposed/Committed:** The site has been identified for conservation, and conservation is the primary objective of the site. The intention to designate the site has been announced in some formal manner. However, the announcement is non-binding.
- **Designated:** The MPA is established through legal means or another form of authoritative rulemaking. The MPA has clear boundaries established for the long-term conservation of the area. The goals of the site's designation are clearly defined and stated, with biodiversity conservation as a primary stated objective. There is a clear process in place to define allowed uses and the associated regulations and rules to control the impact of authorized activities.
- **Implemented:** The MPA exists and is operational, not just on paper. Plans for management are activated, and biodiversity benefits can begin to accrue. The MPA has a plan (a management plan or equivalent) for regulating activities. Governance of the MPA exists within a managing body or people group, such as an Indigenous People, government agency, NGO, or shared governance among these. Resource users, such as fishers or tourism operators, are aware of the MPA regulations.
- **Actively Managed:** Management and scientific monitoring of the MPA is ongoing and subject to periodic review. Management is able to adapt and make changes as needed to achieve stated biodiversity conservation and other social and ecological goals of the MPA. MPA management is ongoing, with scientific monitoring, periodic reviews, and adjustments made as needed to achieve the goals. There is active and ongoing monitoring, community engagement, and management evaluation.

MPAs that are Proposed/Committed or Designated, but not yet Implemented, will not accrue intentional biodiversity conservation benefits because regulations are not yet being enacted. An MPA only starts accruing benefits, according to LEVEL, when it is Implemented. Guidance around LEVELs can assist in planning, designating, and implementing MPAs at any STAGE.

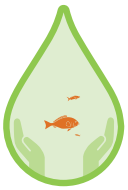
WHICH LEVEL OF PROTECTION BEST DESCRIBES THE ZONE?

The LEVEL describes how well an MPA is protected from seven types of extractive or destructive activities that can be managed within an MPA or MPA zone: (1) mining, mineral, oil and/or gas prospecting and exploitation; (2) dredging and dumping; (3) anchoring; (4) infrastructure; (5) aquaculture; (6) fishing; and (7) non-extractive activities. The LEVEL is based on the impact of activities happening in the MPA Impact is determined by activity type and the intensity, scale, duration, and frequency of impact relative to biodiversity conservation. Impact is described as either "none", "low", "moderate", "high/large", or "incompatible with biodiversity conservation." The impacts of activities may vary due to a variety of factors. Specific features of an MPA or MPA zone, such as size of the zone, can play a role in the distribution of the activity; for example, activities may only happen in one area of a large MPA, or they may occur throughout the MPA, regardless of its size. Please see the Expanded Guidance: Level of Protection for more detailed information, including a research-based list of activities and their known impacts.

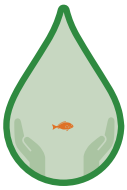
The MPA Guide recognizes four LEVELs of Protection:

Fully Protected: No impact from extractive or destructive activities is allowed, and all abatable impacts are minimized. Non-extractive activities may include recreational, traditional, cultural, or spiritual activities. Examples include minimal impact snorkeling, swimming and SCUBA, tide pooling, cultural/ceremonial gatherings, education, knowledge transmission, and motorized or non-motorized vessels associated with the previously mentioned activities.

Highly Protected: Only light extractive activities that have low impact are allowed that have low impact, and all other abatable impacts are minimized. If any anchoring is allowed, it is small-scale and for a short duration with a low impact. If any infrastructure is allowed, it is small scale with low impact. Any aquaculture must be low-impact, small-scale, low-density, and unfed. If fishing occurs, it is infrequent and only five or fewer highly selective and low-impact gear types are used that are highly selective and low-impact. Any non-extractive activities are regulated and restricted and of low impact, low density, and small scale.



Lightly Protected: Some protection of biodiversity exists but extractive or destructive activities occur that can have moderate impact. Any dredging and dumping that occurs is infrequent and only for selective purposes. Anchoring, infrastructure, and fishing are allowed but the impact is moderate and at a medium scale. If there is aquaculture, it is unfed and occurs at a small scale with low density. Non-extractive recreational, traditional, spiritual, and cultural uses might have moderate impact.



Minimally Protected: Extensive extraction and other activities with high total impact occur, but the site can still be considered an MPA under IUCN criteria and it provides some conservation benefit.

Some zones are "incompatible with the conservation of nature" per IUCN Guidelines.[7,8,9] For example, these zones may include mining or industrial fishing activities.

The bullets above provide general guidance about LEVELs. The Expanded Guidance: Level of Protection provides more detailed information for evaluating any activity in an MPA and the likely impact from that activity. Please consult the Expanded Guidance with any questions about LEVEL.

The MPA Guide does not include every possible activity, but provides best practices wherever possible. For example, shipping is not explicitly addressed in LEVEL, because the right of innocent passage is mandated under international law and regulated by International Maritime Organization treaties. As a result, an MPA managing authority may be unable to restrict shipping movement. Nonetheless, it is recommended that efforts are made to prevent ships carrying dangerous goods or toxic antifouling chemicals from transiting across MPAs, and to minimize noise pollution and other negative impacts such as collisions with marine life.

The MPA Guide is a "living document", meaning that guidance is intended to be updated with new knowledge, activities, and technology. Emerging threats – such as those due to electromagnetic fields, noise, sonar, or other technologies – are not yet included in LEVEL guidance but should be reviewed by the managing authority for impact before allowing their use. These threats should be monitored to assess and actively manage their actual impacts.

In cases where information on the scale or magnitude and corresponding impact of an activity is unknown, the LEVEL should be assigned as accurately as possible by the appropriate MPA managing authority. If this information is not available, a dialogue between the managing authority and MPA experts, such as those at the UNEP-WCMC or MPAtlas, can be initiated to help provide clarity.

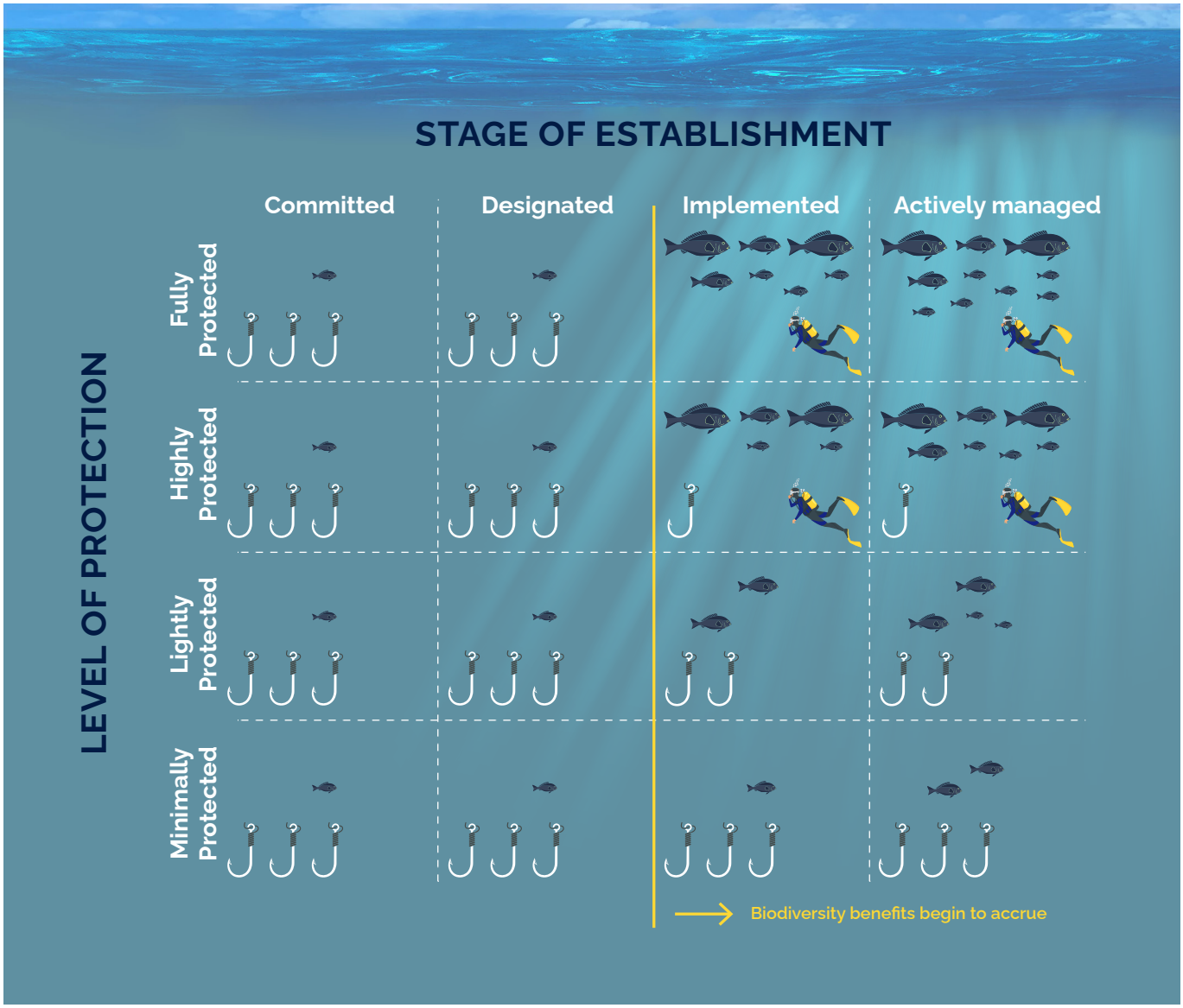


Figure 7. Matrix based on LEVEL of Protection and STAGE of Establishment of MPAs. Any MPA or MPA zone sits in one of the 16 boxes in this matrix according to its LEVEL and STAGE. The global area of ocean protected in MPAs can also be tallied for each box in the matrix. Hooks indicate extractive use; divers indicate recreational, traditional, and cultural use; and fish indicate biodiversity OUTCOMES. As long as CONDITIONS are in place, the OUTCOMES of an MPA will depend primarily on its LEVEL and STAGE, as depicted (other factors, such as state of ecosystem degradation before establishment of the MPA, may also enhance or reduce OUTCOMES). Protection does not begin until an MPA is Implemented or Actively Managed. The most effective biodiversity conservation OUTCOMES from an MPA are likely in the top right quadrant of this matrix, where MPAs are Fully or Highly protected and Implemented or Actively Managed. In considering the global area protected, a larger percentage in the top right quadrant would indicate more effective protection than a larger percentage in the bottom left quadrant. Figure from Grorud-Colvert et al., *Science*, 2021 (DOI: 10.1126/science.abf0861). Reprinted with permission, American Association for the Advancement of Science.

THE MPA GUIDE DECISION TREE

The Decision Tree below (Figure 8) can be used to help determine the LEVEL of a single-zone MPA, or the LEVEL for each zone within a multi-zone MPA. It is based on the impact of activities occurring in the MPA.

The MPA Guide LEVEL Decision Tree

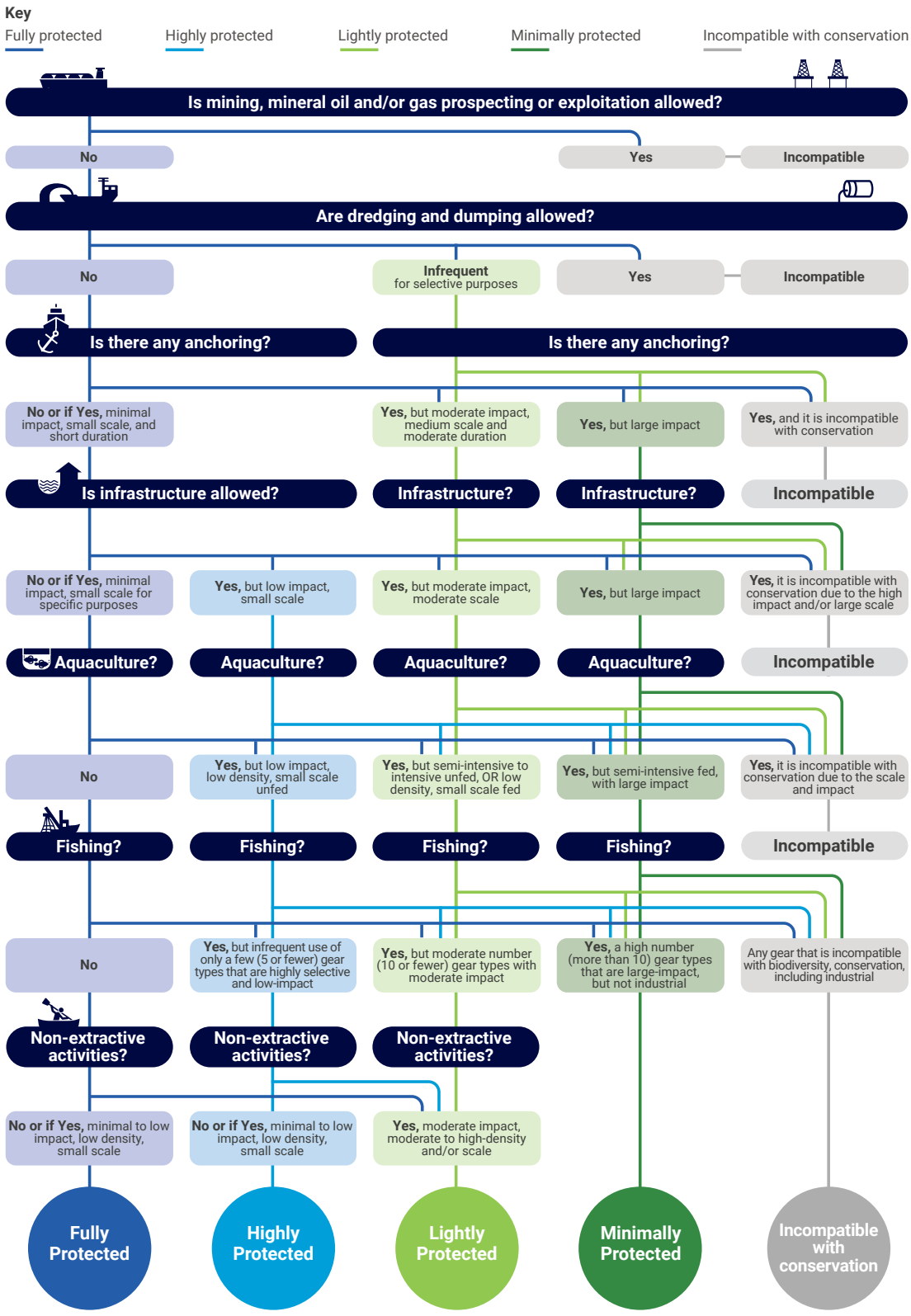


Figure 8. Decision Tree for LEVEL of Protection for *The MPA Guide*. Figure adapted from Grorud-Colvert et al., *Science* 2021 (DOI: 10.1126/science.abf0861).

Sequentially answering the questions in the Decision Tree, from top to bottom, leads to an MPA or MPA zone being assigned one of the four LEVELs -- Fully Protected, Highly Protected, Lightly Protected, or Minimally Protected. Or it may show that activities happening in the zone are incompatible with biodiversity conservation, per IUCN guidelines.[6]

To use the Decision Tree, begin at the top question: "Is mining, mineral, oil and/or gas prospecting or exploitation allowed?" If the answer is "yes", then this site is incompatible with conservation according to the IUCN guidelines, and the assessment is complete. If the answer is "no", then move to the second question about dredging and dumping. If dredging or dumping is allowed, but it only occurs infrequently and for specific purposes (see Expanded Guidance for LEVEL for more details around these purposes and impacts), follow the green line to the next question about anchoring. The site is either Lightly or Minimally Protected, depending on the impacts of the other activities. Alternatively, if dredging or dumping is allowed and has an extreme impact (e.g., they introduce noxious substances or other materials, as listed in the LEVEL of Protection Expanded Guidance), the site is again incompatible with the conservation of nature, and the assessment is complete. If there is no dredging and dumping happening at the site, follow the blue line down the Decision Tree. In this way, you will answer questions about activities and their impact until you reach the bottom and arrive at the MPA or zone's LEVEL.

It is important to understand and categorize the impact level of each activity assessed by *The MPA Guide* in the Decision Tree. However, activities that are addressed lower on the Decision Tree cannot change the results of an MPA's overall LEVEL if an activity higher on the tree is deemed incompatible or indicates that the MPA is at a low LEVEL. In other words, once you have "moved right" on the Decision Tree, you cannot "move back to the left". For example, a zone that is Minimally Protected from anchoring does not revert to Fully, Highly, or Lightly Protected because there is no impact from infrastructure, aquaculture, or fishing. Please see the Case Study on Hawaiian Islands Humpback Whale National Marine Sanctuary for a real MPA example.

More detailed guidance for answering these questions is available in the Expanded Guidance: Level of Protection document. Please see Section 6 for example MPAs with completed decision trees.

There are circumstances where a management plan does not prohibit an activity, but local managers have first-hand knowledge about whether the activity is or is not occurring in the area. For example, a management plan and overlying regulations may not explicitly prohibit anchoring, but the area may be in water too deep for anchoring, so no anchoring is occurring at the site. In this situation, the answer to the question "is there any anchoring?" would be "no". Additionally, some activity types or impact levels are not explicitly stated in MPA rules and regulations, often because they are not within the management jurisdiction of the MPA authority. In these circumstances, knowledge of whether or not that activity occurs may be used. Since it is the current activities that determine the degree to which an MPA is protecting biodiversity at a given point in time, the assessment of LEVEL should reflect the activities actually occurring in the site at the time of reporting (whether or not they are explicitly stated in the management plans). Consequently, assessments should be updated frequently, particularly if the impact of activities changes at the site.

More detailed information about how to use the Decision Tree, including lists of activities and their different impacts, can be found in *The MPA Guide* Expanded Guidance: Level of Protection.

WHEN DO I ASSESS MY MPA?

MPA Guide assessments are intended to be relatively quick. They are not resource-intensive for people familiar with activities happening at the site. An *MPA Guide* assessment can be completed at any time and during any STAGE, including during the planning stages of an MPA. Ideally, assessments will be updated annually for each MPA zone. An assessment should be prioritized if there has been a change to the management plan, or if there is a proposed change. An assessment should be repeated if it has been several years since the last *MPA Guide* assessment.

