



**Experiencing  
Marine Reserves**

Te Kura Moana



**Experiencing Marine Reserves**  
**Reef Savers**  
**Fish Survey**



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## ***Introduction***

With the multitude of pressures impacting our coastal marine ecosystems it's important that we are aware of the changes that are occurring so we can respond appropriately. Timed swim fish surveys provide a quick and simple method to measure the diversity and abundance of fish communities on shallow reef ecosystems. The results of these surveys can give us an idea as to how fish diversity and abundance change over time, and can also be used to compare fish communities between different locations (e.g. fished areas vs. protected areas).

This resource outlines a series of activities building from fish identification skills through to full in water timed swim fish surveys. The resource is standalone and can be adapted to your particular context. For example, it could be used as an educational tool to teach marine ecology principles and techniques, or as a tool to monitor your own local marine environment. You can also upload your data to the [Reef Savers database](#), which enables you to share your data and compare your results with previous surveys.

If you would like assistance with any aspect of delivery, contact your local Experiencing Marine Reserves team through our website - [www.emr.org.nz](http://www.emr.org.nz)

## ***Structure of Resource***

The timed swim fish survey programme is comprised of four sections, including the post survey data processing component. Each section is outlined on the following pages.

**Section 1:** This section introduces participants to the theory of fish identification and timed swims.

**Section 2:** This section provides a means to practise fish identification in the water

**Section 3:** This section encompasses the full timed swim fish survey methodology.

**Section 4:** Data collected using the outlined methods can then be processed to explore ecological questions of interest. E.g. “is fish diversity and abundance higher inside vs. outside the protected area?”

Having access to fish identification resources will be vital throughout this programme. Suggested resources are:

### **Online Resources:**

- Fishbase online database - [www.fishbase.org](http://www.fishbase.org)
- New Zealand Fishes Volume 1 - A field guide to common species caught by bottom and midwater fishing, NIWA. [https://fs.fish.govt.nz/Doc/22895/AEBR\\_68.pdf.ashx](https://fs.fish.govt.nz/Doc/22895/AEBR_68.pdf.ashx)

### **Books:**

- A Photographic Guide to Sea Fishes of New Zealand, by Wade Doak
- Coastal Fishes of New Zealand, by Malcom Francis

## ***For Schools***

### **Curriculum Links**

#### **Science**

Nature of Science: Investigating in Science

Nature of Science: Communicating in Science

Living World: Ecology/ Evolution

### **Applicable NCEA Achievement Standards**

#### ***Biology: Level 1***

AS90925: Carry out a practical investigation in a biological context, with direction.

#### ***Biology: Level 2***

AS9113: Carry out a practical investigation in a biology context, with supervision.

#### ***Biology: Level 3***

AS91601: Carry out a practical investigation in a biological context, with guidance.

## Section 1 – Introducing Fish Identification and Timed Swim Methodology (theory)

Location	Preparation time	Delivery time
Land based	1 hour	1 hour

The purpose of the land based theory session is to inform participants of the theory behind timed swim fish surveys and to teach fish identification skills to a level required to undertake surveys. This session should include:

- Introduction to and explanation of timed swim fish surveys
- Theory presentation covering the identifying characteristics of each species to be surveyed. A template presentation can be found in the [resources](#) tab of the EMR website.
- Virtual video transects and [fish ID quiz](#) to practise fish identification and familiarise participants with the timed swim survey protocol . Again, these are available on the EMR [resources](#) page.

## Section 2 – Fish ID Practise Survey

Location	Preparation time	Delivery time
Field	Half day	2 hours + travel

The purpose of the fish ID practise survey is to provide participants with an opportunity to practise fish identification skills in the water without the additional stress of having to also accurately count fish. This will better equip participants to confidently complete a full timed swim survey. You will normally need to visit the site prior to this activity to ensure it's appropriate. This session should include:

- Briefing on safety and logistics, go over survey instructions, etc
- Enter water and complete a 15 min **practise survey** along your pre-defined transects, as per the instructions below
- Wrap up with debrief and discussion

## Section 3 - Timed Swim Fish Survey

Location	Preparation time	Delivery time
Field	Half day	2 hours + travel

The full timed swim fish survey provides a method of collecting data on the abundance of pre-determined key species at a chosen site. This is a more complex survey than the practise survey and is suitable for people who are already confident identifying fish and recording data while snorkelling. As with the practise survey you will need to visit the site to ensure it is appropriate prior to completing the survey. Depending on the group, this activity may be completed on the same day as the practise survey. This session should include:

- Briefing on safety and logistics, go over survey instructions, etc
- Enter water and complete 15 min **timed swim surveys** along your pre-defined transects, as per the instructions below
- Wrap up with debrief and discussion

### Validating data accuracy

A validation process to confirm the accuracy of individual survey data can be completed by running paired surveys with an experienced surveyor and checking that the trainee's data is sufficiently similar to the experienced surveyor.

