

9. RESEARCH

9.1. Why do we need research?

Research on Maui's and Hector's dolphins is needed to aid future management decisions and enable the effectiveness of management measures, including any new measures implemented under the TMP, to be assessed.

If residual risk to Hector's dolphins from human activities remains after implementation of the TMP, Ministers should consider the level of information necessary to define and monitor the residual risk and enable future consideration of management action.

DOC and MFish consider that where there is an overlap between the dolphins' range and activities that threaten them, a high priority needs to be given to gathering more information on the status of the dolphin populations.

The following sections outline the joint agency view on the Government priorities for research in the short term (next 5 years). DOC and MFish consider that once this research is complete there should be a review of information gaps, and prioritisation of where new research efforts should be directed. Therefore, this section of the draft TMP does not outline all possible research questions, but instead highlights proposed priorities for the next 5 years.

9.2. Current situation

While some information is known about Hector's and Maui's dolphins, considerably more is unknown – previous research on dolphins has been limited because it is very expensive.

No Government funded research is currently being undertaken on Hector's and Maui Dolphins.

DOC and MFish consider that information on the abundance and distribution of Hector's dolphin populations and movements of individual dolphins needs to be expanded. In addition, the Threat Management Discussion Document for Maui's and Hector's dolphins identifies a number of information gaps. DOC and MFish suggest that research ideas should be prioritised to ensure that Government directs funding to areas where there are more critical information gaps.

9.3. Research Prioritisation

The research plan will ensure DOC and MFish can gather information in the short-term that will assist in the management of the four populations as well as assist with monitoring the effectiveness of management measures. DOC and MFish consider the following research areas to be of primary importance, and are ranked with the highest priority:

- ⇒ Information on the distribution of all populations
- ⇒ Information on the abundance of all populations
- ⇒ Information on the genetic flow within and between populations
- ⇒ Information on the life characteristics of the species (for example, age at first reproduction)

Described below are potential broad research projects for the four research portfolios listed above.

9.4. Distribution Research Portfolio

Determining the distribution of the populations provides a mechanism to examine whether management is focused at an appropriate spatial scale and to determine if there is any expansion or contraction in distribution.

Research to date has shown that Hector's dolphins are a relatively shallow water species, rarely found in waters deeper than 100m water depth. DOC and MFish consider there is merit in confirming the depth and offshore limits of the dolphins' range on a seasonal basis. If the currently recognised distribution is confirmed, there would be no need to undertake abundance surveys beyond the continental shelf. Conversely, there would be strong merit in surveying out to the 100m contour irrespective of how far offshore it may be.

In addition, information is currently lacking on where dolphins go at different times of the year, as well as what constitutes the limits of their individual ranges. Information on the movement of dolphins will enable assessments of residual risk to the populations (for example, the level of overlap between the dolphins' range and activities that impact on them), and will assist with understanding their susceptibility to population fragmentation (including genetic fragmentation). This is important both to ensure that the need for protection can be established and acted upon wherever dolphins are found, while also ensuring that utilisation is not curtailed unnecessarily if current information is uncertain about the dolphins' range. In particular, an accurate determination of the distribution of Maui's dolphin is considered essential by MFish and DOC.

Ideally, all distribution surveys (and abundance estimates) at the population level should be undertaken following the same internationally recognised protocol. For Hector's dolphin, DOC and MFish consider that aerial surveys would be the preferred methodology to use. This is because Hector's dolphins are attracted to boats – leading to potential bias in research findings.

Information can also be collected at a finer spatial scale to supplement aerial population distribution surveys. For example, data on where certain individuals go during winter and summer can be gathered by attaching satellite location tags to a sample of dolphins. This is a proven technique¹⁶¹ that will provide much needed information on the seasonal distribution and movement patterns of Hector's dolphins. There is currently a lot of debate about the safety to dolphins when satellite tags are fitted. However, a pilot study has showed there were no mortalities associated with this methodology when trialled on Hector's dolphins. Satellite monitoring, if conducted on a large enough sample size will provide some very important information about the movements of this species. Photo-ID can also be used to investigate home ranges, though home range results will be influenced by distribution of survey effort. Satellite tags will provide more detailed information but, due to their expense, this information will likely be from relatively few individuals.

For highly directed and/or localised distribution and habitat use studies, passive acoustic monitoring devices such as Porpoise Detection Devices (PODs) are proving to be a useful research tool. Passive acoustic monitoring devices log the presence of cetaceans through the recording of vocalisations. The principal benefit offered by PODs or similar instruments is they are able to record during the hours of darkness and during inclement weather, when visual observations would otherwise not be feasible. They could be particularly useful for before/after impact studies of, for example, marine farms. There is also a need for complementary visual sightings information to be collected to corroborate POD acoustic detections (this could be achieved through boat or aerial surveys).

¹⁶¹ Stone, G., *et al.* 2005. Unpublished report: Hector's dolphin (*Cephalorhynchus hectori hectori*) satellite tagging, health and genetic assessment. Report to DOC, Auckland Conservancy, in fulfilment of a contract to the New England Aquarium, Central Wharf, Boston, MA 02110, USA. 77pp.

Objective

To determine the distribution of the four populations to ensure Hector's dolphins are managed across their entire range and determine any distribution changes as a result of any management measures implemented.

Research Question

⇒ What is the spatial and temporal distribution of each population?

The following methodologies to answer the research question have been identified:

⇒ Aerial surveys

⇒ Satellite tagging

⇒ PODs

While a distribution-wide survey undertaken during the winter and again during the summer would be ideal, it may be possible to identify a selection of groups to survey on a regular basis (*e.g.*, Banks Peninsula, Clifford/Cloudy Bays, Te Waewae Bay, Buller River region).