6. Examples of *MPA Guide* Assessments

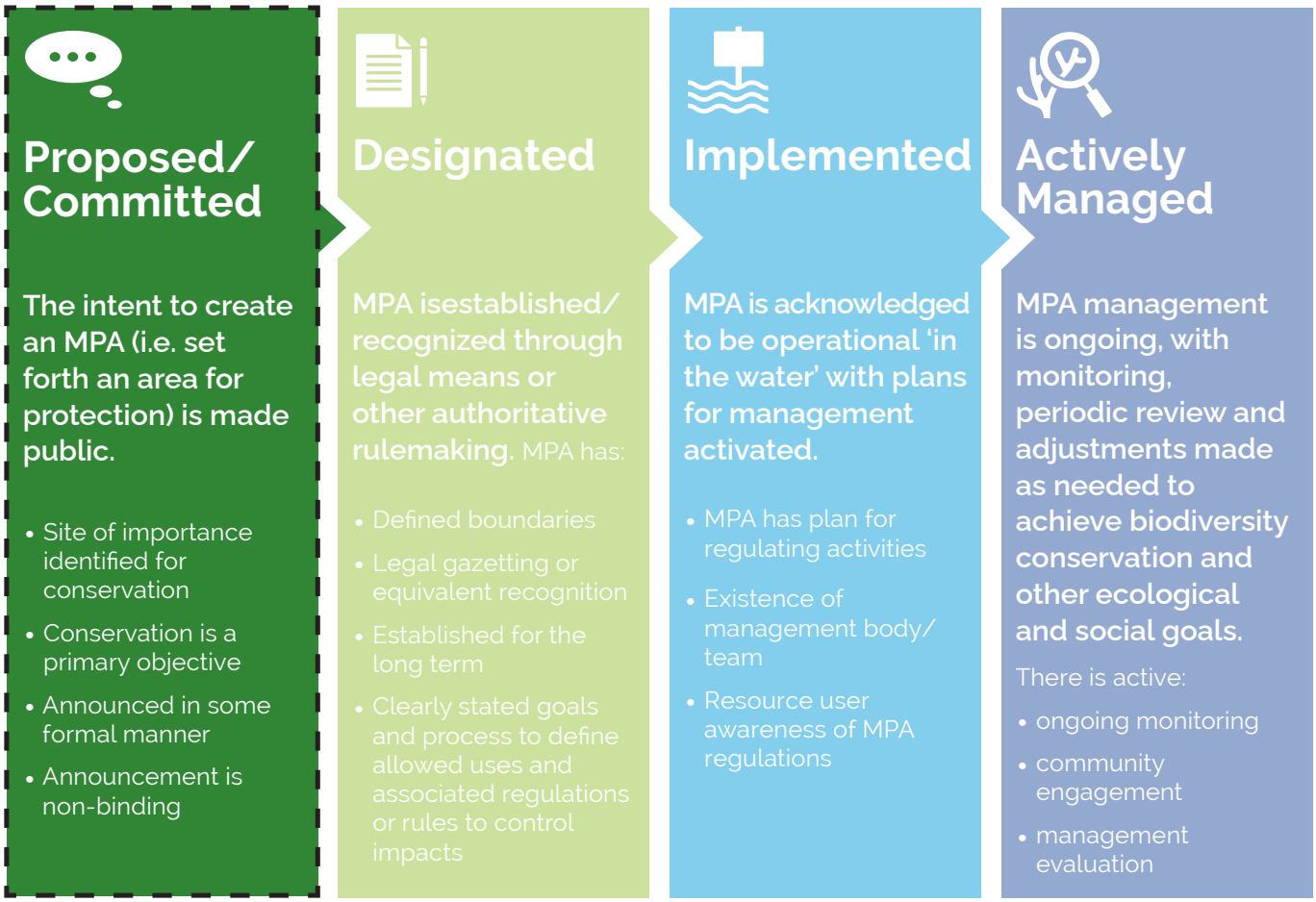
SNAPSHOT: This section explores examples of MPAs assessed using *The MPA Guide*. An example from each STAGE of Establishment and LEVEL of Protection is presented. This section also includes examples of country-wide and region-wide MPA assessments.

6. Examples of *MPA Guide* Assessments

Below are examples from specific MPAs, highlighting each STAGE of Establishment and different LEVELs of Protection, as of January 2023. These examples illustrate some of the ways STAGE and LEVEL can intersect to determine expected OUTCOMES from a given MPA or MPA zone. The STAGE and LEVEL of these example zones may change over time. Examples 1-4 can also be explored as case studies in the MPAtlas.

1. **Example:** STAGE of Establishment - Proposed/Committed

   Weddell Sea: The European Union and its Member States first proposed the Weddell Sea MPA to the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) in 2016. The proposed Weddell Sea MPA now has widespread support that continues to grow across many countries. The proposed MPA is over two million km² (790,000 square miles). As of January 2023, this MPA is yet to be officially Designated or Implemented and is therefore at the Proposed/Committed STAGE (see MPAtlas.org). The LEVEL is not yet known at this STAGE because there is no management plan or equivalent. The Weddell Sea MPA proposal includes distinct zones. Once this MPA is Implemented, each zone of the MPA will need to be evaluated with *The MPA Guide* to determine LEVEL and expected OUTCOMES for each. At this STAGE, there are no expected OUTCOMES from the Weddell Sea MPA since protection is not in force.



STAGE of Establishment for Weddell Sea.

2. **Example:** STAGE of Establishment - Designated

Aldabra Group: The Aldabra Group is a marine national park within the Republic of Seychelles. The area is managed by a non-profit organization, the Seychelles Island Foundation, which was established as a public trust by the Government of the Seychelles in 1979. The Aldabra Group is 195,274 km² and represents 45% of the marine area in the Seychelles.[11] The Aldabra Group is dedicated through legally recognized means by the Government of the Seychelles, meaning the STAGE of the Aldabra Group MPA is Designated. However, the MPA's management plan and a plan for implementation are still being developed, so the MPA is not yet Implemented. Typically, at the Designated STAGE, no LEVEL can be assigned because MPA regulations are not yet active and providing benefits.

STAGE of Establishment for Aldabra Group.

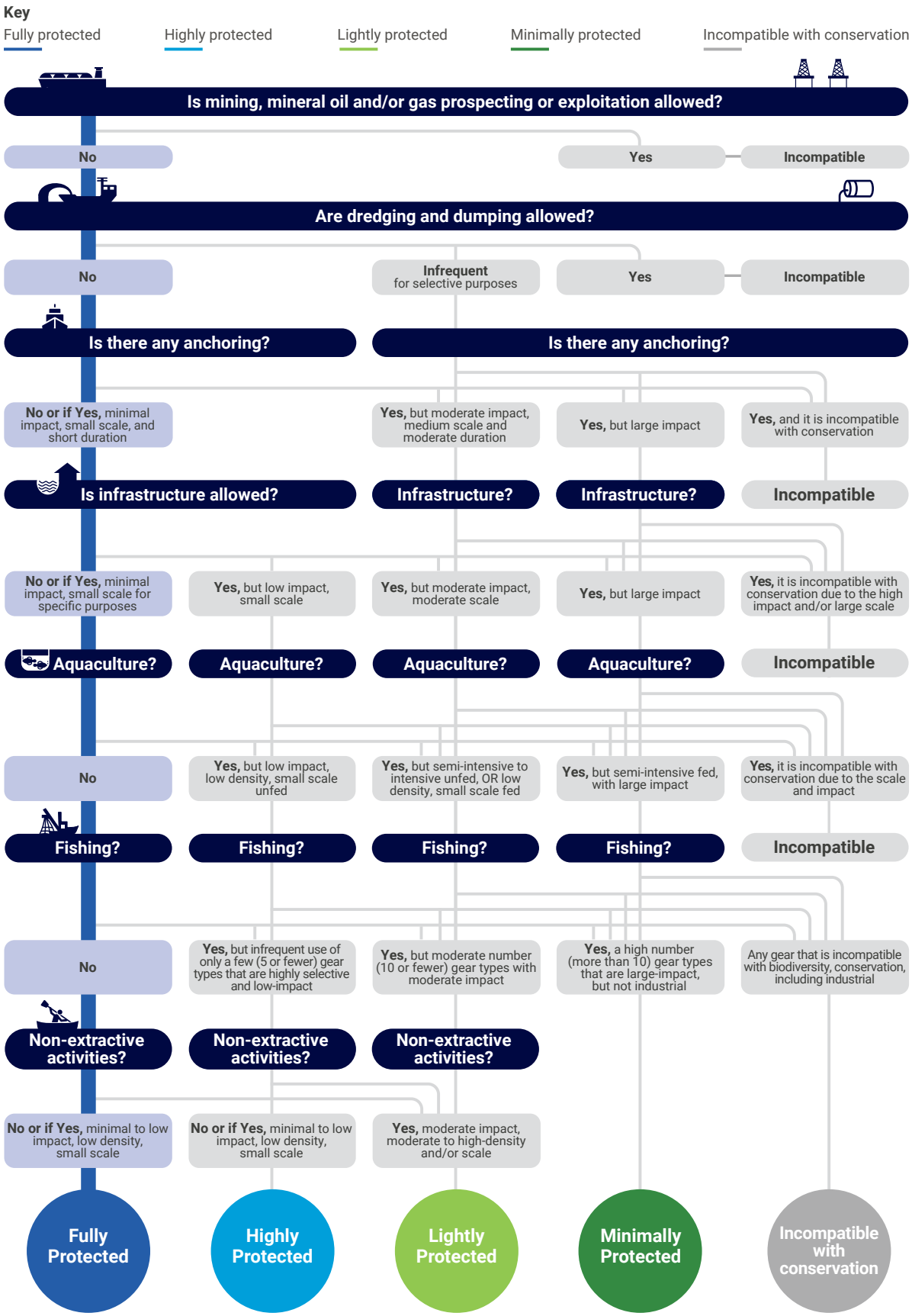
[11] Marine Conservation Institute. (2023). Marine Protection Atlas. Seattle, WA. www.MPAtlas.org. Accessed May 2023. https://mpatlas.org/zones/68816996/

3. **Example:** STAGE of Establishment - Implemented

Niue Moana Mahu: At the 2017 Our Ocean Conference in Malta, the Government of Niue announced the proposal to create a large-scale MPA. The area is 126,650 km^2 and represents 39% of the total protected area in the Cook Islands and >99% of the total area in Niue.[12] Regulations for the area were passed by the Niue cabinet in 2020, which legally formalized the MPA. A local NGO, Tofia Niue, and the Government of Niue co-manage the area through a public-private partnership. With the passing of the Regulations, the formal management was established and is active, meaning the STAGE of Niue Moana Mahu is Implemented. Active monitoring and management evaluation have not yet been developed, so the area is not yet at the Actively Managed STAGE. At the Implemented STAGE, a LEVEL of protection can be determined. According to the 2020 Niue Moana Mahu Marine Protected Area Regulations, there is no mining, dredging or dumping, anchoring, infrastructure, aquaculture, or fishing. Only low-impact, low-density, small-scale non-extractive activities are allowed. Niue Moana Mahu is therefore considered to be Fully Protected. Because Niue Moana Mahu is Fully Protected, it is expected to have larger potential to restore ecosystems, increase resilience, protect biodiversity, and deliver the accompanying benefits that biodiverse, resilient ecosystems provide to people. Niue Moana Mahu may have observable OUTCOMEs at this STAGE. Over time, as Niue Moana Mahu advances to the STAGE of Actively Managed, with key CONDITIONS in place, long-term positive ecological and social OUTCOMES are likely to be achieved.

[12] Marine Conservation Institute. (2023). Marine Protection Atlas. Seattle, WA. www.MPAtlas.org. Accessed May 2023. https://mpatlas.org/zones/68808405/

Decision Tree for Niue Moana Mahu



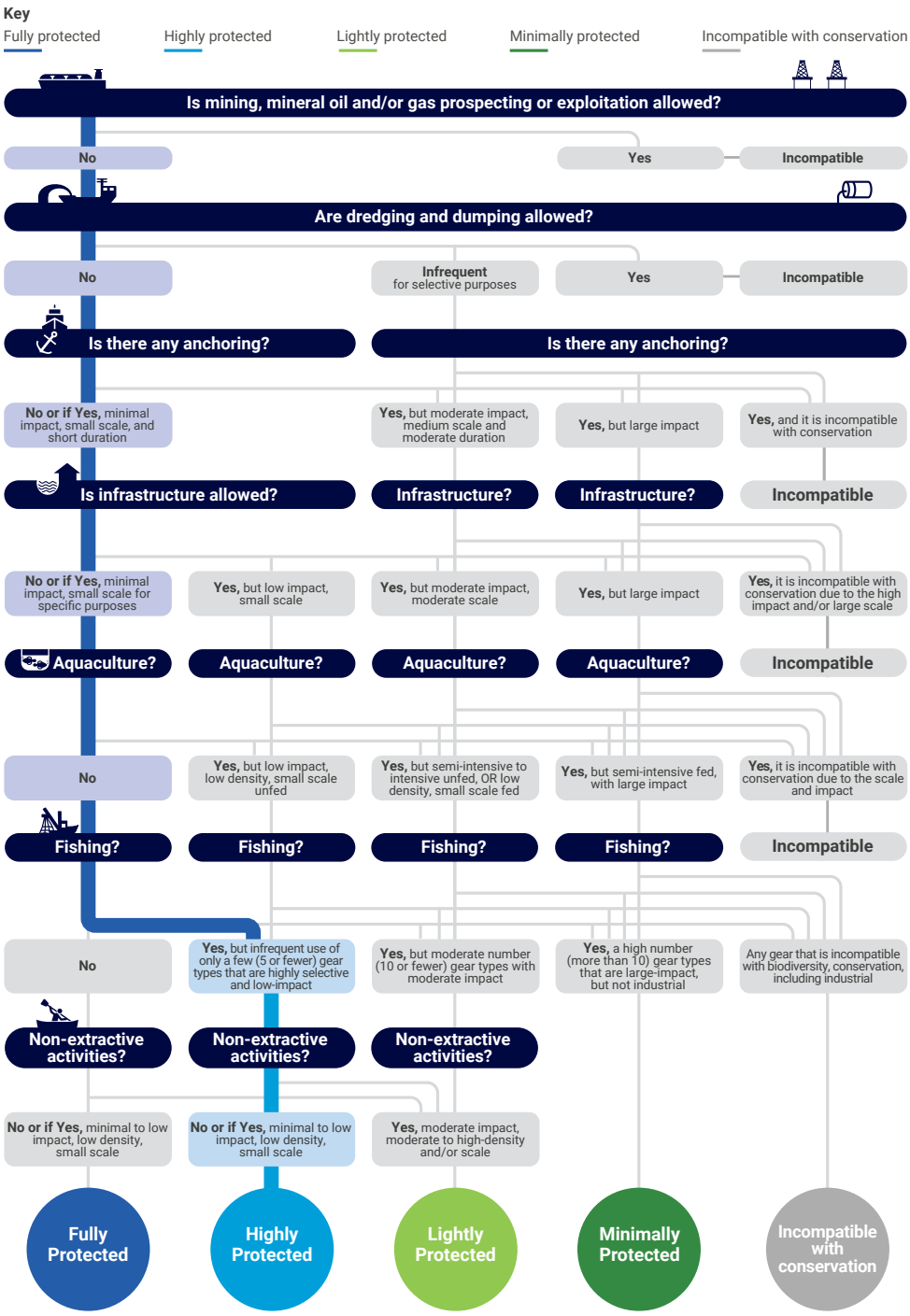
Decision Tree for LEVEL of Protection for Niue Moana Mahu.

4. **Example:** STAGE of Establishment - Actively Managed

1. Papahānaumokuākea Marine National Monument: Papahānaumokuākea Marine National Monument is a large area located in the Hawaiian Island chain of the United States. This area covers 17% of the United States' total marine area and 47% of the total area in US MPAs.[13] The area was originally established by presidential proclamation in 2006 as the Northwestern Hawaiian Islands Marine National Monument. In 2016 the Monument was expanded to 1,508,870 km^2.[14] The MPA includes two zones - the original zone (362,073 km^2) and the expansion zone (1,146,798 km^2). In 2007, the MPA was given its present Hawaiian name, Papahānaumokuākea, which signifies the area's great cultural significance for Native Hawaiian People (Enabling CONDITIONS in this MPA are discussed further in Example 6 below). The area is co-managed with four trustees and seven co-managing agencies, which cooperate to achieve the mission and vision of the Monument. The management is active, ongoing, and there is ecological monitoring and periodic review of the progress towards meeting biodiversity, ecological, and social goals. The monitoring plan is actively used and applied. The monitoring agencies have multiple community engagement programs. Thus, Papahānaumokuākea Marine National Monument's STAGE is Actively Managed. Both the original and expansion zone of Papahānaumokuākea Marine National Monument are Highly Protected, as there is infrequent and selective fishing by permit in the area, particularly to enable Native Hawaiian traditional practices. There is no mining, dredging or dumping, anchoring, infrastructure, or aquaculture, and only low-impact, low-density, small-scale, non-extractive activities are allowed. The OUTCOMES of Papahānaumokuākea Marine National Monument have been studied and continue to be monitored and evaluated.[15] This MPA earned a Blue Park Award (Platinum Level) from Marine Conservation Institute in 2017.

[13] Marine Conservation Institute. (2023). Marine Protection Atlas. Seattle, WA. www.MPAtlas.org. Accessed May 2023.
[14] NOAA Fisheries. (2023). Papahānaumokuākea Marine National Monument. www.fisheries.noaa.gov/pacific-islands/habitat-conservation/papahanaumokuakea-marine-national-monument. Accessed May 2023.
[15] Medoff, S., J. Lynham, and J. Raynor. 2022. Spillover benefits from the world's largest fully protected MPA. Science 378:313–316.

