

Marine: comparative tables

Version 1.0



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Introduction

The comparative tables can help you choose the most appropriate method(s) for your study. Use them in conjunction with the 'Marine: decision tree' (doccm-2783264).¹ Read the full description for each method once you have made your selection.

The way to choose the best method is a cumulative decision, following consideration of many factors that may not become apparent until after reading the method specifications in detail. The ultimate decision is defined by a multitude of considerations that generic comparative tables cannot capture. If the format of the comparative tables does not help you narrow your options, then read the list of advantages and disadvantages within each method specification. If after comparing the advantages and disadvantages of each method you are still unsure which method to use, you should talk to someone in the Marine Ecosystems Team of the DOC Science & Policy Group.

¹ <http://www.doc.govt.nz/documents/science-and-technical/inventory-monitoring/im-toolbox-marine-decision-tree.pdf>



Comparative table 1: Recommended techniques for marine inventory and monitoring

Method precision (relative to objectives): ✓✓✓ Good; ✓✓ Medium; ✓ Poor; ✗ Not Recommended; – Not Applicable. **Resources:** L = Low; M = Medium; H = High.

	Inventory objectives*	Monitoring objectives [†]			Resources		
		Surveillance ¹	Status & trend ²	Management ³	Equipment costs	Personnel costs	Skills required
Fish							
Baited underwater video surveys for fish	✓	✓✓✓	✓✓✓	✓✓✓	H	L	H
Underwater transects for fish	✓✓	✓✓✓	✓✓✓	✓✓✓	L	H	H
Invertebrates							
Quadrats for invertebrate and macroalgal communities	✓✓✓	✓✓✓	✓✓✓	✓✓✓	L	H	M
Functional trait surveys for benthic organisms	✓✓	✓	✓✓✓	✓✓✓	H	H	H
Transects for mobile invertebrates	–	✓✓✓	✓✓✓	✓✓✓	L	H	H
Potting for lobster populations	–	✓✓✓	✓✓✓	✓✓✓	M	L	L
Infauna							
Soft sediment sampling for infaunal communities	✓✓✓	✓✓✓	✓✓✓	✓✓✓	L	L	H
Marine mammals							
Shoreline surveys for seal colonies	✓✓✓	✓✓✓	✓✓✓	✓✓✓	L	L	L
Seabirds							
Surveys for ground-nesting seabirds	✓✓✓	✓✓✓	✓✓✓	✓✓✓	L	L	M
Surveys for tree-nesting seabirds	✓✓✓	✓✓✓	✓✓✓	✓✓✓	M	L	M
Shoreline surveys for seabirds	✓✓✓	✓✓	✓✓✓	✓✓✓	M	L	L
Habitat							
Functional trait surveys for benthic organisms	✓✓	–	✓✓✓	✓✓✓	H	H	H
Surveys for habitat mapping	✓✓✓	–	–	–	H	H	H
Quadrats for invertebrate and macroalgal communities	✓✓	✓✓✓	✓✓✓	✓✓✓	L	H	M
Sampling water and substrate chemistry	✓✓	✓✓✓	✓✓✓	✓✓✓	L	L	L
Contaminants							
Transects for beach-cast litter	✓✓✓	–	✓✓✓	✓✓✓	L	M	L
Sampling for environmental contaminants	✓✓✓	✓✓✓	✓✓✓	✓✓✓	L	L	M
Secchi disk monitoring of water clarity	–	–	✓	✓	L	L	L
Trophic structure							
Sampling for stable isotope analysis	–	–	✓✓✓	✓✓✓	L	L	M
Gut content analysis for fish diet	✓✓	–	✓✓✓	✓✓✓	L	L	H



* Inventory is a one-off survey or assessment with no intention to re-measure. If inventory of a site is repeated in the future, this can be considered monitoring. Typical inventory objectives include:

- What species are present at a site and how are they distributed over a landscape?
- What are the species habitat relationships?
- What is the wildlife value/significance of an area?
- Is this a baseline survey?

Interpretation of results must be based on the understanding that these are single surveys.

† Monitoring assesses change or trend over time and requires re-measurement of parameters at some pre-determined frequency. Typical monitoring questions include:

- ¹ What species have moved into an area? Have range extensions/contractions occurred for a species of interest?
- ² What is the population abundance or density of a species or community? Is this stable over time? What are the population trends? Does this relate to habitat use?
- ³ Do population estimates of density and abundance change as a result of management action? Over what time-scale does this occur? Has a species translocation succeeded? Has management been effective? Has species composition altered as a result of management? What are the visitor impacts?



Comparative table 2: Choosing a method for marine inventory or monitoring that meets your numeric data requirements

Method precision (relative to objectives): ✓✓✓ Good; ✓✓ Medium; ✓ Poor; ✗ Not Recommended; – Not Applicable.

