National Science Challenges
SUSTAINABLE SEAS
Ko ngā moana whakauka

We are interested in recovering health of an area, how do we go about it?

For community groups and members

Often individuals or groups in a location are concerned about the health of the area and want to help it. However, starting action can be a daunting task. This guidance is aimed at helping people on the ground begin the process to start recovery actions for their area.

There are four primary questions

Are you a cohesive group that has been together for a while? If not, setting up engagement and getting people involved can be helped by using *Ingredients to catalyse participation in marine decision-making*. Even at this early stage contacting your council to see if they know of any other interested groups, or if they would be prepared to be involved is useful. (*Roadmaps to EBM: Why should we consider law and policy when assessing, monitoring, and restoring the ecological health of our estuaries?*)

Do you have a definition of "health"? There are many aspects of health. Ecological definitions of health could include presence of dense shellfish beds, abundant and diverse fish species, diverse relatively slow-growing biologically structured habitats (for example mixtures of shellfish, tube worms, sponges, bryozoans, rhodoliths), vegetated habitats (eg seagrass, seaweeds, kelp) and large crustaceans (crabs and shrimps). See *Ecological definitions of health* (below) for more examples. Your definitions of health may also include such things as being able to walk on sand rather than sinking into mud, being able to collect kai in the locations you're used to collecting it, etc. It's important to vocalise these and determine what state you want to recover to. A tool to help understand what is important for different people is *Quick guide two: Worldviews influence people's perceptions of risk and uncertainty*. However, often answering the next question will help decide what your definition is.

What are the changes you've seen that you think means 'health' needs to be recovered? Again, this needs to be answered in a group discussion. While discussing these changes, people can also identify what is driving these changes (for example, sediment inputs from the freshwater, the building of a marina, overfishing, dredge dumping etc). Local hapū/iwi and your council may also have a list of these and where they occur. You can also use the *activities stressors table* to create a list of stressors from known activities.

What is the area you think needs to be managed to recover the 'health'? In a group discussion you can consider this related to the spatial and temporal dynamics of any particular species (see below) you are interested in.

Once these questions are answered you have the background for a more detailed investigation of how to proceed (*Roadmaps to EBM: We have recovery highlighted in our plans – how do we go about it?*) and at this stage council backing would be helpful.

Spatial and temporal dynamics of species

How species respond to management actions are dependent on several life history traits that detail the ability of the species to self-sustain a population within the area that management actions will occur, or to obtain new recruits from outside a managed area (eg adult daily use (home range), breeding, larval and nursery areas).

There are four simple questions that can help disentangle these factors

Do both adults and juveniles live in the area and do adults reproduce there? The size of the area will not prevent the management action being successful.

Are larvae or juveniles produced/living in the area, but adults are rarely seen? The size and location of the area is such that the management action is most likely to benefit other areas.

Are adults daily connectivity/home ranges within the area, but juveniles are rarely seen? The size and location of the area is such that the management action will only be temporarily successful with long-term success depending on the surrounding area continuing to be able to provide adults.

Or is the species not confined in any life stage to the area? The size of the management area is insufficient for successful management actions as individuals will rapidly disperse to other places.

It's not important to be certain about these answers – you can include maybe as an answer. However, if your group is aware that adults are not seen (or hardly ever seen) in the area, then question two should receive a 'yes'. Similarly, if you have not seen (or hardly ever seen) juveniles in the area then the answer to question three should be 'yes'.

It's also not necessary to answer these questions for all species but at least to record the areas and species that are known to locals and the ones that have been identified as being particularly important. Council scientists, NIWA, Cawthron Institute, university ecologists and museum specialists may also be helpful in knowing the generalities of many species' behaviours.

Ecological definitions of health

As most of Aotearoa New Zealand's marine species are not in poor health, the information below focuses on indicators that separate medium to good health. However, there are some strong signals of poor ecological health. These include fish die offs, hypoxia, algal blooms, persistent brown coloured waters (high turbidity), the absence of shellfish or kelp, and muddy sediments lying on a base of sand or rock (indicating that the sediment load is larger than the capacity of the system to cope with the load and self-clean). When these indicators are present the system is in a very poor state with at best slow recovery potential.

Are the 'slow' to regrow structural habitats decreasing or have they been lost?

Areas should contain multiple long-lived biogenic habitats. These may be provided by long-lived species, such as horse mussels, sponges, bryozoans, and rhodoliths, or the habitat itself may be long-lived, such as dense beds of oysters, mussels, cockles, pipi and wedge shells, tube worm mats, and vegetated habitats (mangroves, seagrass, crustose algae, or different types of seaweeds). Decreasing number of habitat types, decreasing coverage or replacement of habitats created by long-lived species with shorter-lived species (for example, replacement of kelp with urchin barrens) are generally indicative of anthropogenic stressors and decreasing health.

Is the seascape diversity of biogenic habitat types decreasing?

These habitat types include more than the long-lived ones mentioned above. Many mobile species also form habitats, for example snails, large crustaceans (crabs and shrimps), urchins, starfish and sea cucumbers. Collectively they provide many important functions and services, including oxygenating the seafloor sediments, processing nutrients, providing food for other species. The more diverse types there are, the more likely that these functions can be maintained. Decreasing number of habitat types, or decreasing coverage are generally indicative of anthropogenic stressors and decreasing health.

Only rarely is information on these habitats available due to their mobility. We suggest that creating an exhaustive list is not necessary but a list that includes the common ones and any covering large areas, even if they are unique, is useful. It's also important to record the relative area covered by these habitats, just to know if one habitat covers most of the area with the rest being small or occurring in one place only. This list, with relative cover information, can form the basis for assessing changes to these habitats.

For species whose juveniles and adults live in the same place, is the range of sizes decreasing?

Not all species have juveniles and adults that like living in the same place. For example, juvenile pipi live in upper estuary mid to low tide muddy sand environments, while adults prefer very low tide, shallow, subtidal high current areas. But for species whose juveniles and adults do like the same places, size is important. It is an indicator of the robustness of the species population. If adult size is decreasing, or if adults are no longer found, the population is at risk. If small juveniles are no longer observed, then even though adults remain, the population is unlikely to be maintained as the adults reach old age and die.