Decision Tree for Papahānaumokuākea 2016 Expansion

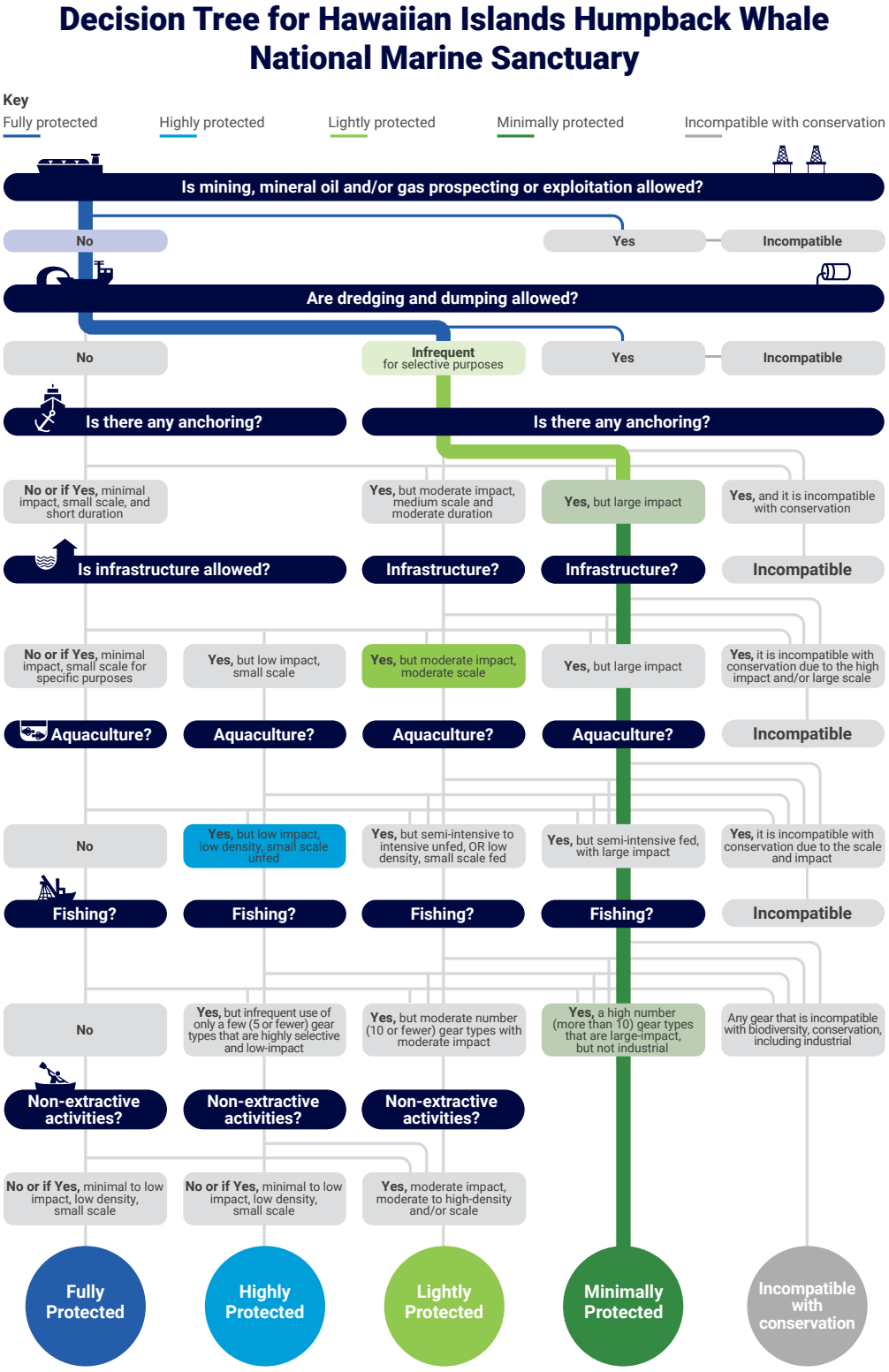


Decision Tree for LEVEL of Protection for Papahānaumokuākea Marine National Monument.

2. Hawaiian Islands Humpback Whale National Marine Sanctuary: The boundary of the Hawaiian Islands Humpback Whale National Marine Sanctuary surrounds coastal and ocean waters off the main Hawaiian Islands. The mission of the sanctuary is to protect Hawaii humpback whales and their habitat through education, research, and resource protection efforts. The sanctuary is the winter breeding, calving, and nursing waters for more than half of the humpback whales of the North Pacific. This area is 3,517 km² and it represents <1% of the total marine protected area in the United States.[16] The Hawaiian Islands Humpback Whale National Marine Sanctuary's STAGE is Actively Managed. It is jointly managed through

[16] Marine Conservation Institute. (2023). Marine Protection Atlas. Seattle, WA. www.MPAtlas.org. Accessed May 2023. https://mpatlas.org/zones/8700/

the United States Government and the State of Hawaii. The Hawaiian Islands Humpback Whale National Marine Sanctuary's LEVEL is Minimally Protected. The management plan for the Hawaiian Islands Humpback Whale National Marine Sanctuary prohibits all dredging, dumping, mining, and most aquaculture. But the management plan allows anchoring with large impacts, and unregulated anchoring occurs on the coral reefs inside the MPA. There is also fishing occurring with more than ten gear types, including those with large impacts such as longlines. Minimally Protected areas are unlikely to deliver OUTCOMES for species, habitats, or human communities that significantly differ from unprotected or un-Implemented sites.



Decision Tree for LEVEL of Protection for Hawaiian Islands Humpback Whale National Marine Sanctuary.

5. **Regional Assessment Examples:**

The MPA Guide can also be used for larger regional-level or country-level assessments to better understand the effectiveness of multiple MPAs in a specified area. For example:

1. Indonesia's Marine Protected Areas

Researchers applied *The MPA Guide* to Indonesia's system of Marine Protected Areas to determine STAGE of Establishment and LEVEL of Protection.[2] Many of Indonesia's MPAs have dual objectives to deliver biodiversity conservation and sustainable fisheries management for fisheries-dependent coastal communities. The study of STAGE concluded that, by area, Indonesia's MPAs are: 39% Actively Managed, 30% Designated, 15% Implemented, and 14% Proposed/Committed. The study also assessed the LEVEL of 21% of Indonesia's MPAs. By area, this 21% represents 57% of Indonesia's national MPA extent (13,383,030 ha). The study determined that, by area, the LEVELs of this 21% of Indonesia's MPAs are: 58.7% Minimally Protected, 36.4% Lightly Protected, 2.5% Highly Protected, and 2.4% Fully Protected. Many MPAs in Indonesia do not yet have zonation plans available, or they remain "not zoned", and therefore do not yet have a LEVEL. This means the relative area of each LEVEL across Indonesia's MPAs will likely change in the future. The authors note: "Our results highlight how much can be gained from looking at Indonesia's national MPA estate as more than just a single percentage area or millions of ha target. Our assessment demonstrates that Indonesia is a global leader in investment in active MPA management, while highlighting the potential for designating more MPAs with increased biodiversity conservation outcomes…Furthermore, our results facilitate clear communication of Indonesia's progress towards international MPA targets, and positions Indonesia as a leader in transparency and accountability."[2]

2. The 50 Largest MPAs in the United States

Researchers assessed the 50 largest MPAs in the United States, which cover 99.7% of the country's total MPA area.[5] The analysis found that over 96% of this protected area is in the central Pacific Ocean. Beyond the US central Pacific Ocean area, no other region is close to achieving the US's stated "30x30" goal, because only 1.9% of the rest of the US's waters are protected in any type of MPA. Furthermore, the central Pacific Ocean is home to 99% of the total US MPA area that is Fully or Highly Protected. Less than one-quarter of the 1.9% non-central Pacific MPA area is Fully or Highly Protected against extractive or destructive activities. These types of country-wide assessments using *The MPA Guide* can provide more nuance and clarity about how a country is progressing towards its goals. They can help not just to look at MPA coverage but also to identify what is already effectively protected, where positive OUTCOMES from MPAs can be expected, and what still needs adequate protection.

3. The European Union Natura2000 sites

The majority of the Natura2000 sites in the European Union lack a plan for management. This means that their STAGE is Designated, not Implemented, reflecting a lack of active management in the water. Once these MPAs are Implemented, their LEVEL can be assessed.[17]

[17] European Commission Environment. (2023). https://ec.europa.eu/environment/nature/natura2000/management/index_en.htm. Accessed May 2023.

6. **Examples of the importance of Enabling CONDITIONS:**

1. Arnavon Community Marine Park

The Arnavon Community Marine Park is the first and longest managed MPA in the Solomon Islands. It represents 16% of the total MPA area in the Solomon Islands and protects an area of incredibly high biodiversity.[18] It was awarded a Blue Park Award (Gold Level) from Marine Conservation Institute in 2019. This Award recognizes Arnavon Community Marine Park for its Actively Managed STAGE and Highly Protected LEVEL, which allows line fishing for subsistence only, not for commercial purposes. The Blue Park Award further recognizes the corresponding positive conservation OUTCOMES of the Marine Park that are facilitated by the presence of key Enabling CONDITIONS. It is managed by the local Arnavon Community Marine Park Management Committee, which includes representatives from the Ministry of Forests, Ministry of the Environment and Conservation, The Nature Conservancy, provincial fisheries officers, and representatives from the neighboring communities of Kia, Waghena, and Katupoika.[19] Many key CONDITIONS for effectiveness are in place, including: upholding the traditional rights of local people via co-management and purposeful community engagement and consultation; a formal process for conflict resolution via specific community representatives; transparency and accountability to the local community; sustainable financing via an endowment established by The Nature Conservancy; adequate staff and enforcement via the employment of full-time rangers; economic development activities within the Kia, Waghena, and Katupoika communities to provide alternatives to poaching, which threatens sea turtle populations and other key species; and educational activities that have built understanding of and support for the MPA within local communities.[18] The Arnavon Community Marine Park strives to operate in a partnership "that crosses community, language, province, and religious borders to strengthen spiritual and cultural links to the environment through the preservation and protection of critical habitats and species."[18]

2. California's MPA Network

The State of California in the United States has established a state-wide network of MPAs within state waters. This network was created based on ecological design CONDITIONS, including best practices for size, spacing, shape, and connectivity. This makes it one of the best examples of a true MPA "network" in the world. In addition, the process of establishing the network revealed the importance of many other CONDITIONS related to social processes when planning MPAs, such as (1) transparency and communication, (2) public participation with contextual and procedural fairness, (3) sustainable financing, (4) collaboration across jurisdictions, (5) conflict resolution mechanisms, and (6) recognition of pre-existing rights, tenure, and uses. The first two attempts to plan this network failed because some of these important CONDITIONS were not yet in place.[20] The California Network's Master Plan is under continued review and evaluation so that it can be revised to include the best available information. The goal is to learn from both western science and Indigenous knowledge and wisdom to achieve positive social and ecological OUTCOMES.[21]

[18] Marine Conservation Institute. (2023). Marine Protection Atlas. Seattle, WA. www.MPAtlas.org. Accessed May 2023. https://mpatlas.org/zones/6034/

[19] Welcome to the Arnavon Islands. (2023). www.arnavons.com. Accessed May 2023.

[20] Gleason, M., Fox, E., Ashcraft, S., Vasques, J., Whiteman, E., Serpa, P., et al. (2013). Designing a Network of Marine Protected Areas in California: Achievements, Costs, Lessons Learned, and Challenges Ahead. Ocean Coast. Manage. 74, 90–101. doi: 10.1016/j.ocecoaman.2012.08.013

[21] California Department of Fish and Wildlife. (2022). California's Marine Protected Area Network Decadal Management Review. https://nrm.dfg.ca.gov/

3. Papahānaumokuākea Marine National Monument

Papahānaumokuākea Marine National Monument was established as a conservation site due to both its ecological and cultural significance. Native Hawaiian storytelling notes that, as the westernmost region of the Hawaiian Island archipelago, this area is a pathway to be traveled after death to return to pō (night; realm of the gods).[11] Management of Papahānaumokuākea Marine National Monument incorporates many important CONDITIONS from *The MPA Guide*. The office of Hawaiian Affairs has published a guidance document, Mai Ka Pō Mai[22], which is a cumulation of over a decade of discussion with Native Hawaiian communities and management agencies to provide a Native Hawaiian perspective on Papahānaumokuākea management. A scientific paper on this MPA states:

In Papahānaumokuākea Marine National Monument:

> *"Current management emphasizes integration of science, policy, cultural knowledge, traditions, and practices to create successful management strategies appropriate for both natural and cultural resources. This management is based on Native Hawaiian values and practices that incorporate observation and understanding of the natural world, indigenous principles and philosophies, cultural norms, community relationships, and unique epistemologies deeply imbedded in and formed by relationships of people with place. A cornerstone of this effort has been the direct involvement of cultural practitioners in policy, management, education, and research. This biocultural approach has led to more effective management of the monument and serves as a model for conservation around the world."* [23]

[22] Office of Hawaiian Affairs, National Oceanic and Atmospheric Administration, U.S. Fish and Wildlife Service, and State of Hawai'i. (2021). Mai Ka Pō Mai: A Native Hawaiian Guidance Document for Papahānaumokuākea Marine National Monument. Honolulu, HI: Office of Hawaiian Affairs.

[23] Kikiloi, K., Friedlander, A. M., Wilhelm, 'Aulani, Lewis, N., Quiocho, K., 'Āila, W., & Kaho'ohalahala, S. (2017). Papahānaumokuākea: Integrating Culture in the Design and Management of one of the World's Largest Marine Protected Areas. Coastal Management, 45(6), 436–451. https://doi.org/10.1080/08920753.2017.1373450

7. Glossary

7. Glossary

30x30: Colloquial shorthand for Target 3 of the Kunming-Montreal Global Biodiversity Framework, which includes a commitment to protect at least 30% of terrestrial and inland water areas, and of marine and coastal areas, by 2030.

Aichi Target 11: A target set by the CBD in 2010, stating that: "By 2020 at least 17 percent of the terrestrial and inland water, and 10 percent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecological representative and well connected systems of protected areas and other effective- area-based conservation measures, and integrated into the wider landscapes and seascapes."

CBD: Convention on Biological Diversity. The CBD provides a global framework for action on biodiversity. "It brings together the Conference of the Parties (COP), which is the governing body that meets every two years, or as needed, to review progress in the implementation of the Convention, to adopt programmes of work, to achieve objectives and provide guidance."

CONDITIONS: Social and ecological Enabling Conditions by which an MPA is effectively planned, designed, implemented, governed, and managed to achieve desired ecological OUTCOMES and the direct and indirect human well-being OUTCOMES that result.

IUCN: International Union for Conservation of Nature. IUCN is an international organization working in the field of nature conservation and sustainable use of natural resources. The mission of IUCN is to "influence, encourage, and assist societies throughout the world to conserve nature and to ensure that any use of natural resources is equitable and ecologically sustainable."

IUCN Protected Area Management Categories: The system by which IUCN categorizes protected areas based on their management objectives. The categories are:

Ia: Strict Nature Reserve
Ib: Wilderness Area
II: National Park
III: National Monument or Feature
IV: Habitat/Species Management Area
V: Protected Landscape/Seascape
VI: Protected area with sustainable use of natural resources.

Kunming-Montreal Global Biodiversity Framework Target 3: A target agreed by the parties to the CBD at COP 15 in December 2022. The wording of this Target is as follows: "Ensure and enable that by 2030 at least 30 per cent of terrestrial and inland water areas, and of marine and coastal areas, especially areas of particular importance for biodiversity and ecosystem functions and services, are effectively conserved and managed through ecologically representative, well-connected and equitably governed systems of protected areas and other effective area-based conservation measures, recognizing indigenous and traditional territories, where applicable, and integrated into wider landscapes, seascapes and the ocean, while ensuring that any sustainable use, where appropriate in such areas, is fully consistent with conservation outcomes, recognizing and respecting the rights of indigenous peoples and local communities, including over their traditional territories."

LEVEL: The Level of Protection clarifies how well an MPA or MPA zone is protected from the seven most common types of activities occuring in MPAs. An MPA's LEVEL is evaluated using *The MPA Guide*.

MPA: Marine Protected Area. An MPA is defined by IUCN as: "A clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values."

MPA Zone: Some Marine Protected Areas are divided into smaller sections, or zones, with different regulations or management. Each zone of an MPA should be assessed individually by carrying out an *MPA Guide* assessment of the area. Here, we are referring to lateral zones, not vertical; the IUCN has a strong presumption against vertical zoning, where there are different protections for the ocean bottom than the water column above, due to the importance of interactions between these areas.[24]

OUTCOMES: The ecological and social OUTCOMES that can be expected from an MPA based on the STAGE, LEVEL, and CONDITIONS in *The MPA Guide*, summarized using decades of science and knowledge from MPA research.

STAGE: The Stage of Establishment in *The MPA Guide*, which specifies the status of an MPA in the process of creating a protected area.

UN: United Nations. An international organization "where all the world's nations can gather together, discuss common problems, and find shared solutions that benefit all of humanity."

[24] Day, J., Dudley, N., Hockings, M., Holmes, G., Laffoley, D., Stolton, S., Wells, S. and Wenzel, L. (eds.) (2019). Guidelines for applying the IUCN protected area management categories to marine protected areas. Second edition. Gland. Switzerland: IUCN.

Frequently Asked Questions (FAQs)

Frequently Asked Questions (FAQs)

1. **Why would I use *The MPA Guide*?**
   The MPA Guide will help you determine what can be expected from an MPA based on the MPA's STAGE of Establishment and LEVEL of Protection. It also highlights the Enabling CONDITIONS needed for effectiveness. Not all MPAs are the same. The language provided by *The MPA Guide* provides clarity and a simple way to discuss, compare, track, and plan MPAs.

2. **What will *The MPA Guide* tell me about my MPA?**
   The MPA Guide will tell you what conservation OUTCOMES can be expected from each zone in your MPA based on its STAGE of Establishment and LEVEL of Protection, if certain Enabling CONDITIONS are in place.

3. **What if I have already done other assessments?**
   Great! *The MPA Guide* can provide different, useful information. *The MPA Guide* STAGE and LEVEL are simple categories that can likely be assigned in large part using information you already have; for example, if you have already done an in-depth site-level assessment like the METT. Knowing your MPA's STAGE and LEVEL will help to compare your MPA with other sites that have been assessed around the world using the *Guide*. *The MPA Guide* can help determine the *expected* OUTCOMES from your MPA based on STAGE and LEVEL, which you can compare with the *actual* OUTCOMES quantified by other assessment tools, for example through monitoring data. *The MPA Guide* helps to determine if an MPA is meeting all the appropriate enabling CONDITIONS of its STAGE.

4. **What information do I need to do an assessment using *The MPA Guide*?**
   Some examples of the resources you will need to do an assessment with *The MPA Guide* are: management plans, information on regulations from other authorities that overlap with regulations from the MPA authority, and local knowledge of activities that are actually occurring in an MPA or MPA zone. For more information, see the above section, "Steps for Using *The MPA Guide*."