## Section 4 - Follow-up data processing

<i>Location</i>	<i>Preparation time</i>	<i>Delivery time</i>
Classroom	1 hour	1 hour

Participants can use the data for a range of purposes of their choice. For example, the data could be used to monitor the effectiveness of a conservation programme, analysed in a range of ways to gain a deeper understanding of the local marine ecosystem, or uploaded to [iNaturalist](#) or the online [Reef Savers database](#), where it will contribute to a larger body of data enabling us to gain a better understanding of our marine environment.

# Fish Survey Instructions

These instructions relate to the fish ID practise survey and the full timed swim survey. These surveys provide an effective and simple means for participants to engage with their local marine environment and learn more about its health and functioning. Participants will need to be confident snorkellers and able to identify the fish species listed on the corresponding field sheet. Fish identification should be refreshed during a briefing prior to entering the water.

## Preparation

1. Determine survey transects
  - a. Select transects that are representative of the area of interest and follow the depth contour at a depth of 4-8 m. See **Figure 1** for an example of transects following the depth contour at Goat Island Marine Reserve)
  - b. The transect should be ~ 300-400 m in length and take 15 min to swim at a slow pace (approximately 20-25 m per minute).
  - c. Use landmarks on the shore and underwater to 'fix' transect start and end points
  - d. Mark the transects on a map and keep in a safe place for future reference
  - e. Ideally set up one transect for every 2-4 participants. If you have lots of participants, increase the number of transects as required. Alternatively, groups can repeat transects a set time after the previous survey has been completed.
2. Gather equipment (see equipment list below)
3. Check the tide & weather forecast



Figure 1: Timed swim transects following the depth contour at Goat Island Marine Reserve

## Day of Survey

1. Arrive at the location with plenty of time to set up
2. Check conditions at the site and ensure it is safe to undertake the survey. E.g. wind, waves, tidal currents, water visibility, boat traffic, obstacles, other hazards, etc
3. Take any necessary safety precautions
4. Ensure all field sheets have pencils attached
5. Split into groups of 2-4 per transect
6. Conduct briefing and prepare to enter water

## In the Water

1. For the full timed swim survey, from the beginning of each transect swim slowly along the full length of the transect following the 4-8 m depth contour. Time yourself and adjust your pace so you take 15 min to complete the transect.
2. As you swim, record **counts** of all the fish species that are listed on your field sheet that you observe within a width of 4 m either side of the transect.
  - a. Alternatively, for the fish ID practise survey just record the **presence** of each species you identify until you are confident enough to both ID and count fish accurately
3. Keep track of the time and ensure you stick to the designated duration for each transect
4. Pause briefly throughout the survey to discuss fish ID if required (pause timer)
5. At the end of each transect ensure all data is entered correctly onto your field sheet
6. Move to the location of the next transect and repeat

### ***Remember!***

Swim as quietly as possible to avoid disturbing the fish. Keep arms close to body, move slowly and keep fin kicks below the surface.

## Post Survey

1. Upload data and any photos to an online database e.g. [iNaturalist](#) or the [Reefsavers database](#)
2. Analyse data using any method of your choosing
3. Celebrate and share your findings!

# Equipment List

1. Waterproof watch
2. Survey slate (field sheet) with pencil attached (**Figure 2**). If you don't have a printed PVC slate you can print and laminate the field sheet (**Appendix 1**)
3. Snorkelling equipment
4. Fish ID guide
5. Waterproof camera (if available)

<b>Name:</b>		<b>Date:</b>	
<b>Location:</b>		<b>Weather:</b>	

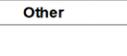
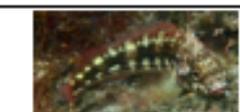
Species		Transect ID:	Transect ID:
		Start time:	Start time:
		Visibility (m):	Visibility (m):
Tāmure/ Snapper			
Nanua/ Red Moki			
Marari/ Butterfish			
Kokiri/ Leather-jacket			
Ahuruhuru/ Goatfish			
Grey-mullet			
Sweep			
Blue-maomao			
Triplefin			
Other			

Figure 2: Survey slate (field sheet) set-up

# Appendix 1 Field Sheet

Name:		Date:	
Location:		Weather:	

Species	Transect ID:	Transect ID:
	Start time:	Start time:
	Visibility (m):	Visibility (m):
Tāmure/ Snapper 		
Nanua/ Red Moki 		
Marari/ Butterfish 		
Kokiri/ Leather-jacket 		
Ahuruhuru/ Goatfish 		
Grey- mullet 		
Sweep 		
Blue- maomao 		
Triplefin 		
<b>Other</b>		