	Numeric parameters [†]							
	Presence/Absence ¹	Frequency ²	Cover ³	Relative abundance ⁴	Density ⁵	Biomass ⁶	Richness ⁷	Diversity ⁸
Fish								
Baited underwater video surveys for fish	✓✓	✓✓	–	✓✓	✗	✗	✓✓✓	✓✓✓
Underwater transects for fish	✓✓	✓✓	–	✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓
Invertebrates								
Quadrats for invertebrate and macroalgal communities	✓✓✓	✓✓✓	✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓
Functional trait surveys for benthic organisms	✓✓✓	✓✓✓	✓✓	✓✓✓	✓✓	✗	✓✓✓	✓✓✓
Transects for mobile invertebrates	✓✓✓	✓✓✓	–	–	✓✓✓	✓✓✓	✗	✗
Potting for lobster populations	✓✓✓	✓✓✓	–	–	✗	✗	✗	✗
Infauna								
Soft sediment sampling for infaunal communities	✓✓✓	✓✓✓	–	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓
Marine mammals								
Shoreline surveys for seal colonies	✓✓	✓✓	–	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓
Seabirds								
Surveys for ground-nesting seabirds	✓✓✓	✓✓✓	–	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓
Surveys for tree-nesting seabirds	✓✓✓	✓✓✓	–	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓
Shoreline surveys for seabirds	✓✓	✓✓	–	✓✓✓	✗	✓	✓✓	✓✓
Habitat								
Functional trait surveys for benthic organisms	✓✓✓	✓✓✓	✓✓	✓✓	✓✓	✗	✓✓✓	✓✓✓
Surveys for habitat mapping	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓	✗	✓✓✓	✓✓✓
Quadrats for invertebrate and macroalgal communities	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓	✓✓✓
Sampling water and substrate chemistry	✓✓✓	–	–	–	–	–	–	–
Contaminants								
Transects for beach-cast litter	✓✓✓	✓✓✓	–	✓✓✓	✓✓✓	–	✓✓✓	✓✓✓
Sampling for environmental contaminants	✓✓✓	✓✓✓	–	–	–	–	✓✓✓	✓✓✓
Secchi disk monitoring of water clarity	–	–	–	–	–	–	–	–



	Numeric parameters [†]							
	Presence/Absence ¹	Frequency ²	Cover ³	Relative abundance ⁴	Density ⁵	Biomass ⁶	Richness ⁷	Diversity ⁸
Trophic structure								
Sampling for stable isotope analysis	–	–	–	–	–	–	–	–
Gut content analysis for fish diet	✓	✓	–	–	–	–	✓✓✓	✓✓✓

† Numeric parameters help define or classify species, populations or communities, and typical questions include:

- ¹ Does a species occur in a sample unit or sub-unit?
- ² What is the proportion of sample units or sub-units occupied by a species?
- ³ What is the proportion of an area covered by a particular habitat type?
- ⁴ How common or rare is a species relative to other species in a community?
- ⁵ What is the number of individuals per unit area?
- ⁶ What is the relative dominance of different species in an area?
- ⁷ How many different species are represented in an ecological community, landscape or region?
- ⁸ What is the variety of species within a community?



Comparative table 3: Choosing a method for marine inventory or monitoring that meets your demographic and trophic data requirements

Method precision (relative to objectives): ✓✓✓ Good; ✓✓ Medium; ✓ Poor; ✗ Not Recommended; – Not Applicable.

	Demographic parameters [†]					Trophic parameters ^{††}			
	Survival ¹	Mortality ²	Productivity ³	Sex ratio ⁴	Size distributions ⁵	Trophic position ⁶	Trophic niche width ⁷	Trophic structure ⁸	Trophic diversity ⁹
Fish									
Baited underwater video surveys for fish	–	–	–	✓	✓✓✓	–	–	–	–
Underwater transects for fish	–	–	–	✓	✓✓✓	–	–	–	–
Invertebrates									
Quadrats for invertebrate and macroalgal communities	–	–	–	✓	✓✓✓	–	–	–	–
Functional trait surveys for benthic organisms	–	–	–	–	–	–	–	–	–
Transects for mobile invertebrates	–	–	–	✓✓✓	✓✓✓	–	–	–	–
Potting for lobster populations	–	–	–	✓	✓✓	–	–	–	–
Infauna									
Soft sediment sampling for infaunal communities	–	–	–	✓	✓✓✓	–	–	–	–
Marine mammals									
Shoreline surveys for seal colonies	–	–	–	✓✓✓	✓✓	–	–	–	–
Seabirds									
Surveys for ground-nesting seabirds	–	–	–	✓✓	✓✓	–	–	–	–
Surveys for tree-nesting seabirds	–	–	–	✓✓	✓✓	–	–	–	–
Shoreline surveys for seabirds	–	–	–	–	–	–	–	–	–
Habitat									
Functional trait surveys for benthic organisms	–	–	–	–	–	–	–	–	–
Surveys for habitat mapping	–	–	–	–	–	–	–	–	–
Quadrats for invertebrate and macroalgal communities	–	–	–	–	–	–	–	–	–
Sampling water and substrate chemistry	–	–	–	–	–	–	–	–	–
Contaminants									
Transects for beach-cast litter	–	–	–	–	–	–	–	–	–
Sampling for environmental contaminants	–	–	–	–	–	–	–	–	–
Secchi disk monitoring of water clarity	–	–	–	–	–	–	–	–	–



	Demographic parameters [†]					Trophic parameters ^{††}			
	Survival ¹	Mortality ²	Productivity ³	Sex ratio ⁴	Size distributions ⁵	Trophic position ⁶	Trophic niche width ⁷	Trophic structure ⁸	Trophic diversity ⁹
Trophic structure									
Sampling for stable isotope analysis	–	–	–	–	–	✓✓✓	✓✓✓	✓✓✓	✓✓✓
Gut content analysis for fish diet	–	–	–	–	–	✓✓✓	✓	✓	✓

† Demographic parameters assess the characteristics of a population. Typical demographic questions include:

- ¹ What is the proportion of individuals that continue to exist within a defined population?
- ² What is the proportion of deaths within a defined population?
- ³ What is the rate of biomass generation in a population, community or ecosystem?
- ⁴ What is the relative abundance of species/sexes/life history phases by size?
- ⁵ What is the proportional distribution of sexes in a population?

†† Trophic parameters assess the structure of feeding relationships among organisms in an ecosystem. Typical trophic questions include:

- ⁶ What trophic level does an organism occupy in a food chain?
- ⁷ What is the width of niche space occupied by a population or community?
- ⁸ What is the pattern of movement of energy and matter through an ecosystem?
- ⁹ What is the variety of species within or across trophic levels?