   Evaluating an MPA with *The MPA Guide* should be a quick process. If you have in-depth knowledge of site management, activities happening at the site, and their impact levels, you likely have everything you need to move through the Decision Tree. If you are less familiar with the site, the MPA's management plans should have most of the information you need to assess the LEVEL of the site. It is also important to consult other authorities with overlapping regulations. To evaluate STAGE, you will need background information and knowledge about the site's governance, management, engagement with local communities, scientific monitoring, and management evaluation.

5. **Should I assess my MPA with *The MPA Guide* using only what the management plan says is allowed or not allowed? Or, if I have knowledge of different activities *actually* happening in the MPA, should I use that information to determine STAGE and LEVEL?**
   Since it is the current activities that influence the degree to which an MPA is protecting biodiversity at a given point in time, the assessment of MPA LEVEL should reflect activities actually occurring in the site at the time of reporting, whether or not they are explicitly stated in the management plans.

   There are circumstances where a management plan does not specifically prohibit an activity, but local managers have first-hand knowledge that the activity is not happening in the area. For example, a management plan may not explicitly prohibit anchoring, but the

area may be too deep for anchoring – therefore no anchoring is occurring at the site and likely never will. In this situation, the answer to the question "Is there any anchoring?" would be "no". As you move though this decision tree the questions should be answered based on what is actually happening in the MPA.

Some activity types are not explicitly included in MPA rules and regulations, often because they are not within the management jurisdiction of the MPA authority. In these circumstances, knowledge of whether or not an activity occurs may be used.

6. **How do I assess an MPA with multiple zones (not vertical zones)?**
   MPA zones are defined areas in a single MPA with different regulations or management. Each zone of a multi-zone MPA should be assessed individually and assigned the STAGE and LEVEL appropriate to that individual zone. This means each zone will have its own STAGE and LEVEL, which should be considered separately. This allows a more precise understanding of corresponding expected OUTCOMES, and it aligns with the data structure in the WDPA and MPAtlas. In these databases, each MPA zone has its own data record.

7. **What about an MPA that has vertical zones?**
   The MPA Guide points to IUCN guidance on vertical zoning. IUCN is opposed to vertical zoning in MPAs, as there may be important interactions between the benthos and the water column above (see Guidelines for Applying IUCN Protected Area Categories to Marine Protected Areas for more information).

8. **Does *The MPA Guide* help address governance challenges with MPAs?**
   Governance systems are complex and diverse. The *Guide* does not resolve whether and how governance structures address MPAs. However, it does provide clarity and transparency by tracking aspects of governance that are related to an MPA's STAGE of Establishment and LEVEL of Protection, as well as by documenting the enabling CONDITIONS that lead to effective MPAs. This can ultimately help improve the governance and management of these areas.

9. **Does *The MPA Guide* assign value to MPAs at different STAGEs and LEVELs?**
   No, the *Guide* does not assign value to different types of MPAs. Instead, it simply provides clarity to users and managers. Use of *The MPA Guide* helps provide a realistic understanding of the OUTCOMES that can be expected from a particular type of MPA.

10. **What about activities that are not listed in *The MPA Guide*?**
    The MPA Guide cannot include every possible activity. It does provide best practices wherever possible. For example, shipping is not explicitly addressed because it is challenging for an MPA managing authority to restrict shipping movement. The right of innocent passage is mandated under international law and regulated by International Maritime Organization treaties. Nonetheless, research supports recommendations that ships with dangerous goods or toxic antifouling chemicals do not transit through MPAs. Shipping activity should be restricted to shipping lanes outside of MPAs to minimize noise pollution and other negative impacts, such as collisions with marine life.

    As new activities emerge within MPAs, *The MPA Guide* Team reviews new research and updates the Expanded Guidance for STAGE and LEVEL.

11. **What does "incompatible with biodiversity conservation" or "incompatible with the conservation of nature" mean?**
    An area may be deemed incompatible with biodiversity conservation if extremely impactful activities occur in the area. This is defined by IUCN Guidelines (IUCN and WCPA 2018).

Activities that have extreme impacts include industrial extractive activities such as industrial fishing (defined by IUCN Resolution WCC-2020-Res-055 as fishing vessels larger than 12 meters that use towed or dragged gear types), oil and gas exploration, or mining.

12. **What is the IUCN definition of an MPA?**
    IUCN defines an MPA as: "A clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values (IUCN and WCPA 2018)."

13. **What if my site doesn't meet the IUCN's definition of an MPA?**
    There are other area-based management designations that do not prioritize biodiversity conservation but may still provide conservation benefits. These sites may be considered Other Effective Area-based Conservation Measures (OECMs) if they fit the criteria. Territories and areas conserved by Indigenous Peoples and local communities or "territories of life" are another type of area that can provide conservation benefits as custodians steward and conserve resources, even though the management priorities of these areas may differ from an MPA. In these situations, *The MPA Guide* can still provide insight as to what OUTCOMES can be expected from the area, based on how the area is being used.

14. **What are some other terms for Marine Protected Areas? How do these relate to *The MPA Guide*?**
    There are many different terms for MPAs in use around the world; some examples in English are "marine park", "marine sanctuary", and "marine reserve". The term that is used locally varies according to national and local governance context and community preferences. Each of these terms can mean different things in different contexts. *The MPA Guide* provides a common language to talk about MPAs. They can be Fully Protected, Highly Protected, Lightly Protected, or Minimally Protected (defined using LEVEL), and they can be Proposed/Committed, Designated, Implemented, or Actively Managed (defined using STAGE). This provides simple, consistent, and powerful information for practitioners, managers, and others, whether they are reporting on MPA coverage to the WDPA or making decisions about MPA management.

15. **How can I submit information to the Marine Protection Atlas (www.MPAtlas.org)?**
    If you are interested in partnering with the MPAtlas Team at Marine Conservation Institute and/or contributing MPA information to the database, please contact info@mpatlas.org.

16. **How can I submit information to WDPA?**
    If you are interested in submitting data to the WDPA, please contact UNEP-WCMC at protectedareas@unep-wcmc.org.

17. **What can I do if I have a question that isn't addressed by this User Manual?**
    Please visit mpa-guide.protectedplanet.net for more information. If you have further questions, email the *MPA Guide* Team at TheMPAGuide@gmail.com.

Appendices

Appendix A: References and Additional Resources

References by Order of Appearance

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Additional resources for Examples in Section 6:

i. Weddell Sea

1. https://www.antarctica.gov.au/about-antarctica/law-and-treaty/ccamlr/marine-protected-areas/eampa/

2. https://meetings.ccamlr.org/en/wg-emm-15/38-rev-1

ii. Aldabra Group

1. http://www.sif.sc/

iii. Niue Moana Mahu

1. https://old.mpatlas.org/media/filer_public/bc/95/bc959065-13b7-42d7-97dd-507503fc4b01/reg_2020-04_niue_moana_mahu_marine_protected_area_regulations_1.pdf

iv. Papahānaumokuākea Marine National Monument

1. https://sanctuaries.noaa.gov/science/condition/pmnm/

2. Office of Hawaiian Affairs, National Oceanic and Atmospheric Administration, U.S. Fish and Wildlife Service, and State of Hawai'i. (2021). Mai Ka Pō Mai: A Native Hawaiian Guidance Document for Papahānaumokuākea Marine National Monument. Honolulu, HI: Office of Hawaiian Affairs. https://www.oha.org/mai-ka-po-mai/

v. Hawaiian Islands Humpback Whale National Marine Sanctuary

1. https://hawaiihumpbackwhale.noaa.gov/management/

vi. Regional Assessments:

1. A Scientific Synthesis of Marine Protected Areas in the United States: Status and Recommendations. (See reference 5; Sullivan-Stack et al., 2021)

2. Indonesia's Marine Protected Area Network (See reference 2; Andradi-Brown et al., 2020)

Appendix B: Background and History of *The MPA Guide*

As MPA designations grew throughout the world, there also grew a parallel need for global reporting and improved tracking of MPA coverage. In 2015, Oregon State University researchers Dr. Jane Lubchenco and Dr. Kirsten Grorud-Colvert published a policy forum in the journal *Science* called: "Making waves: The science and politics of ocean protection"[25], which included a figure illustrating the increases in global MPA coverage over time. Although these data included the percent of ocean surface area that is strongly protected (i.e., Fully or Highly Protected), out of the total MPA coverage there still remained questions about how much of the ocean is truly protected, the extent of those protections, and the social and ecological implications of protection.

The definition of "protection" was also a source of confusion because not all MPAs are the same. MPAs throughout the world have varying levels of protections – ranging from full to minimum protection – because they allow or disallow a number of different types of activities, ranging from full to minimum protection in an area. Some MPAs only exist on paper and not in practice. This led to more confusion about the accuracy of the reported percentages for ocean protections being used to measure and evaluate global targets, such as the Convention on Biological Diversity's (CBD) Aichi Target 11 and the United Nations (UN) Sustainable Development Goals. And, at a local level, this confusion could result in a mismatch between community expectations of an MPA and the outcomes it actually can deliver. The need for a tool to clarify language was evident.

The MPA Guide was years in the making and involved extensive discussions about global reporting with partners throughout the world. There was a collective realization among these partners and other collaborators that in order to determine the success of global targets, a shared understanding and language defining MPA protections and their effectiveness needed to be developed. It was concluded that much of the confusion about MPAs can be resolved by addressing these three critical questions:

1) What does "protected" mean for biodiversity conservation?
2) When should an MPA "count" as effectively protected?
3) What is needed to achieve effective ocean protection?

In 2017, a meeting was held to gather individuals from different sectors involved with MPAs (e.g., NGOs, agencies, international groups). This meeting's discussions laid the groundwork for *The MPA Guide*, with the goal to create a framework that reduces the confusion around MPA reporting. The resulting *MPA Guide* integrates decades of research to clarify these issues.

The MPA Guide is facilitated by the founding partners: the UN UN Environment Programme World Conservation Monitoring Centre, Protected Planet, IUCN-Marine, Marine Conservation Institute's Marine Protection Atlas, National Geographic Pristine Seas, and The MPA Project at Oregon State University. In 2021, a collaboration of 42 authors published *The MPA Guide: A framework to achieve global goals for the ocean* in the peer-reviewed scientific journal *Science*. These 42 co-authors from 38 institutions across six continents represent expertise and perspectives spanning a variety of fields and backgrounds in the science, governance, and management of MPAs.

The creation of *The MPA Guide* brought, and continues to bring, people and organizations together to navigate complex conversations about MPAs and global targets. Collaboration was always the center

[25] Lubchenco, J., & Grorud-Colvert, K. (2015). Making waves: The science and politics of ocean protection. Science, 350(6259), 382–383. https://doi.org/10.1126/science.aad5443

and main driver to the creation of the *Guide* and is still paramount for its ongoing implementation. The network of collaborators and implementers of *The MPA Guide* is continuing to expand. Today, *The MPA Guide* has become an increasingly valuable tool for characterizing MPAs throughout the world with a common language and understanding of the expected OUTCOMES of different types of MPAs based on STAGE, LEVEL, and CONDITIONS.

Appendix C: Quick Reference: Using *The MPA Guide*

USING THE MPA GUIDE

The MPA Guide is a science-based framework to categorize, plan, track, evaluate, and discuss marine protected areas (MPAs). It provides a systematic way to organize types of MPAs and connect them with the different social and ecological outcomes they are expected to achieve.

The MPA Guide has been the work of hundreds of experts over many years. It is the result of consultation and collaboration between scientists, policymakers, NGOs, and communities across the world. Based on decades' worth of social and ecological scientific research, *The Guide* also draws on the wealth of local and traditional knowledge across the globe and input from ocean experts and practitioners working in MPA design, governance, and management.

The MPA Guide was developed to be useful, relevant, and applicable to real-world MPAs—which are defined by IUCN as areas whose primary objective is the conservation of nature. It can help assess progress towards the goals of global coverage targets, such as that set by the Convention for Biological Diversity. It is already in use around the world.

***The MPA Guide* has four core components:**

1. **Stage of Establishment: an MPA's status in the process of creating an MPA.**
2. **Level of Protection: how well an MPA is protected from extractive or destructive activities.**
3. **Enabling Conditions: principles and processes for effective MPA planning, design, and governance.**
4. **Outcomes: the different social and ecological benefits and impacts that come from different types of MPAs, assuming Enabling Conditions are in place.**

WHAT IS THE MPA GUIDE?

The MPA Guide identifies four Stages of Establishment and four Levels of Protection. As long as an MPA, or a zone within a multi-zone MPA, meets the IUCN definition (the primary goal is the conservation of nature), it will fit into one Stage and one Level at any point in time.

Stage of Establishment

- **Proposed or Committed** by a governing or other organizing body;
- **Designated** by law or other authoritative rulemaking;
- **Implemented** with in-the-water changes in management; and
- **Actively Managed** with ongoing monitoring, adaptive management, and other elements of effective protection.

Once an MPA or zone is **Implemented**, with Enabling Conditions in place, it will start to deliver conservation outcomes in the water. This is when an MPA should be 'counted' as providing protection.

Level of Protection

The Level of Protection clarifies how well an MPA or MPA zone is protected from the following extractive or destructive activities:

- Mining
- Dredging and Dumping
- Anchoring
- Infrastructure
- Aquaculture
- Fishing
- Non-extractive activities

The four Levels of Protection are based on the intensity, scale, duration, frequency, and overall impact of these seven activities. If the impact of activities is too large, the area is considered incompatible with the conservation of biodiversity and its benefits.

1

Levels of Protection

- **Fully Protected** with no extractive or destructive activities, and all abatable impacts minimized. These areas can include 'marine reserves' and 'no-take' areas. Any activities (such as tourism or cultural practices) must be non-extractive and have low total impact. Fishing or extraction of any wild marine resources is not allowed.
- **Highly Protected** with only minimal extractive or destructive activities, and other abatable impacts minimized. Any activities must have low total impact. For example, some Highly Protected areas may allow a small amount of traditional, subsistence or small-scale fishing that uses a few highly selective gear types; number of fishers and intensity of use must be consistent with low total impact.
- **Lightly Protected** with some protection, but moderate to significant extraction and impacts are allowed; and
- **Minimally Protected** in which more extensive extraction and other impacts are allowed, while still providing some conservation benefits to the area. Extremely destructive activities, like industrial fishing, are still prohibited.

Level of **IMPACT** that is allowed for each level of protection

From Grorud-Colvert et al., Science, 2021 (DOI: 10.1126/science.abf0861). Reprinted with permission, AAAS.

No value judgement is made for any type of MPA; each is respected for its circumstances and evaluated based on biodiversity conservation outcomes and their benefits.

WHAT THE MPA GUIDE PROVIDES

Consistent understanding of global ocean protection. It can be used to show where we currently stand in reaching international targets, what we still need, and how to achieve global goals. It also provides a common understanding of what is required of MPAs to ensure biodiversity conservation and its benefits.

Clarity on what effective protection looks like. By connecting the outcomes with MPA type, *The MPA Guide* clarifies that it is through Fully or Highly Protected, Implemented or Actively Managed MPAs, with key Enabling Conditions in place – such as inclusivity, transparency, accountability – that we can achieve the most effective protection of the global ocean and deliver win-win outcomes for people and the planet.

An internationally recognised and relevant framework. This framework is already in use internationally to help match Level of Protection with MPA goals, to advance Stage of Establishment, and to ensure key Enabling Conditions are in place. It enables countries to share knowledge and showcase their MPA achievements on the global stage. This logic and framework may also apply to other areas, such as protected areas on land or Other Effective Area-based Conservation Measures (OECMs).

Science-based guidance to inform decision making and implementation. *The MPA Guide* provides the science to guide decision making in MPA policy, including opportunities to design new MPAs and modify existing MPAs to better achieve stated goals.

HOW TO BEGIN USING THE MPA GUIDE

Please visit http://mpa-guide.protectedplanet.net to find out more about *The MPA Guide*, including practical guidance, real-world examples, explanatory videos on each of the four core components, and an interactive decision tree to aid in categorizing your MPA or zone into a Stage of Establishment and Level of Protection. For more information, email TheMPAGuide@gmail.com.

Appendix D: Expanded Guidance for STAGE of Establishment

Version 1 (September, 2021)

The MPA Guide (1; https://mpa-guide.protectedplanet.net) organizes MPAs and zones within multi-zone MPAs according to two features: Level of Protection and Stage of Establishment. Further, it links these Levels and Stages to Outcomes that can be expected for biodiversity and human well-being, and describes the Enabling Conditions that are prerequisite for durable, effective MPAs. As long as an MPA (or zone within a multi-zone MPA) meets the IUCN definition (2), it will fit into one Stage of Establishment and one Level of Protection at any given point in time. This system complements the IUCN Protected Area Categories that are based, not on the Level of Protection, but on an area's management objectives and governance types (2). It builds from the IUCN MPA Standards (2). Zones within MPAs must meet all qualifying requirements in the same way as entire MPAs, including the guidance on both Level of Protection and Stage of Establishment.

This document focuses on Stage of Establishment. MPA establishment generally occurs as a series of steps taken by governing or other authorities, based on their local and national context. *The MPA Guide* outlines the minimum criteria for an MPA to achieve each Stage of Establishment and provides guidelines for best practices.

In some cases, several years may pass between an announcement of the intent to create an MPA, and the time when *in situ* protection and management occurs. In other situations, an MPA may be Designated and Implemented simultaneously if the announcement has legal authority and includes management plans. It is important to note that MPAs that are Proposed/Committed or Designated, but not yet Implemented, will not accrue intentional biodiversity conservation benefits; protection only starts accruing benefits when an MPA is Implemented.

The Stages of Establishment are summarized as follows:

1. Proposed/Committed: The intent to create an MPA is made public.
2. Designated: The MPA is established or recognized through legal means or other authoritative rulemaking.
3. Implemented: The MPA has transitioned from existence "on paper" to being operational "in the water" with plans for management activated.
4. Actively Managed: MPA management is ongoing, including monitoring, periodic review, and adjustments made as needed to achieve biodiversity conservation and other ecological and social goals.

