![CHONe - Canadian Healthy Oceans Network logo]

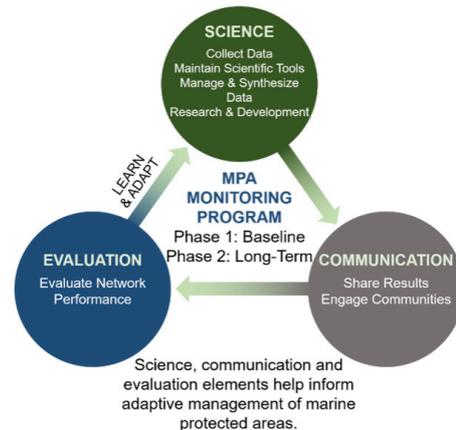# Meaningful Monitoring to Evaluate Marine Ecosystem Response to Area-Based Management

SEC 01

WHY THIS SCIENCE BRIEF?

Tracking conditions and trends in marine populations, habitats, and ecosystems requires monitoring and research to understand how they may change over time. For marine protected areas and networks, meaningful monitoring data to inform planning (conservation objectives), establishment (regulatory regime), and ongoing (adaptive) management has proven key to their effectiveness.

The specifics of MPA monitoring programs should be determined on a case-by-case basis. Conservation objectives, the management regime, as well as available resources, typically define these specifics initially. However, the appropriate monitoring indicators, protocols, and strategies for monitoring MPAs can also determine social, cultural, and economic outcomes of conservation measures..


SCIENCE
Collect Data
Maintain Scientific Tools
Manage & Synthesize Data
Research & Development

LEARN & ADAPT

MPA MONITORING PROGRAM
Phase 1: Baseline
Phase 2: Long-Term

EVALUATION
Evaluate Network Performance

COMMUNICATION
Share Results
Engage Communities

Science, communication and evaluation elements help inform adaptive management of marine protected areas.

SEC 02

THE CHALLENGE, NEED, AND OPPORTUNITY

The large geographic expanse of Canada's oceans, paired with the diverse objectives and management approaches represented by Canada's marine protected areas, creates a significant challenge in monitoring these environments in a meaningful way to inform on their status, particularly from the perspective of available resources.

These challenges point to the need to acquire data that can characterize the status of protected areas with the highest accuracy and efficiency possible. Such characterization includes monitoring appropriate indicators, collecting data via the most efficient tools, and employing strategies that address both scientific and financial capacity issues.

Our newly tested indicators and protocols in MPA monitoring plans present an opportunity to streamline monitoring efforts while increasing the rigour of reporting on the status of conservation priorities. CHONe demonstrates significant benefits from scientists sharing new and diverse scientific approaches and research tools across disciplines.
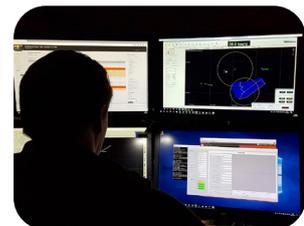
SEC 03   OUR APPROACH

Recognizing the importance of meaningful monitoring of MPAs to Canada's conservation efforts, as well as the need for appropriate monitoring tools to assess the status of high-use habitats such as ports, CHONe researchers considered multiple diverse strategies. They considered, among other relevant studies, important marine monitoring concepts such as indicators of biological or ecological status of species and habitats, the use of different seabed video survey tools and imaging technologies to inform the status of bottom habitats and species, cost-effective monitoring protocols and strategies for large deep-water MPAs, the complexity of monitoring environments exposed to multiple stressors, environmental and biodiversity associations in areas with sea pens and other deep-sea coral and sponges, and the incorporation of reference sites in area-based monitoring.

CHONe also aimed to interface existing and acquired expertise with marine protected areas activities as appropriate through extensive and ongoing engagement with DFO advisory processes and panels pertaining to planning and implementing area-based management in Canada. In parallel, CHONe worked with stakeholders such as municipalities and port authorities who seek to monitor environmental status within their jurisdictions. .

SEC 04   OUR RECOMMENDATIONS

The collective work across CHONe identified these priority recommendations:

> Gather and make available baseline data on natural variation, environmental drivers, and associations of marine systems to inform evaluation over time,

> Identify meaningful indicators of ecological and social effects of conservation measures under consideration, identifying those most likely to be useful and gain acceptance,

> Explore cost-effective monitoring protocols and strategies through existing and new technologies and collaborations, Whenever possible, include appropriate reference sites in monitoring protected areas or focal areas for environmental impact assessment, i.e., before and after; and inside and outside.

SEC 05   CHONe EXAMPLES

CHONe research explored various underwater imaging technologies and methodologies available to conduct seabed video surveys (both nearshore and offshore) and considered the effectiveness of these methods to document species and habitat distributions and associations in protected areas. Whereas more advanced technologies, such as remotely operated vehicles (ROVs such as ROPOS in deep-sea habitats), are often desired, and indeed required, for some sampling to identify or understand the important baseline ecology of the area or components under consideration. CHONE also recognized and supported more accessible monitoring methods such as Dropcam or trawl surveys that provide valuable data to monitoring objectives over time. A recent CHONe study highlighted the essential need to consider the sampling performance of different tools when collecting baseline data for monitoring. This study showed that ROV, drop-camera, and trawl surveys could produce differences in estimates of species abundance and diversity in deep-sea environments due to differences in sampling performance and biases among the sampling techniques. Selection of monitoring strategies should therefore consider how these differences might influence decision making. Parallel efforts on environmental impact assessment identified strategies to incorporate diverse data sources into multistressor monitoring. Yet another study in an MPA assessed which species and functional groups contribute the most to critical seabed processes; thus, monitoring efforts can give the greater contributors more attention.

This collective work demonstrated the enhanced attainability and utility of indicators, protocols, and strategies to support the collection of effective monitoring data by using a complementary suite of available and affordable methods over the long term.

SEC 05

CONCLUSION

 Identifying new and tested monitoring approaches for MPAs and impacted coastal locations can catalyze more holistic and cost-effective efforts in advancing and reporting on Canada's marine conservation targets.

Once strategically developed, MPA monitoring plans can benefit from leveraging monitoring resources and expertise through partnerships between government and non-government organizations to streamline monitoring efforts. When implemented in all three oceans, this integrated science and management approach broadens the availability of and access to purposeful

SEC 06

ANTICIPATED BENEFITS

Meaningful monitoring supports a clean, healthy, productive, sustainable and predicted ocean. These outcomes benefit Canadians and support United Nations Sustainable Development Goals 14 and the United Nations Decade of Ocean Science. The likelihood of successful outcomes, however, significantly increases only by engaging coastal communities, Indigenous groups, industry, and other ocean stakeholders, including the governments that represent them.

SEC 09

GET IN TOUCH

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