Research into the distribution of Hector's dolphins will tie in closely with abundance surveying (see portfolio described below).

9.5. Abundance Research Portfolio

The relatively long time-frames between abundance surveys makes it difficult to assess the current state of the populations. Focused research using consistent methodology over a five year period to determine baseline information will enable ongoing monitoring to determine trends in population size and, consequently, whether threats to the populations are being managed effectively.

DOC and MFish consider that estimates of population size either should be made during summer and winter (as there may be a seasonal shift in distribution and accompanying population size), or consistently during one time of year to identify any relative changes in population size over time. As mentioned above, DOC and MFish consider that aerial surveys would be the preferred methodology to use. Genetic analysis can also supplement systematic aerial surveying, in that it provides some indication of past trends in abundance.¹⁶² Photo-ID also can be used to obtain population estimates, particularly from a relatively small and highly resident group such as that found in Porpoise Bay.

Objective

To gather base-line data on the abundance of each population

Research questions

⇒ What is the current abundance of each population?

Are populations declining, stable or increasing and at what rate?

¹⁶² For example, a reduction in genetic diversity signals that the population may have undergone a decline in abundance

The following methodologies to answer the research questions have been identified:

- ⇒Aerial surveys
- ⇒Genetic analysis
- ⇒Photo-ID (within restricted areas)

9.6. Genetics Research Portfolio

Biopsy samples collected from living Hector's dolphins would provide a source of information on the genetic structure (and relatedness) of groups.¹⁶³ It may be possible to determine the degree of relatedness of Hector's dolphins within groups and along a line of progression from, for example, the northern end of the west coast of South Island to the southern end of their west coast South Island distribution. These studies will provide information on possible effects of fragmentation and on the possible genetic dispersion among groups.

DOC and MFish note that information on the movement of individual dolphins collected through the distribution research portfolio will also assist with understanding Hector's dolphins' susceptibility to population fragmentation (including genetic fragmentation).

Objective

To determine the level of gene flow within and between populations to assess current levels (and potential effects) of population fragmentation.

Research questions

- ⇒What is the level of genetic dispersion between adjoining groups within the regional populations?
- ⇒What is the degree of genetic relatedness between regional populations?

The following methodology to answer the research questions has been identified:

- ⇒Genetic analysis

9.7. Biology Research Portfolio

There are currently gaps in information that, if filled, would enable more accurate modelling of Hector's dolphin populations. A focus of future research is to identify parameters within models where more information can be obtained - perhaps through the expansion of existing necropsy and genetics programmes.

DOC and MFish consider that retrieved Hector's dolphin carcasses should continue to be sent to Massey University for detailed necropsy, acknowledging that the state of decomposition of many of the remains makes a full necropsy impossible. These studies will provide information of possible cause of death, sex, age and maturity status. These data are useful for modelling exercises and when describing the population biology of Hector's dolphin.

¹⁶³ Biopsy samples can be taken relatively easily using a biopsy dart. A small plug of tissue would be collected from each animal, which should not jeopardise their survival

The necropsy of fresh animals also will provide information on possible disease issues and parasite load.

It is believed that there may be some risks to Hector's dolphin populations due to contaminants and pollutants in the marine environment. The impact of these on Hector's dolphins is largely unknown, but necropsy of dead animals and biopsy samples collected from living Hector's dolphins could provide an assessment of the heavy metal and pesticide load carried by individuals within groups.

Photo-ID remains one of, if not the best tool for estimation of certain population parameters such as adult survival rate (which is a highly influential parameter in population modelling) and calving intervals. However, photo-ID studies are relatively labour intensive, requiring an experienced boat driver and an experienced photographer as well as a long-term commitment. To date, the Hector's dolphins at Banks Peninsula have received the most intensive photo-ID effort, and the results from various studies (*e.g.*, adult survival) have subsequently been widely applied to groups from several other areas. More widespread photo-ID effort could allow for a higher degree of certainty when undertaking regional population modelling exercises.

Objective

To gather information to enable more robust assessment on the life history characteristics of Hector's dolphins and threats to the populations.

Research questions

- ⇒What are the life history characteristics of the population?
- ⇒How do life history characteristics constrain the recovery of the populations?
- ⇒What are the causes of death of recovered carcasses?
- ⇒Are there contaminants that are affecting the populations? If so, how are these effects permutated (for example, death or reduction in reproductive ability)?

The following methodologies, to answer the research questions, have been identified:

- ⇒Biopsy of live animals.
- ⇒Necropsy of carcasses
- ⇒Photo-ID

9.8. Process for implementation of research

DOC and MFish note that research on the abundance and distribution of dolphins is expensive. The first step in progressing any research portfolios is to establish funding. DOC have completed their allocation of funding for research for the 2008-09 research year, so there is no additional funding available. MFish is able to put proposals to the MFish Aquatic Environment Research Planning Group (AE RPG) for projects that look at the effects of fishing on the aquatic environment. A number of the suggested areas of research outlined above fall within the gambit of the AEWG/AERPG, including studies on distribution, abundance and genetics.

Proposed AEWG research projects must be submitted to MFish for inclusion in the annual research planning round, where they are discussed in an open forum that includes Government, stakeholders and research providers. A prioritised list of research projects is put forward for consideration and further

prioritisation by a Research Coordinating Committee. Final research services are approved by the Minister of Fisheries.

MFish notes that in line with the upcoming medium term research plan, MFish will accept research proposals on Hector's dolphins put forward by research providers for the 2008-09 research planning round. These proposals will be due with the Science Manager, Aquatic Environment, no later than 14 September 2007, with a research planning meeting to discuss the detail of draft projects scheduled for 21 September 2007.