Stage of Establishment	Minimum Criteria	Example Best Practices
Proposed/Committed	**The intent to create an MPA is made public**	
	• Site of importance identified for conservation • Conservation is primary objective	Site ideally identified based on traditional knowledge and scientific data, with clear goals, and informed by stakeholder and rights-holder participation, with Indigenous or other local and scientific knowledge of the social-ecological context
	• Announced in some formal manner • Announcement is non-binding	May be announced via a statement by a government, community, conservation organization, or other organizing group, with transparency and coordination across jurisdictions and sectors, for example via a conference or international meeting, a press release, or online
Designated	**MPA is established or recognized through legal means or other authoritative rulemaking**	
	• MPA has defined boundaries	Boundaries unambiguous, published, and known to local users Identified via WDPA ID, coordinates, published maps
	• Legal gazetting or equivalent Indigenous/ traditional authorization or customary recognition • Established for the long term	No sunset clause or review process that allows for rescinding protection shorter than 25 years MPA governance specified, including responsibilities for management and implementation
	• Clearly stated goals (for biodiversity conservation and other goals) and process to define allowed uses and associated regulations or rules to control impact	Consideration of key ecological and social design principles (e.g., size, spacing, incorporation of key habitats and species, recognition of pre-existing rights and uses, etc.) Collection of baseline data to measure MPA Outcomes Administrative structure for enforcement, such as fines, penalties, etc. Governance and administrative structures for management, implementation, and sustainable financing should be specified (e.g., in management plans)

Stage of Establishment	Minimum Criteria	Example Best Practices
Implemented	**The MPA has transitioned from existence "on paper" to being operational "in the water" with management plans activated**	
	• MPA has plans for regulating activities	Management plan (or equivalent) includes information such as: • Existing regulations and procedures, that have been updated as appropriate • Zones, if present, defined with clear rules, rights and boundaries • Identification of key habitats and species to protect • Identification of key threats • Planned activities to mitigate abatable threats and achieve conservation goals • Identified measurable targets • Plan for monitoring activities, such as collection of ecological & socio-economic data, monitoring of economic activities (e.g., fisheries, tourism, etc.)
	• Existence of management body/team	Management enacted through sufficient and organized staffing and funding, with local engagement (may be with governmental or NGO partner) Management agency is empowered to regulate activities that negatively impact the biodiversity values of the site, or partners with other agencies to manage activities outside their jurisdiction
	• Resource user awareness of MPA regulations	Mechanisms to promote compliance and enforcement exist, with sufficient capacity in staff, budget, and infrastructure to enforce the MPA rules if they are broken (e.g., control of access or resource use through permits) System in place for compliance and enforcement Plan for regular surveillance (e.g., by patrols, remote surveillance, or an offense reporting system) that addresses any MPA-specific challenges due to size, location, and/or zoning Local stakeholders and rights-holders are partners in MPA management Plan for managing users outside the system (e.g., unintended use or activities from unregulated sources)

Stage of Establishment	Minimum Criteria	Example Best Practices
Actively Managed	**MPA management is ongoing, including monitoring, periodic review, and adjustments made as needed to achieve biodiversity conservation and other ecological and social goals**	
	• Active/ongoing monitoring	Ecological monitoring at appropriate spatial and temporal scales for identifying existing and emerging threats and their ecological impacts Social monitoring at appropriate spatial and temporal scales to measure human dimensions of MPAs, including uses Ecological monitoring to measure progress towards measurable biodiversity conservation targets Regular summary reports of monitoring results
	• Active/ongoing community engagement	Established process for co-management with local leadership from stakeholders and rights-holders Ongoing efforts to build trust and partnerships with local users Ongoing consideration of cultural values, traditions, and activities in site management
	• Active/ongoing management evaluation	Flexible governance and decision-making in a structured, continual process for adaptive management in the face of uncertainty Use of monitoring and learning feedbacks that inform changes to management rules, zoning systems, or MPA boundaries as needed to achieve goals/targets

Notes:

- The Proposed/Committed stage can encompass everything from promised protection of a percent of a country's EEZ, to a vague area of interest, to a more formal proposal of actual boundaries and possible regulatory structure. Not all of these will be shared and thus this category will include a broad spectrum.
- An MPA or zone may progress through these Stages of Establishment in a non-linear way or skip steps. For example, an MPA may go from Proposed/Committed straight to Actively Managed. Or, an MPA that is Designated may go back to Proposed/Committed if a change in governance results in changed spatial management priorities.
- See the IUCN Green List (4) and the Blue Parks Program (5) as examples of comprehensive systems to evaluate Actively Managed, effective MPAs.

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2. IUCN, WCPA, "Applying IUCN's Global Conservation Standards to Marine Protected Areas (MPA). Delivering effective conservation action through MPAs, to secure ocean health and sustainable development." (Version 1.0, Gland, Switzerland., 2018).

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Appendix E: Expanded Guidance for LEVEL of Protection

Version 2 (December, 2021)

The MPA Guide (1; mpa-guide.protectedplanet.net) organizes MPAs and zones within multi-zone MPAs according to two features: Level of Protection and Stage of Establishment. Further, it links these Levels and Stages to Outcomes that can be expected for biodiversity and human well-being, and describes the Enabling Conditions that are prerequisite for durable, effective MPAs. As long as an MPA (or zone within a multi-zone MPA) meets the IUCN definition (2), it will fit into one Stage of Establishment and one Level of Protection at any given point in time. This system complements the IUCN Protected Area Categories that are based, not on the level of protection, but on an area's management objectives and governance types (2). It builds from the IUCN MPA Standards (2). Zones within MPAs must meet all qualifying requirements in the same way as entire MPAs, including the guidance on both Level of Protection and Stage of Establishment.

This document focuses on Level of Protection and outlines how *The MPA Guide* categorizes the degree to which biodiversity and habitats within an MPA or MPA zone are protected from abatable extractive and destructive activities. The Levels of Protection are summarized as follows:

1. Fully Protected: No extractive or destructive activities are allowed; all abatable impacts are minimized.
2. Highly Protected: Only light extractive activities with low total impact are allowed, with all other abatable impacts minimized.
3. Lightly Protected: Some protection of biodiversity exists, but moderate to significant extraction and other impacts are allowed.
4. Minimally Protected: Extensive extraction and other impacts are allowed, but the site still provides some conservation benefits in the area.

Allowed activity types include both those explicitly permitted by regulations and those that are not forbidden by either the MPA or the surrounding regulations. Potential users of *The MPA Guide* include government officials and MPA managers, who may be charged with official reporting of the Level of Protection of an MPA or MPA zone to the World Database on Protected Areas (WDPA). The Guide can also be used by NGOs, academics, policymakers, and others who may be interested in understanding the Level of Protection of specific MPAs, or in tracking regional or global trends in MPAs to better understand collective progress towards global area-based conservation targets.

Guidance from Grorud-Colvert et al. (1) states: Impact is determined via activity type, intensity, scale, duration, and frequency relative to biodiversity conservation goals, and is described as "none", "minimal", "low", "moderate", "high/large", or "incompatible with biodiversity conservation".

Level of Protection is directly related to the impact of different activities occurring inside an MPA or zone. For example, "none" or "minimal" impact activities often align with Fully Protected MPAs. Assigning a Level of Protection requires identifying the impact of each of the activities listed below. These impacts may differ across any given MPA or zone due to different locations, species, and other features or circumstances. For example, an activity that is distributed across a larger area may have a lower impact than if that same activity is concentrated in a smaller area.

Seven main types of activities determine Level of Protection: (1) Mining, mineral, oil and/or gas prospecting or exploitation, (2) Dredging and Dumping, (3) Anchoring, (4) Infrastructure, (5) Aquaculture, (6) Fishing (whether it is subsistence, professional, or recreational fishing; this activity encompasses extraction of wild fish and other marine species and includes gleaning), and (7) Non-extractive activities, including recreational, traditional, and cultural activities. The compatibility of each activity with conservation goals was evaluated through multiple, iterative workshops using peer-reviewed literature, scientific judgment, expert opinion, and IUCN resolutions and protected area guidance. Incompatible activities include industrial extraction such as industrial fishing (e.g., vessels > 12m using towed/dragged gears; see IUCN Resolution 066), oil and gas exploration, mining, and other extremely impactful activities such as fishing with dynamite or poison. The compatibility of activities conducted in an MPA or zone for scientific research purposes is at the discretion of the MPA management authority.

The MPA Guide does not include every possible activity but provides best practices wherever possible. For example, shipping is not explicitly addressed, because the right of innocent passage is mandated under international law and regulated by International Maritime Organization treaties. As a result, it is challenging for an MPA managing authority to restrict shipping movement. Nonetheless, it is recommended that ships with dangerous goods or toxic anti-fouling chemicals do not transit MPAs, and that shipping activity be restricted to shipping lanes to minimize noise pollution and other negative impacts such as collisions with marine life. Guidance is intended to evolve with new knowledge, activities, and technology. Emerging threats due to electromagnetic fields, excessive or persistent noise, high energy active sonar, or other technologies not explicitly addressed in the Guide are subject to the burden of proof. That means management bodies should receive evidence of their expected impacts before allowing their use, and they should monitor to assess and actively manage their actual impacts. Impacts should not exceed those associated with a given Level of Protection.

Some activity types or impact levels are not explicitly stated in MPA rules and regulations, often because they are not within the management jurisdiction of the MPA authority. In these circumstances, knowledge of whether or not a particular activity occurs may be used. Since it is the current activities that influence the degree to which an MPA is protecting biodiversity at a given point in time, the assessment of an MPA's Level of Protection should reflect activities actually occurring in the site at the time of reporting, whether or not they are explicitly stated in the management plans.

In cases where information on the scale or magnitude of an activity is unknown, the Level of Protection should be assigned as accurately as possible by the appropriate managing authority. If this information is not available, a dialogue between the managing authority and MPA experts, such as those at the WDPA, can be initiated to improve the protection and the transparency of the MPA for users and reporters.

This document supplements the Level of Protection information presented in the Decision Tree (Fig. S1) from Grorud-Colvert et al. (2021) and the other Resources available on https://mpa-guide.protectedplanet.net. Here we provide three layers of detail within each of the seven activity types to help users assign a Level of Protection based on the actions occurring in an MPA or zone:

Layer 1: Summary tables. These provide a concise summary of activities allowed in each Level of Protection.

Layer 2: Color-coded tables that link specific activities to their level of impact, from low impact (green) to impact that is Incompatible with the Conservation of Nature (gray). The Layer 1 Summary table refers to these color-coded activities.

Layer 3: Long-form tables and notes with an in-depth description of the criteria and activities associated with each Level of Protection.

This document provides the information needed to allow different types of users to assign a Level of Protection to any given MPA or zone.

Layers 1 & 2: Summary and Color-Coded Impacts Tables of Activities by *Level of Protection*

In Layers 1 and 2, we provide summary information on the seven activities and examples of specific activities that are allowed or disallowed in the different Levels of Protection: Fully, Highly, Lightly, and Minimally, as well as activities that are Incompatible with the Conservation of Nature.

1. Mining, mineral, oil and/or gas prospecting or exploitation

Any mining, mineral, oil and/or gas prospecting or exploitation, or active pipelines with the potential to leak, have impacts that are incompatible with the conservation of nature, as stated in the IUCN MPA Standards (1).

	Fully Protected	Highly Protected	Lightly Protected	Minimally Protected	Incompatible with the Conservation of Nature
Is mining, mineral, oil and/or gas prospecting or exploitation allowed in the MPA or MPA zone?	No.				Yes. All of these are incompatible with the conservation of nature (any GRAY types, *see below*)

Color-coded impacts table: gray = Incompatible with the Conservation of Nature. The table below gives examples of types of mining, mineral, oil and/or gas prospecting or exploitation; none are compatible with the conservation of nature.

Description	Examples
Any mining, mineral, oil and/or gas prospecting or exploitation, or active pipelines with the potential to leak, occur and may have impacts that are Incompatible with the Conservation of Nature	• Prospecting, exploring, or mining for recovery of sand, gravel, or minerals • Oil and/or gas prospecting or exploitation (e.g., oil platforms) • Active pipelines that have the potential to leak, or where leaking is known to occur

2. Dredging and dumping

All dredging and dumping activities should undergo review and approval by the managing authority; any impacts should be compatible with a given Level of Protection. Whether dredging and dumping are compatible with the conservation objectives of the MPA will depend on location, type, scale, and intensity.

	Fully Protected	Highly Protected	Lightly Protected	Minimally Protected	Incompatible with the Conservation of Nature
Are dredging or dumping allowed in the MPA or MPA zone?	No.		Yes. Only if infrequent for selective purposes and if area still provides some biodiversity conservation (may include RED types, *see below*)		Yes. It is Incompatible if the Minimally Protected conditions are not met (any GRAY types, *see below*)

Color-coded impacts table: red = high impact, gray = Incompatible with the Conservation of Nature. The table below gives examples of the types of dredging and dumping activities that are most likely to be compatible with each Level of Protection; it is advisable for the managing authority to make case-by-case decisions given the large variability in scale and impacts.

Description	Examples
Dredging and dumping are infrequent and only for specific, approved purposes	• Includes dredging and dumping of both capital and maintenance dredge spoil • Formally approved navigation (e.g., shipping channels, ports) • Shoreline protection • Coastal erosion prevention • Restoration (connectivity, e.g., to ensure natural access between a wetland and the ocean, or as determined by managing authority)

Dredging and dumping occurs and may have impacts that are Incompatible with the Conservation of Nature	• Sea dumping
	• Deliberate/harmful discharge of noxious substances (solid or liquid)
	• Dumping of any material that will adversely impact, or has the potential to adversely impact, the receiving waters, including any activity or use of a material that:
	  • is direct untreated effluent discharge from land
	  • may cause eutrophication in receiving waters
	  • may introduce marine pests
	  • may introduce genetic material that is dissimilar to that existing at the introduction site
	  • may introduce genetically modified material
	  • may artificially increase endemic species to outbreak levels (e.g., Crown of Thorns; *Drupella* spp.)

3. Anchoring

All anchoring activities should undergo review and approval by the managing authority; any impacts should be compatible with a given Level of Protection. Whether an activity is compatible with the conservation objectives of the MPA will depend on location (including species and habitat type affected), scale, and intensity.

	Fully Protected	Highly Protected	Lightly Protected	Minimally Protected	Incompatible with the Conservation of Nature
Is there any anchoring in the MPA or MPA zone?	None, or if any, only low impact, small-scale, short duration anchoring (only GREEN types, *see below*)		Yes, but only moderate impact, medium-scale, moderate duration (may include YELLOW types, *see below*)	Yes. Anchoring may have a large impact, but area still provides some biodiversity conservation (may include RED types, *see below*)	Yes. Accumulative anchoring has an impact so high it is Incompatible with the Conservation of Nature (any GRAY types, *see below*)

Color-coded impacts table: green = low impact, yellow = moderate impact, red = high impact, gray = Incompatible with the Conservation of Nature. The table below gives examples of the types of anchoring that are most likely to be compatible with each Level of Protection; it is advisable for the managing authority to make case-by-case decisions given the large variability in impacts.

Description	Examples
Low impact, small-scale, and short duration anchoring	• Regulated by MPA or other managing authority • Vessels are only anchored in the same location for a short time, as determined by the managing authority for durations consistent with low impacts and meeting conservation requirements • Best practices are to anchor at an appropriate distance from sensitive habitats (e.g., in sand or gravel, soft bottoms, some kelps, or other ecosystems or habitats that recover quickly) • Best practices use existing moorings
Moderate impact, medium-scale, and moderate duration anchoring	• Regulated by MPA or other managing authority, but may include some unregulated anchoring • Vessels are only anchored in the same location for a short time, as determined by the managing authority for durations consistent with moderate impacts and meeting conservation requirements • Anchoring may be occurring in or too close to sensitive habitats, e.g., coral or rocky reefs, seagrass beds, some kelps (e.g., those with slow recovery times), or in sand patches within these habitats
Large impact, scale and duration	• As above (yellow), but has large impact, e.g., through anchoring for longer duration or causing large impact to habitats
Accumulative anchoring activities occur that may have impacts that are Incompatible with the Conservation of Nature	• Unregulated anchoring which has impacts that are incompatible with biodiversity conservation • Areas where large ships repeatedly anchor • Repetitive or large-scale anchoring in habitats causing long-term damage

4. Infrastructure

The impact of a given infrastructure, and its potential compatibility with MPA goals, scales with its size, permanence, frequency and intensity of use, and type of materials involved. The guidelines below give examples of the types of infrastructure (whether planned or pre-existing) that are most likely to be compatible with each Level of Protection. All infrastructure should undergo review and approval by the managing authority; any impacts should be compatible with a given Level of Protection. There are no official standards governing allowed infrastructure within different types of MPAs, but these guidelines are largely informed by guidance on infrastructure given by the Great Barrier Reef Marine Park Authority [e.g., for artificial reefs (4) and moorings (5)].

	Fully Protected	Highly Protected	Lightly Protected	Minimally Protected	Incompatible with the Conservation of Nature
Is there any existing or proposed infrastructure in the MPA or MPA zone?	None, or if any, only minimal impact, small-scale, and for conservation, fixed moorings, scientific or navigational purposes (only GREEN types, *see below*)	Yes, but low impact, small-scale infrastructure (only GREEN or YELLOW types, *see below*)	Yes, but moderate impact, medium-scale infrastructure (only GREEN or YELLOW types, *see below*)	Yes. Infrastructure may have large impact, but area still provides some biodiversity conservation (may include RED types, *see below*)	Yes. Large scale, long-term infrastructure occurs that may have impacts that are Incompatible with the Conservation of Nature (any GRAY types, *see below*)

Color-coded impacts table: green = minimal impact, yellow = low to moderate impact, red = high impact, gray = Incompatible with the Conservation of Nature. The table below gives examples of the types of infrastructure that are most likely to be compatible with each Level of Protection; it is advisable for the managing authority to make case-by-case decisions given the large variability in impacts.

Description	Examples
Small scale infrastructure with minimal impact for conservation, scientific, navigational, or sustainable tourism purposes	• Fixed moorings • Artificial reefs made from material that does not adversely affect surrounding area and only for conservation purposes (i.e., harvest is not allowed) • Agency-approved channel markers • Navigation lights • Restoration works using aquaculture techniques, but not for the purpose of harvesting seafood* • Facilities associated with limited, regulated and monitored non-extractive recreational and cultural use, e.g., for sustainable tourism*
Small- to medium-scale infrastructure with an impact that is low to moderate	• Low to moderate impact facilities associated with aquaculture* or non-extractive use, e.g., for sustainable tourism* • Renewable energy structures with low to moderate impact • Artificial reefs made from material that does not adversely affect surrounding area. May allow seafood harvest
Infrastructure with a large impact, but biodiversity conservation goals are not compromised	• Large impact facilities associated with aquaculture* • Large impact facilities associated with tourism* • Renewable energy structures with large impact • Artificial reefs considered to have a large impact, but not leaching or releasing pollutants into surrounding waters • Ports, harbors, or marinas with large impact
Large-scale, long-term infrastructure that may have impacts that are Incompatible with the Conservation of Nature	• Large-scale ports or areas where large ships repeatedly anchor • Planned or pre-existing artificial reefs or other infrastructure that may leach pollutants into surrounding waters • Facilities for aquaculture that are Incompatible with the Conservation of Nature* • The use of toxic antifouling on structures

* Infrastructure associated with aquaculture and non-extractive recreational or cultural activities should be approved by the managing authority and should meet conservation requirements. See Sections in this document on "Aquaculture" and "Non-extractive activities".

5. Aquaculture

Aquaculture types and their potential compatibility with MPA goals are based on preliminary work by IUCN (6, 7). There are no official standards for acceptable aquaculture practices within different types of MPAs. All activities should undergo review and approval by the managing authority; any impacts should be compatible with a given Level of Protection. Regardless of the Level of Protection, whether a particular aquaculture operation is compatible with the conservation objectives of the MPA will depend on the type of aquaculture, the scale of the operation, the intensity of cultivation (stocking density, frequency of harvest cycles), and whether the operation is appropriately sited (6, 7), making it difficult to develop generic guidelines.

There are two main categories of marine aquaculture: unfed aquaculture (e.g., seaweed, bivalves like mussels and oysters), and fed aquaculture (e.g., finfish like Atlantic salmon). In general, unfed

aquaculture will have lower environmental impacts. The table below suggests the types of aquaculture most likely to be compatible with each Level of Protection, although it is advisable to make case-by-case decisions given the large variability in the environmental effects of aquaculture.

	Fully Protected	**Highly Protected**	**Lightly Protected**	**Minimally Protected**	**Incompatible with the Conservation of Nature**
Is aquaculture allowed in the MPA or MPA zone?	No. Restoration works using aquaculture techniques may be allowed, but not for the purpose of harvesting seafood	Yes, but only low density, small-scale unfed aqua-culture, with low impact (only GREEN types, *see below*)	Yes. Unfed aquaculture that is semi-intensive to intensive, OR low density, small-scale fed culture, with moderate impact (only GREEN or YELLOW types, *see below*)	Yes. Fed aquaculture that is semi-intensive with large impact, but area still provides some biodiversity conservation (may include RED types, see below)	Yes. Aquaculture is allowed with an impact that is so high that it is Incompatible with the Conservation of Nature (any GRAY types, *see below*)

Color-coded impacts table: green = low impact, yellow = moderate impact, red = high impact, gray = Incompatible with the Conservation of Nature. The table below gives examples of the types of aquaculture activities that are most likely to be compatible with each Level of Protection; it is advisable for the managing authority to make case-by-case decisions given the large variability in impacts.

Description	Examples
Unfed (or integrated mul-ti-trophic) aquaculture that is small-scale and low density (i.e., low total impact)	• Algae • Bivalves (e.g., mussels, clams, oysters) • Sea cucumbers • Herbivorous fish • Integrated multi-trophic aquaculture (IMTA) • Restoration aquaculture that includes harvest (e.g., Indigenous clam gardens) • Appropriate distance from sensitive habitats (e.g., coral reefs, seagrass beds, kelp forests)
Unfed (or integrated multi-trophic) aquaculture that is commercial scale and semi-intensive to intensive; or fed aquaculture that is small-scale and low density (i.e., moderate total impact)	• Medium or high density (i.e., semi-intensive to intensive; up to commercial scale) unfed aquaculture (e.g., algae, bivalves, sea cucumbers), or integrated multi-trophic aquaculture (IMTA) • Low density, small-scale/traditional use, fed culture (e.g., fish, shrimp) • Appropriate distance from sensitive habitats (e.g., coral reefs, seagrass beds, kelp forests)
Fed aquaculture that is commercial scale and semi-intensive	• Medium density fish cages or shrimp farms (i.e., semi-intensive; commercial scale) • May be located in or close to sensitive habitats
Fed aquaculture that is commercial scale and intensive and/or industrial-scale aquaculture that may have impacts that are Incompatible with the Conservation of Nature	• Practices that convert/destroy habitats, cause hypoxia, use harmful chemicals, or significantly degrade water quality, e.g., o High density fish cages (i.e., intensive) o Shrimp farms that deforest mangrove habitat o Introduction of feed supplements which have the potential to introduce disease

6. Fishing (extraction of wild fish and other marine species, including gleaning)

The ability of an MPA to meet its conservation objectives will depend on the impact of fishing activities, which is determined by the intensity and frequency of fishing by each gear type (e.g., number of fishers or amount of gear deployed). All activities should undergo review and approval by the managing authority; any impacts should be compatible with a given Level of Protection.

The framework used here to assess the compatibility of different types of fishing with each MPA Level of Protection builds from the Regulation Based Classification System (RBCS), a recently published categorization system that synthesizes new and existing data to assess gear types and their potential impacts (8). The RBCS system scores different types of fishing gear for their impact on biodiversity – and hence the ability of an MPA to meet conservation objectives – by using three criteria: species selectivity, size selectivity, and bottom impact. Using this system and expert input, we assigned gears into four categories of impact (see color-coded gear table below) and also accounted for the number of gears used in an MPA, with the assumption that more gear types is likely to lead to more total fishing pressure and disturbance to the ecosystem (8). As agreed by the IUCN (WCC-2016-Rec-102-EN), industrial fishing is incompatible with an MPA.

The impact of fishing will also depend on management regulations such as: size limits, mesh size regulations, and temporal closures; where gears are deployed (e.g., bottom gears may be less destructive over soft bottom habitat); and interactions with non-target species (e.g., bycatch). Such information is often not readily available. **Given available data, consider the types of gears used, the number of different types of gears, and whether permits and catches are limited by management authorities as metrics of fishing impact**. Since it is the current activities that influence the degree to which an MPA is protecting biodiversity at a given point in time, the assessment of fishing impact should reflect fishing that is actually occurring in the site at the time of reporting, whether or not it is explicitly stated in the management plans.

Any fishing that may be conducted for scientific research purposes in an MPA or zone is subject to the review and approval of the MPA management authority based on its impact. Any research fishing should align with IUCN Resolution 066 on Industrial Fishing, which allows for scientific research to be carried out in MPAs if it is: *"low-impact scientific research activities and ecological monitoring related to and consistent with the values and restrictions of the protected area can be carried out, particularly when collection cannot be conducted elsewhere"*. Best practices include to (1) establish clear hypotheses and research plans at the outset and revise as needed, and (2) report the data and research findings each year, including to the MPA managing authority, with renewal of permission contingent upon evidence of progress towards research objectives. An example of research fishing that is compatible with a Highly Protected MPA is the Ross Sea MPA in Antarctica (9).

In all Levels of Protection, except for Fully Protected, sustainable extractive activities by Indigenous Peoples may occur to enable traditional, spiritual and cultural practices. Many areas within MPAs hold significant spiritual or cultural importance and, thus, should be adequately preserved in recognition of those values. Extraction of marine resources for this purpose by Indigenous Peoples can have variable impacts on density and diversity of marine communities – indeed, in some cases, there may be positive impacts on biodiversity conservation. However, as stated above, the primary objective of the MPA must be nature conservation. In other words, in cases where maintaining spiritual or cultural activities geared towards sustainable use is the primary goal, please see guidance for Other Effective Area-Based Conservation Measures (OECMs).

	Fully Protected	Highly Protected	Lightly Protected	Minimally Protected	Incompatible with the Conservation of Nature
Is fishing allowed in the MPA or MPA zone? (extraction of wild fish and other marine species, including gleaning, for commercial, recreational, subsistence, or spiritual, traditional or cultural reasons)	No.	Yes. There is infrequent use of only a few selective and low impact gear types (5 or fewer, only GREEN types, see below)	Yes. There is a moderate number of fishing gear types allowed with moderate total impact (10 or fewer gear types, only GREEN or YELLOW types, s*see below*)	Yes. There is a large number of gear types allowed and/or gears with large impact, but area still provides some biodiversity conservation (more than 10 gear types, may include non-industrial RED types, *see below*)	Yes. There is a large number of gear types allowed, including any industrial gears, with impact that is so high it is Incompatible with the Conservation of Nature (includes any GRAY gear types, *see below*)

Fishing is prohibited in Fully Protected MPAs (except for scientific monitoring purposes – *see above*). The same fishing gear type may count multiple times (up to three) if used (1) commercially, (2) recreationally, (3) for cultural reasons, or (4) is illegal, unregulated, or unreported (IUU). For example, if the same fishing gear is used commercially, recreationally, and for cultural reasons, it would count as three gears.

Color-coded gear impacts table: green = low impact, yellow = moderate impact, red = high impact, gray = Incompatible with the Conservation of Nature. The table below gives examples of the types of fishing activities that are most likely to be compatible with each Level of Protection; it is advisable for the managing authority to make case-by-case decisions given the large variability in impacts.

Description	Gear type examples
Small-scale, selective gear with low impact	• Cast nets • Hand captures/gleaning • Single lines (hooks, pole and line, rod, troll) • Spearfishing (free diving only) • Traps (lobster/octopus/crab) • Fish traps (if similar to octopus traps, used over a soft bottom habitat) • Hand dredges (bivalves) • Low impact traditional extraction
Gear with a moderate impact	• Drift nets (small-scale) • Fixed fish traps (e.g., "madragues") • Fish traps (as used in coral reefs) • Gillnets • Longlines (bottom; small-scale) • Longlines (pelagic; small-scale) • Spearfishing (scuba diving) • Surrounding nets near shore (e.g., fixed nets) • Trammel nets • Beach seines • Purse seining (pelagic; small-scale for small species, minimal bycatch)

Description	Gear type examples
Gear with a large impact (e.g., towed gears from non-industrial vessels; <12m in length)	• Dredges (bivalves) • Drift nets (medium- to large-scale) • Electric fishing • Longlines (bottom; medium-scale) • Longlines (pelagic; medium-scale) • Purse seining (bottom; medium-scale) • Purse seining (pelagic; medium-scale) • Trawl (bottom, small-scale & non-industrial) • Trawl (pelagic, small-scale & non-industrial) • Fish aggregating devices (FADs; non-industrial) • Fish fences
Gear with an impact so high it is Incompatible with the Conservation of Nature	• Industrial fisheries (*see above*; operated by motorized vessels larger than 12m length using trawling gears that are towed/dragged across the seafloor or through the water column, as well as using purse seines and large longlines) • Dynamite/explosive fishing • Poison fishing • Industrial anchored and drifting FADs

7. Non-Extractive Activities

Non-extractive activities (i.e., recreational, traditional, spiritual or cultural activities) can have an impact on the density and diversity of marine communities (10). Impacts include trampling sensitive habitats, boat anchoring damage, and damage caused by snorkeling, SCUBA diving, and other nature viewing activities. Importantly, the impact of the non-extractive activities will depend on not only the type of activity, but also the intensity and frequency of use. Recreational use should always be formally approved by the managing authority, and appropriate measures should be in place to minimize impacts; any impacts should be compatible with a given Level of Protection. Non-extractive use by Indigenous Peoples to preserve traditional, spiritual and cultural practices and values is guided by Indigenous leadership. Measures should be in place to minimize impacts. As stated in Section 6: Fishing, this use should be adequately preserved in recognition of those values. In cases where maintaining spiritual or cultural activities is the primary goal of the area, please see guidance for Other Effective Area-Based Conservation Measures (OECMs).

Because of the lower degree of overall impact of non-extractive activities relative to other activities included in *The MPA Guide*, here we do not use non-extractive activities to distinguish between Lightly and Minimally Protected areas or those that are Incompatible with the Conservation of Nature. Similarly, we do not use non-extractive activities to distinguish Fully and Highly Protected areas.

	Fully Protected	Highly Protected	Lightly Protected	Minimally Protected	Incompatible with the Conservation of Nature
Are there non-extractive uses in the MPA or MPA zone? (i.e., recreational, traditional, cultural, or spiritual)	None, or if any, only minimal to low impact, low density, and/or small-scale (only GREEN types, see below)		Yes. Uses are moderate impact, and moderate to high density and/or scale, but area still provides some biodiversity conservation		

Color-coded impacts table: green = low impact. The table below gives examples of the types of non-extractive activities that are most likely to be compatible with each Level of Protection; it is advisable for the managing authority to make case-by-case decisions given the large variability in impacts.

Description	Examples
None, or if any, only minimal to low impact, low density, and/or small-scale	• Snorkeling • Swimming • SCUBA diving • Tide pooling • Motorized or non-motorized vessels for non-extractive purposes (e.g., snorkeling, SCUBA, wildlife viewing) • Cultural/ceremonial gatherings • Cultural education • Teaching/knowledge transmission • Other uses with minimal to low impact
Yes. Non-extractive recreational, traditional, spiritual, and cultural uses that are moderate impact, moderate to high density and/or scale, but area still provides some biodiversity conservation	• All non-extractive uses that have moderate to high impact, density, and/or scale

Layer 3: Supplemental Information and Notes for Use

In Layer 3, we provide additional notes on the seven activities, along with best practices for the types of activities allowed or disallowed in the different Levels of Protection: Fully, Highly, Lightly, and Minimally, as well as activities that are Incompatible with the Conservation of Nature.

1. Mining, mineral, oil and/or gas prospecting or exploitation

Notes:

- If prospecting, exploring, or mining for the recovery of sand, gravel, or minerals occurs in the MPA or zone, the area is considered Incompatible with the Conservation of Nature.
- If inactive pre-existing infrastructure associated with prospecting, exploring, or mining occurs in an MPA or zone, impacts should be appropriate to a given Level of Protection as outlined in the Infrastructure guidance (Infrastructure: Activity 4). If leaking is known to or has the potential to occur, the area is considered Incompatible with the Conservation of Nature.
- If active pipelines occur within the MPA or zone, the probability of leaking is considered real, and the MPA is considered Incompatible with the Conservation of Nature.
- Best practices include limits on sonar related to oil and gas prospecting to protect marine life, e.g., cetaceans.

2. Dredging and Dumping

Notes:

- Ballast water should not be released in an MPA as it may introduce marine pests or genetic material dissimilar to that existing at the introduction site.
- In many cases, land disposal of dredged materials is preferred to disposal in the sea.
- Consider that maintenance dredge spoil is composed of fine material, may be contaminated, and may be easily re-suspended and transported great distances by currents and tides, where it can smother reefs, seagrasses, or other marine habitats.
- Best practices are that the proposed dredging, the dump site, and the intended spoil have undergone review and approval by the managing authority prior to commencement of works.
- Best practices are for small, recreational boats to not empty/treat bilge water in the MPA.
- Point source pollution not directly located in the MPA (e.g., on land near a coastal MPA) is not evaluated by *The MPA Guide* because it is not abatable by the MPA, but impacts should be minimized to the extent possible.

3. Anchoring

Notes:

- Consider that mooring is preferred to anchoring, as anchoring can have severe impacts on bottom habitats. Best practice is to avoid anchoring in Fully Protected MPAs or zones. If anchoring occurs, it is well-regulated and permitted, including being confined to specific zones, and avoids sensitive habitats.
- Best practices for anchoring are to avoid anchoring in or near a sensitive habitat, e.g., coral or rocky reefs, seagrass beds, some kelp forests (e.g., those with slow recovery times), or sand patches within these habitats. Consider anchor drag and swing and anchor in an area that will minimize potential harm to habitats.

4. Infrastructure

Notes:

- A facility is defined as "a building, a structure, a vessel, goods, equipment or services" (11).
- For infrastructure purposes, "location" is defined as the same broad anchorage location, e.g., in the same bay or reef.
- Proposed or approved future structures should follow review and approval by the managing authority (e.g., an environmental impact assessment or council approval based on collected data and traditional knowledge) to ensure the MPA still provides biodiversity conservation that is compatible with a given Level of Protection, otherwise it should go to the following Level of Protection.
- Pre-existing structures are automatically compatible with a given Level of Protection if they do not leach or release pollutants to surrounding waters. If leaching or pollution occurs as a result of the pre-existing structure, the area is considered Incompatible with the Conservation of Nature.
- Most privately installed moorings may not have been approved and may not meet appropriate environmental or safety standards; these should be assessed to ensure they are acceptable for conservation before any approval, and then routinely monitored.
- Infrastructure by Indigenous Peoples for preserving traditional, cultural or spiritual values or practices is guided by Indigenous leadership. Measures should be in place to minimize impacts.
- Infrastructure associated with aquaculture should be formally approved by the managing authority and should meet conservation requirements. See "Aquaculture: Activity 5". Infrastructure associated with non-extractive recreational or cultural activities, such as tourism, should be approved by the managing authority and should meet conservation requirements. See "Non-extractive activities: Activity 7".
- Effects of infrastructure due to renewable energy such as wind towers or wave turbines are an emerging area of research. Best practices will be updated accordingly. Infrastructure should undergo review and approval by the managing authority (e.g., an environmental impact assessment or council approval based on collected data and traditional knowledge).
- Additional potential infrastructure facilities (e.g., communication cables), including those for research, should also undergo review and approval, as above.

Level of Protection	Potentially Compatible Activities	Example Best Practices
Fully Protected	Impacts of infrastructure are minimal, based on scale and magnitude. Infrastructure is small-scale. • **MPA park management facilities** • **Facilities for conservation or scientific purposes** • **Navigation aids** • **Fixed moorings for small vessels**, provided they meet the qualifying requirements in the Example Best Practices column. • **Artificial reefs** with material that does not adversely affect surrounding area. The objective must be to restore degraded reef for conservation purposes, not allowing any kind of fisheries. • **Restoration works that use aquaculture techniques** • **Facilities for cultural use or recreational use** (e.g., sustainable tourism)	• May include facilities that enhance the protection and conservation of an MPA, e.g., official or agency moorings; MPA signage, such as agency-approved channel markers; navigation lights. • Vessels are only moored in the same location for a short time, as determined by the managing authority for durations consistent with minimal impacts and meeting conservation requirements. • Facilities undergo review and approval by the managing authority (e.g., an environmental impact assessment or council approval based on collected data and traditional knowledge) that demonstrates any impacts are minimal and will be minimized based on scale and magnitude, and that they are not leaching or releasing pollutants into surrounding waters. • There are appropriate measures in place to minimize impacts.

Level of Protection	Potentially Compatible Activities	Example Best Practices
Highly Protected	All **potentially compatible activities** that are allowed in Fully Protected MPAs or zones *(see above)*	
	Impacts of infrastructure are low, based on scale and magnitude. Infrastructure is small-scale. • Facilities associated with low impact, small-scale renewable energy, sustainable tourism, aquaculture, cultural use, or other uses. • **Artificial reefs** made from material that does not adversely affect surrounding area, but that may allow fishing.	• Facilities undergo review and approval by the managing authority (e.g., an environmental impact assessment or council approval based on collected data and traditional knowledge) that demonstrates any impacts are low, based on scale and magnitude, and that facilities are not leaching or releasing pollutants into surrounding waters. • There are appropriate measures in place to ensure impacts are low at most.
Lightly Protected	All **potentially compatible activities** that are allowed in Fully Protected and Highly Protected MPAs or zones *(see above)*	
	Impacts of infrastructure are moderate at most, based on scale and magnitude. Infrastructure is medium scale. • Facilities associated with moderate impact, medium-scale renewable energy, aquaculture, tourism, cultural use, or other uses. • **Artificial reefs** made from material that does not adversely affect surrounding area, but that may allow fishing.	• Fisheries occurring around artificial reefs within Lightly Protected MPAs or zones should be monitored and regulated accordingly to avoid overexploitation and targeting of fish aggregations (to classify the Level of Protection according to allowed fisheries, see "Fishing: Activity 6"). • Facilities undergo review and approval by the managing authority (e.g., an environmental impact assessment or council approval based on collected data and traditional knowledge) that demonstrates only a moderate impact based on scale and magnitude, and that facilities are not leaching or releasing pollutants to surrounding waters. • There are appropriate measures in place to ensure impacts are moderate at most.
Minimally Protected	All **potentially compatible activities** that are allowed in Fully Protected, Highly Protected or Lightly Protected MPAs or zones *(see above)*	
	Impacts of infrastructure may be large, based on scale and magnitude. • Facilities associated with high impact renewable energy, aquaculture, tourism, cultural use, or other uses. • **Artificial reefs** considered to have large impact, but with material that does not adversely affect surrounding area. May allow fishing. • Any high-impacting marine facility associated with small ports, harbors, marinas, or tourism.	• Facilities undergo review and approval by the managing authority (e.g., an environmental impact assessment or council approval based on collected data and traditional knowledge) that demonstrates that, despite large impact, regulations in place still provide some biodiversity conservation, and that facilities are not leaching or releasing pollutants into surrounding waters. • There are appropriate measures in place to ensure impacts are large at most, and not Incompatible with the Conservation of Nature.
Incompatible with the Conservation of Nature	• **Pre-existing or planned (future) artificial reefs or other infrastructure constructed of materials that adversely affect surrounding area** (e.g., car bodies, tires, wrecks), especially those materials that in time will rust, erode, or otherwise deteriorate and leach pollutants. • **Any facility or vessel for which the level of impact** is so high that it is Incompatible with the Conservation of Nature (e.g., medium/large-scale ports or areas where large ships repeatedly anchor, facilities for aquaculture that is Incompatible with the Conservation of Nature (see Activity 5), use of toxic antifouling on structures).	

5. Aquaculture

Notes:

- Restoration of biogenic habitats (e.g., oyster reefs, coral reefs) by cultivating an aquatic species through off-site rearing and/or transplantation of wild stock is allowed.
- Associated infrastructure should be formally approved by the managing authority and should meet conservation requirements and minimize impacts (See "Infrastructure: Activity 4").
- Aquaculture by Indigenous Peoples for preserving traditional, cultural or spiritual values and practices is guided by Indigenous leadership. Measures should be in place to minimize impacts.
- Point source pollution associated with aquaculture not directly located in the MPA (e.g., from aquaculture facilities near a coastal MPA) is not evaluated by *The MPA Guide* because it is not abatable by the MPA, but impacts should be minimized to the extent possible.

Level of Protection	Potentially Compatible Activities	Example Best Practices
Fully Protected	Only for the purpose of active restoration and not for harvesting seafood; impacts are minimal, based on scale and magnitude. • Restoration works (also referred to as conservation aquaculture; not for commercial purposes or subsistence food) are defined as "the use of human cultivation of an aquatic organism for the planned management and protection of a natural resource" (12). • Release of individuals from hatcheries for stock enhancement of an endangered or threatened local population, as long as the hatchery genetic stock matches that of the wild population and there are appropriate safeguards against pathogen spread. • Restoration of biogenic habitats (e.g., oyster reefs, coral reefs) by cultivating an aquatic species through off-site rearing and/or transplantation of wild stock.	• All aquaculture for restoration undergoes review and approval by the managing authority (e.g., an environmental impact assessment or council approval based on collected data and traditional knowledge) that demonstrates any restoration actions are in line with biodiversity conservation goals. • There are appropriate measures in place to minimize impacts.

Level of Protection	Potentially Compatible Activities	Example Best Practices
Highly Protected	All **potentially compatible activities** that are allowed in Fully Protected MPAs or zones *(see above)*	
	Impacts of aquaculture are low at most. • Types of aquaculture allowed are restricted	• Aquaculture of native species • Does not degrade water quality • Does not use harmful chemicals • Does not destroy natural habitats • Does not cause hypoxic conditions • Over soft bottom • Low density, small-scale/traditional use unfed aquaculture (e.g., algae, bivalve, sea cucumber), restoration aquaculture that includes harvest (e.g., Indigenous clam gardens), or integrated multi-trophic aquaculture (IMTA) are most likely to be able to meet the conservation objectives of a Highly Protected MPA. • Aquaculture operation undergoes review and approval by the managing authority prior to installation (e.g., an environmental impact assessment or council approval based on collected data and traditional knowledge) that demonstrates any impacts associated with farm and associated infrastructure will be minimized, based on scale and magnitude, and that the MPA still provides biodiversity conservation. • There are appropriate measures in place to ensure impacts are low at most.
Lightly Protected	All **potentially compatible activities** that are allowed in Fully Protected and Highly Protected MPAs or zones *(see above)*	

	Impacts of aquaculture are moderate at most.
	• Types of aquaculture allowed are restricted
		• Aquaculture of native species
		• Does not degrade water quality
		• Does not use harmful chemicals
		• Does not destroy natural habitats
		• Does not cause hypoxic conditions
		• Over soft bottom
		• The following aquaculture types may be able to meet the conservation objectives of a Lightly Protected MPA:
		  • Medium or high density (i.e., semi-intensive to intensive; commercial scale) unfed aquaculture (e.g., algae, bivalve, sea cucumber)
		  • integrated multi-trophic aquaculture (IMTA)
		  • low density, small-scale/traditional use, fed culture (e.g., fish, shrimp)
		• Aquaculture operation undergoes review and approval by managing authority prior to installation (e.g., an environmental impact assessment or council approval based on collected data and traditional knowledge) that demonstrates only a moderate impact, based on scale and magnitude, and that the MPA still provides biodiversity conservation.
		• There are appropriate measures in place to ensure impacts are moderate at most.

Level of Protection	Potentially Compatible Activities	Example Best Practices
Minimally Protected	All **potentially compatible activit**ies that are allowed in Fully Protected, Highly Protected or Lightly Protected MPAs or zones *(see above)*	
	Impacts of aquaculture may be large based on scale and magnitude. • Types of aquaculture allowed are restricted	• Aquaculture of native species • Does not degrade water quality • Does not use harmful chemicals • Does not destroy natural habitats • Does not cause hypoxic conditions • Over soft bottom • More permanent infrastructures may be present. • Medium density fish cages (i.e., semi-intensive; commercial scale) may be able to meet some conservation objectives of a Minimally Protected MPA. • All aquaculture operations should be reviewed and approved by the managing authority (e.g., an environmental impact assessment or council approval based on collected data and traditional knowledge) and demonstrate that, despite large impact, regulations in place still provide some biodiversity conservation. • There are appropriate measures in place to ensure impacts are large at most, and not Incompatible with the Conservation of Nature.
Incompatible with the Conservation of Nature	• **High intensity aquaculture** (i.e., high density fish cages) • **Any aquaculture for which the level of impact** is so high that it is Incompatible with the Conservation of Nature (e.g., the introduction of feed supplements for aquaculture, which have the potential to introduce disease).	

6. Fishing (extraction of wild fish and other marine species, including gleaning)

Notes:

- By definition, the primary objective of any MPA, including those that allow fishing, is the conservation of biodiversity (2).
- Fishing should be regulated by specific management measures (e.g., maximum number of vessels or gears allowed, limits on mesh size, quotas, spatio-temporal closures, etc.), ideally based on the evaluation of target species, main bycatch species, and others. See *The MPA Guide* Stages of Establishment: Implemented and Actively Managed.
- IUCN (WCC-2016-Rec-102-EN) states that industrial fishing is incompatible with an MPA.
- The "same" fishing gear may count up to three times if used commercially, recreationally, and for cultural reasons (i.e., as three different gear types).
- Fishing should be formally approved by the managing authority and should meet conservation requirements.
- Fishing for endangered or protected species (including through unintended bycatch) is not allowed in any MPA and is considered Incompatible with the Conservation of Nature.
- Fishing for invasive species may occur at any Level of Protection, if it is formally approved by the managing authority and meets conservation requirements.
- All fishing vessels should utilize automatic location communicators (e.g., AIS/VMS) at all times to enable surveillance.
- Fishing vessels that are unlicensed and conducting innocent passage through an MPA should follow these best practices: (1) fishing gear should be stowed and not readily accessible for use; (2) vessel should transmit at all times via AIS, VMS, or other appropriate position-fixing and identification equipment to enable surveillance; (3) no loitering within an MPA.
- In all Levels of Protection, except for Fully Protected, sustainable extractive activities by Indigenous Peoples may occur to enable traditional, spiritual, and cultural practices. Many areas within MPAs hold significant spiritual or cultural importance and, thus, should be adequately preserved in recognition of those values.
- Any fishing that may be conducted for scientific research purposes in an MPA or zone is subject to the review and approval of the MPA management authority based on its impact. Best practices include to (1) establish clear hypotheses and research plans at the outset and revise as needed, and (2) report the data and research findings each year, including to the MPA managing authority, with renewal of permission contingent upon evidence of progress towards research objectives.
- Fishing by Indigenous Peoples for preserving traditional, cultural or spiritual values and practices is guided by Indigenous leadership. Measures should be in place to minimize impacts.

Level of Protection	Potentially Compatible Activities	Example Best Practices
Fully Protected	• None	• Fishing gears are not allowed in a Fully Protected MPA or MPA zone
Highly Protected	Impacts of fishing activities are low at most. • A maximum of 5 fishing gear types allowed • Only GREEN fishing gears (if 5 or fewer different types of fishing gears are allowed but some are YELLOW or RED, go to Lightly or Minimally Protected, respectively)	• Infrequent use of small-scale, highly selective gear with low impact (e.g., single lines, octopus traps) – only GREEN gear types. • See specific GREEN gears listed above (Level 2 information). • These gears may be used commercially, recreationally, or culturally, but each use counts as one gear type. These fishing types are usually distinguished in management plans. • Permits and catches are both limited as deemed appropriate by managing authority. • There are appropriate measures in place to ensure impacts are low at most.

Level of Protection	Potentially Compatible Activities	Example Best Practices
Lightly Protected	Impacts of fishing activities are moderate at most. • Maximum of 10 different fishing gear types, commercial, recreational, or cultural uses • Only GREEN and YELLOW fishing gears (if any RED gears are allowed, go to Minimally Protected)	• Small-scale, moderate impact gear (e.g., nets, longlines) – any YELLOW gear types. • See specific YELLOW gears above (Level 2 information). • Up to 10 gear types, either GREEN or YELLOW. • These gears may be used commercially, recreationally, or culturally, but each use counts as one gear type. • Permits and catches are both limited as deemed appropriate by managing authority. • There are appropriate measures in place to ensure impacts are moderate at most.
Minimally Protected	Impacts of fishing activities may be large, based on scale and magnitude. • > 10 fishing gears allowed • GREEN, YELLOW and RED fishing gears	• Medium- to large-scale use of non-industrial gears with high impact (e.g., towed gears such as trawls and dredges) – i.e., any RED gear types. • See specific RED gears above (Level 2 information). • More than 10 gear types, GREEN or YELLOW or RED. • These gears may be used commercially, recreationally, or culturally, but each use counts as one gear type. • Bottom gears should be reviewed and approved by the managing authority (e.g., an environmental impact assessment or council approval based on collected data and traditional knowledge) and demonstrate that, despite large impact, the MPA still provides biodiversity conservation. • There are appropriate measures in place to ensure impacts are large at most, and not Incompatible with the Conservation of Nature
Incompatible with the Conservation of Nature	• **Any fishing, including illegal fishing, for which the level of impact** is so high that it is Incompatible with the Conservation of Nature. • **Industrial fishing** (from vessels >12m in length using towed/dragged gears, *see above*) is not permitted within an MPA. Neither is the use of a combination of gear types with such a high impact that it is Incompatible with the Conservation of Nature. For example: Industrial vessels using trawling gears that are dragged or towed across the seafloor or through the water column, as well as industrial fishing using purse seines and large longlines; dynamite explosive fishing; poison fishing; industrial-scale anchored and drifting fish aggregating devices.	

7. Non-Extractive Activities

Notes:

- Best practices for implementation: Recreational use should always be formally approved by the managing authority, and appropriate measures should be in place to minimize impacts. Use by Indigenous Peoples for preserving traditional, cultural or spiritual values and practices is guided by Indigenous leadership. Measures should be in place to minimize impacts.
- See "Anchoring: Activity 3" for information on anchoring restrictions by Level of Protection.

Level of Protection	Potentially Compatible Activities	Example Best Practices
Fully and Highly Protected	Unregulated or regulated use that is minimal to low impact, density and/or scale.	• Non-destructive, spatially limited, permitted, regulated, or otherwise limited (e.g., temporally). • May include no-access area (conservation zones). • Include visitor education/information, and money raised (e.g., recreation fees) contributes to conservation. • Recreational activities undergo review and approval by managing authority (e.g., an environmental impact assessment or council approval based on collected data and traditional knowledge) that demonstrates any impacts will be minimized based on scale and magnitude. • There are appropriate measures in place to ensure impacts are low at most.
Lightly Protected	All **potentially compatible activities** that are allowed in Fully and Highly Protected MPAs or zones *(see above)*	
	• Unregulated or regulated use that is moderate impact, moderate to high density and/or scale.	• All non-extractive uses that are unregulated, with moderate impact and moderate to high density and/or scale.

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Appendix F: Expanded Guidance for OUTCOMES

Version 1 (September, 2021)
Also Table S1 in Supplementary Materials for Grorud-Colvert et al. 2021, "The MPA Guide: A Framework to Achieve Global Goals for the Ocean", *Science.*

Expanded Ecological Outcomes of MPAs according to Level of Protection.
The Outcomes assume that best practices in Enabling Conditions (CONDITIONS) have been met, key threats are abatable by the MPA, and the system has had time to progress from a degraded state to one with relatively few fluctuations. While some ecological benefits occur quickly following protection (e.g., 1), it can take time for many benefits to accrue. Levels of confidence in the Outcome represent expert judgements based on available research (see References). Supporting references for each Outcome are not exhaustive but are representative of this evidence.

OUTCOME	**LEVEL OF PROTECTION**				**Confidence in effect/Supporting references**
	Fully	**Highly**	**Lightly**	**Minimally**	
Biodiversity conservation					
Many attributes of individual organisms, their populations, and their communities contribute to the overall persistence and resilience of species and ecosystems, and the benefits they provide to people. The cells to the right of each Outcome describe the extent to which different Levels of Protection are likely to protect or restore that attribute.					
Abundance: maintained at or increases towards pre-exploitation levels • In general, protection results in increases in abundance of organisms within the MPA. • What increases, by how much, and when depends on the Level of Protection and degree of previous exploitation or impact. • Previously exploited species generally increase more rapidly than other species. • The prey of these previously exploited species will likely decrease in abundance as their predators recover, indicating that the ecosystem is recovering.	Abundances are maintained in unimpacted sites, or they increase towards unexploited / unimpacted levels, including many species highly vulnerable to depletion.	Abundances increase, including some species highly vulnerable to depletion, but for those still targeted to lower levels than with full protection.	Species that are given specific protections may increase in abundance. Vulnerable species may be present at low population levels.	Minimal change or continued decline of overexploited or impacted species.	High confidence Côté et al. 2001 (1); Lester and Halpern 2008 (2); Claudet et al. 2008 (3); Lester et al. 2009 (4); Giakoumi et al. 2017 (5); Zupan et al. 2018 (6)

OUTCOME	LEVEL OF PROTECTION				Confidence in effect/Supporting references
	Fully	Highly	Lightly	Minimally	
Population age structure: maintained at or extends towards natural age structure • Once protected, previously exploited or impacted species (e.g., bycatch) live longer, particularly predators. • This shifts the population structure towards larger, older individuals that usually invest more in reproduction, are more experienced (e.g., in finding mates or favorable spawning areas), may produce higher quality offspring, and can buffer the population through multi-year periods of environmental conditions unfavorable to replenishment.	Older individuals will gradually return to the population, with timelines dependent upon growth rates of the species.	Older individuals will gradually return to the population if they are not exploited.	Species that are given specific protections live longer; exploited or impacted species will not.	Minimal difference in population structure compared to unprotected sites.	High confidence Roberts et al. 2001 (7); Claudet et al. 2006 (8); Ruttenberg et al. 2011 (9); García Rubies et al. 2013 (10); Abesamis et al 2014 (11); Malcolm et al. 2015 (12); Harasti et al. 2018 (13)
Biomass: maintained at or increases towards pre-exploitation levels • Protection generally results in increases in abundance and larger average body sizes, leading to large increases in biomass of previously exploited or impacted species.	Biomass is maintained at unexploited / unimpacted levels or recovers towards this.	Biomass is maintained at unexploited / unimpacted levels or it increases. For exploited or impacted species, biomass is at lower levels.	Those species that are given specific protections will increase in biomass. Exploited or impacted species will stay at depleted levels or continue to decline.	Minimal difference in biomass compared to unprotected sites.	High confidence Lester and Halpern 2008 (2); Lester et al. 2009 (4); Sala et al. 2012 (14); Guidetti et al. 2014 (15); Giakoumi et al. 2017 (5); Giakoumi 2018 (16); Zupan et al. 2018 (6); Agnetta et al. 2019 (17)
Species richness (no. of species): increases as populations recover • Protection results in an increase in the number of species as populations recover, rare species become more common, and vulnerable, previously absent, species recolonize.	Richness is maintained in previously unexploited areas or it recovers towards unimpacted levels.	Richness is maintained (in previously unexploited areas) or it recovers to higher levels.	There is little difference in overall richness, although species with specific protections have an increased frequency of occurrence.	Minimal difference in richness compared to unprotected sites.	High confidence Lester and Halpern 2008 (2); Russ and Alcala 2011 (18); Nash and Graham 2016 (19)
Reproductive output and replenishment: increases as populations recover • Because bigger animals generally produce vastly greater numbers of young than do smaller animals, and because animals live longer when not exploited, far more young are produced in protected areas. • Bigger animals may also be more successful at reproducing and producing higher quality offspring that survive better.	Reproductive output of most previously depleted populations can increase several times and in some cases by tens to more than a hundred times.	Reproductive output increases are substantial for most previously depleted populations.	Some increases in reproductive output are seen for those species given specific protections.	Minimal difference in reproduction compared to unprotected sites.	High confidence Nemeth 2005 (20); Kaiser et al. 2007 (21); Crec'hriou et al. 2010 (22);Taylor and McIlwain, 2010 (23); Díaz et al. 2011 (24); Hixon et al. 2014 (25); Barneche et al. 2018 (26); Marshall et al. 2019 (27)

OUTCOME	LEVEL OF PROTECTION				Confidence in effect/Supporting references
	Fully	Highly	Lightly	Minimally	
Connectivity of populations: higher self-replenishment and export of offspring as populations recover • In protected areas, the larger production of eggs or other propagules can lead to faster replenishment of the population within the MPA, but also higher export of offspring and therefore greater replenishment outside the MPA, sometimes over long distances.	Egg/larvae/ propagule export is enhanced for most species.	Egg/larvae/ propagule export is enhanced for many species.	Egg/larvae/ propagule export is enhanced for only a few species.	Minimal difference in egg/ larvae/ propagule export compared to unprotected sites.	Moderate confidence Pelc et al. 2010 (28); Christie et al. 2010 (29); Di Franco et al. 2012 (30); Roberts and Hawkins 2012 (31); Andrello et al. 2017 (32); Roberts et al. 2017 (33); Manel et al. 2019 (34); Assis et al. 2021 (35)
Rare and endangered species protected: increased protection allows populations to recover • Some species are more vulnerable to exploitation and damage than others, sometimes even at low intensities of human use.	MPAs provide refuge for and enhance populations of many rare and endangered species, especially sessile, sedentary, or low mobility species.	MPAs provide refuge for and enhance populations of some rare and endangered species, especially sessile, sedentary, or low mobility species, but at lower levels than with full protection for these species.	Rare and endangered species given specific protections are present, especially if they are sessile, sedentary, or low mobility species, but at lower levels than with full or high protection.	Minimal differences compared to unprotected sites.	Moderate confidence Mouillot et al. 2008 (36); Pichegru et al. 2010 (37); Gormley et al. 2012 (38); Goetze et al. 2015 (39); McLaren et al. 2015 (40); Dwyer et al. 2020 (41)
Genetic diversity: enhanced as populations recover and habitat heterogeneity increases • Large population sizes and increased environmental heterogeneity promote genetic diversity, although the effect may be limited for species that have been through population bottlenecks. (Environmental heterogeneity refers to the diversity of habitats, which will increase as sensitive and vulnerable habitats recover.) • Genetic diversity may also be enhanced by the different selective environments MPAs provide compared to unprotected areas.	Genetic diversity is maintained or enhanced for most species.	Genetic diversity is maintained or enhanced for many species.	Genetic diversity is maintained or enhanced for some species.	Minimal difference in genetic diversity compared to unprotected sites.	Moderate confidence Miethe et al. 2009 (42); Fidler et al. 2018 (43); Jones et al. 2018 (44); Sørdalen et al. 2018 (45)

OUTCOME	LEVEL OF PROTECTION				Confidence in effect/Supporting references
	Fully	Highly	Lightly	Minimally	
Habitats: recover over years to decades • Habitats will recover over timescales of years to decades as habitat-forming species (seaweeds, seagrass, coral, oysters, etc.) benefit from protection and produce cascading ecological effects of protection throughout the ecosystems.	Full recovery of all habitats is possible, but timescales depend on the types of habitats present or able to re establish. Greater three dimensional complexity develops.	Many habitats recover fully or partially, but timescales depend on the types of habitats present. Greater three dimensional complexity develops.	Some habitats recover partially.	Minimal difference compared to unprotected sites in habitat condition or types of habitats present.	High confidence Guidetti 2007 (46); Babcock et al. 2010 (47); Costello 2014 (48); Williamson et al. 2014 (49); Turnbull et al. 2018 (50)
Ecosystem functioning: natural interactions and processes recover • As targeted species recover, they will re-establish interactions with other species in the community. • This in turn alters other interactions that may reverberate throughout the community. • Ecosystem-level changes will often be most dramatic when the targeted species were high-level/apex predators, habitat-forming, or keystone species.	Full recovery of natural levels of trophic structure and complexity for most species and habitats; partial recovery for those where key species are highly mobile or migratory.	Partial recovery toward re-established levels of trophic structures and complexity.	Food web effects of protection are quite limited and incomplete.	Minimal difference compared to unprotected sites.	Moderate confidence Guidetti 2006 (51); Claudet et al. 2010 (52); Babcock et al. 2010 (47); McClanahan and Graham 2015 (53); Russ et al. 2015 (54); Acuña-Marrero et al. 2017 (55); Selden et al. 2017 (56)
Ecosystem resilience (ability to recover after disturbance): maintained at or increases towards pre-exploitation levels • Restoration of natural ecological interactions, higher population sizes, and associated increased genetic diversity will likely enhance the resilience of the community within the MPA.	Resilience increases significantly.	Resilience increases	Little apparent increase in resilience.	Minimal or no apparent increase in resilience.	Low confidence McLeod et al. 2008 (57); Ling et al. 2009 (58); Micheli et al. 2012 (59); Barnett and Baskett, 2015 (60); Mellin et al. 2016 (61); Wilson et al. 2020 (62)

OUTCOME	LEVEL OF PROTECTION				Confidence in effect/Supporting references
	Fully	Highly	Lightly	Minimally	
Effects on exploited species					
The Level of Protection of each MPA or zone can have important impacts on exploited species. The cells to the right of each Outcome describe the extent to which different Levels of Protection are likely to protect or recover these populations, and the benefits they provide to people.					
Spillover: net movement of targeted mobile animals and some seaweeds to adjacent fishing grounds • Spillover typically to a maximum of a few kilometers away, as population densities rise and conditions become more crowded. Spillover is often first noticed as an increase in fishery catch rates just outside the MPA (or their no-take zone) boundaries. • Level of spillover varies by species, and is highly dependent on species' mobility, habitat conditions, and level of fishing outside of the protected area.	Spillover increases significantly with time as populations recover strongly inside MPAs. Bigger fish inside MPAs produce proportionally more larvae leading to potential spillover.	Spillover increases with time as populations recover inside MPAs. Rates of spillover and numbers of species showing the effect are lower than under full protection.	Spillover may increase for species given specific protections.	Minimal spillover to adjacent areas.	High confidence Abesamis and Russ 2005 (63); Halpern et al. 2009 (64); Russ and Alcala 2011 (18); Roberts and Hawkins 2012 (31); Di Lorenzo et al. 2016 (65); Di Lorenzo et al. 2020 (66)
Larval export: maintained at or increases towards pre-exploitation levels • Increased abundance and body size, plus reduced disturbance enhances reproductive output, usually results in the export of eggs and larvae from the MPA to surrounding areas.	Very high rates of egg and larval export are observed, and they increase with time. Bigger fish inside MPAs produce proportionally more larvae enhancing potential larval export.	High rates of egg and larval export are observed, and they increase with time, but at lower levels than with full protection.	Egg and larval export are higher for those species given specific protections, and they increase with time.	Minimal change in egg and larval export following protection.	High confidence Manríquez and Castilla, 2001 (67); Planes et al. 2009 (68); Christie et al. 2010 (29); Crec'hriou et al. 2010 (22); Pelc et al. 2010 (28); Harrison et al. 2012 (69); Di Franco et al. 2015 (70)
Insurance against management failure or stock collapse: protects a portion of the population from exploitation • Increased abundance and body size, extended population age structures, and increased reproduction reduce the likelihood that overfishing outside the MPA causes stock collapse, and they promote recovery following management problems in fishing grounds.	Insurance value potentially very high and rises with time and with area protected.	Insurance value potentially high and rises with time and with area protected.	Some insurance value for species given specific protections, but the effect is likely to be low.	Minimal or no apparent insurance value.	Moderate confidence Lauck et al. 1998 (71); Roberts et al. 2005 (72); Russ and Alcala 2011 (18); Krueck et al. 2017 (73)

OUTCOME	LEVEL OF PROTECTION				Confidence in effect/Supporting references
	Fully	Highly	Lightly	Minimally	
Protection of vulnerable life stages: enhanced via nursery grounds, spawning aggregations, etc., including for highly migratory species • Protection promotes survival and growth and reduces impacts of overfishing.	Benefits could be very high if key areas of vulnerability (e.g., spawning aggregations) are fully protected in MPAs.	Benefits could be high if key areas of vulnerability are highly protected in MPAs.	Some benefits evident for key areas of vulnerability given specific protection.	Minimal benefits.	High confidence Beets and Friedlander 1999 (74); Planes et al. 2000 (68); Rogers Bennett and Pearse 2001 (75); Sala et al. 2001 (76); Mumby et al. 2004 (78); Garla et al. 2006 (77); Nemeth 2005 (20); Armsworth et al. 2010 (78); Grüss et al. 2014 (79); Erisman et al. 2017 (80); Farmer et al. 2017 (81); Sadovy de Mitcheson et al. 2020 (82)
Water quality					
The Level of Protection of each MPA or zone can have important impacts on water quality. The cells to the right of each Outcome describe the extent to which different Levels of Protection are likely to protect or restore water quality, and the benefits this provides to people.					
Eutrophication: reduced, lower likelihood of dead zones, harmful algal blooms, etc. • More intact pelagic and benthic food webs can increase grazing rates/nutrient cycling/detritivory, reducing adverse effects of nutrient enrichment. • More intact pelagic food webs can reduce the probability of harmful algae species from blooming, although, even for highly and fully protected MPAs, the effect is likely to be offset if there is excessive nutrient pollution.	Possible	Possible	Unlikely	Unlikely	Low confidence Olds et al. 2014 (83); Alongi et al. 2015 (84); McKinnon et al. 2017 (85); Bergstrøm et al. 2019 (86); Strain et al. 2019 (87)

OUTCOME	LEVEL OF PROTECTION				Confidence in effect/Supporting references
	Fully	Highly	Lightly	Minimally	
Pathogens and pollutants: reduced concentrations • High densities of filter feeders may reduce nutrient and pathogen levels in overlying water and vegetated habitats can reduce bacterial pathogens. • Disease mitigation for species such as corals through reductions in physical injury in areas where human activities are reduced. May improve ecosystem resilience by preserving ecosystem function. • Mobile fishing gears can resuspend sediments and legacy pollutants (e.g., DDT, PCBs, heavy metals) at a higher rate than natural disturbances, reintroducing them to demersal and pelagic food webs. • Protection from mobile gears increases longevity and efficacy of storage.	Reduced pathogen levels likely compared to unprotected sites. Effects may also extend to adjacent areas. Evidence of reduced levels of coral disease in fully protected areas due to lower levels of coral damage and lower abundance of abandoned fishing line. Higher rates of uptake and sequestration of legacy chemicals by seabed invertebrates with longer sediment residence time.	Reduced pathogen levels likely compared to unprotected sites. Effects may also extend to adjacent areas. Minimizing impacts from other pressures (e.g., fishing) has been shown to increase resilience to coral disease. Higher rates of uptake and sequestration of legacy chemicals by seabed invertebrates with longer sediment residence time.	Reduced pathogen levels possible, especially where vegetated habitats are included. Impacts from fishing (e.g., abandoned fishing lines) can exacerbate instances of coral disease. If protected from mobile fishing gears, higher rates of uptake and sequestration of legacy chemicals by seabed invertebrates with longer sediment residence time.	Minimal difference compared to unprotected sites.	Moderate confidence Cotou et al. 2005 (88); Durrieu de Madron et al. 2005 (89); Lamb et al. 2017 (90); Pollack et al. (2014) (91)
Suspended sediment: reduced levels • Reestablishment of dense populations of filter-feeding invertebrates will increase water filtration rates and reduce suspended sediment. In addition, improved water clarity can foster an increase in rooted aquatic vegetation (such as seagrasses) which provide important fish nursery habitat.	Dense populations of filter feeders reestablish on the seabed, increasing water clarity, and the abundance of rooted aquatic vegetation, especially in semi enclosed water bodies.	Dense populations of filter feeders reestablish on the seabed, increasing water clarity and abundance of rooted aquatic vegetation, especially in semi enclosed water bodies.	If protected from mobile fishing gears, dense populations of filter feeders may reestablish on the seabed, increasing water clarity, and allowing for the persistence of rooted aquatic vegetation, especially in semi enclosed water bodies.	Minimal difference compared to unprotected sites.	Low confidence State of Queensland, 2018 (92); Powell et al. 2019 (93)

OUTCOME	LEVEL OF PROTECTION				Confidence in effect/Supporting references
	Fully	Highly	Lightly	Minimally	
Climate resilience/adaptation/mitigation					
The Level of Protection of each MPA or zone can play an important role in climate resilience, adaptation, and mitigation. There is high confidence in the first principle knowledge about how marine systems sequester and store carbon; however, more studies are needed about how MPAs specifically contribute to the carbon budget. The cells to the right of each Outcome describe the extent to which different Levels of Protection are likely to impact the changing climate, and the benefits this provides to people.					
Carbon: sequestration and storage enhanced and safeguarded • Greater primary production by vegetated habitats such as mangroves, salt marshes, and seagrasses protected in MPAs leads to greater carbon capture (e.g., blue carbon). • Existing stores of carbon in sediments in MPAs are protected from disturbance from mobile fishing gears and other sources. • Untrawled and undredged seabed habitats promote carbon uptake by richer communities of filter feeding organisms and plants, and storage in sediments. • Pelagic habitats with high abundance of mesopelagic species promote carbon shuttling from surface to deep water. • High abundances of animals that feed deep and excrete nutrients at the surface enhance surface productivity, some of which is eventually stored in deep sea sediments.	High, if MPA protects blue carbon coastal habitats such as mangroves, salt marshes and seagrasses, and other marine communities that sequester carbon, and/or protects sediments from mobile fishing gears or other sources of disturbance.	High, if MPA protects blue carbon coastal habitats such as mangroves, salt marshes and seagrasses, and other marine communities that sequester carbon, and/or protects sediments from mobile fishing gears or other sources of disturbance.	Moderate, but only if MPA provides some protection to vegetated coastal habitats, and/or to sediments from mobile fishing gears and other sources of disturbance.	Minimal difference compared to unprotected sites.	Moderate confidence High confidence in first principle based knowledge of carbon sequestration and storage in marine systems. Pendleton et al. 2012 (94); Atwood et al. 2015 (95); Mineur et al. 2015 (96); Zarate Barrera and Maldonado 2015 (97); Krause Jensen and Duarte 2016 (98); Howard et al. 2017 (99); Roberts et al. 2017 (33); Duarte et al. 2020 (100); Mariani et al. 2020 (101); Saba et al. 2021 (102); Sala et al. 2021 (103)
Acidification: local effects mitigated • Vegetated areas may reduce local acidification. This may benefit local shellfish or other economically or culturally important species. • Carbonate excretion at surface by vertically migrating fish may buffer surface acidity. • Seaweed aquaculture may reduce acidification.	Vegetated habitats increase in extent and quality, especially if supplemented by active restoration/coastal realignment, mitigating local acidification. Protection of vertically migrating species facilitates surface buffering.	Vegetated habitats increase in extent and quality, especially if supplemented by active restoration/coastal realignment, mitigating local acidification. Protection of vertically migrating species facilitates surface buffering.	Given specific protection, vegetated habitats may increase in extent and quality, especially if supplemented by active restoration, mitigating local acidification. Protection of vertically migrating species can facilitate surface buffering.	Minimal difference from unprotected sites. However, MPAs supporting seaweed aquaculture may have benefits in ameliorating local acidification.	Low confidence Unsworth et al. 2012 (104); Roberts et al. 2017 (33); Duarte et al. 2017 (105); But see Koweek et al., 2018 (106)

OUTCOME	LEVEL OF PROTECTION				Confidence in effect/Supporting references
	Fully	Highly	Lightly	Minimally	
Productivity: declines due to climate change are offset • Greater potential for adaptation and sustained productivity due to higher genetic diversity. • Climate change is reducing marine productivity. With MPAs, primary productivity may be maintained by a greater abundance of marine life playing key roles in the nutrient pump (shuttling of nutrients from depth to epipelagic zone), which promotes primary production. • Expanded area of coastal vegetated habitats increases productivity and nutrient subsidy to adjacent ecosystems. • Secondary productivity declines can be countered by increased populations of previously exploited species.	Maintained or increased productivity.	Maintained or increased productivity.	Maintained or increased productivity, if specific protections target key ecosystem components that promote productivity.	Minimal difference compared to unprotected sites.	Low confidence Grémillet and Boulinier 2009 (107); Reed et al. 2016 (108); Kelly et al. 2017 (109); But see Rogers Bennett and Catton 2019 (110)
Coastal protection: disturbances offset, coastal defenses maintained or enhanced • Protection of biogenic habitats, such as mangroves, seagrasses, saltmarsh, coral reef and oyster beds, can protect coasts even as sea levels rise. This has benefits to human health, safety and security, and economies.	Natural coastal defenses are maintained or enhanced, especially if supplemented by active restoration/ coastal realignment.	Natural coastal defenses are maintained or enhanced, especially if supplemented by active restoration/ coastal realignment.	Natural coastal defenses are maintained or enhanced if given specific protection, especially if supplemented by active restoration/ coastal realignment.	Minimal difference compared to unprotected sites.	High confidence. Luo et al. 2015 (111); Miteva et al. 2015 (112); Narayan et al. 2016 (113); Roberts et al. 2017 (33); Harris et al. 2018 (114); Powell et al. 2019 (93); Duarte et al. 2020 (100)

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