

# A guide to using the Fish Passage Assessment Tool

New Zealand  
Fish Passage  
Advisory Group



## Why is fish passage important?

Many of New Zealand's freshwater fish species need to move between habitats to support their different life stages and ecological needs (eg for spawning, rearing young, feeding and finding refuge). Some species, like whitebait and eels, even move between fresh water and the sea.

In-stream structures, such as culverts, weirs and dams, can delay or prevent fish movements if they are not well designed, installed or maintained. This can reduce the distribution (number of places they can be found) and abundance (quantity) of some of our most iconic and valued freshwater species.

Today, more than 70% of our native freshwater fish are threatened.



## What is the Fish Passage Assessment Tool?

An easy to use, practical assessment tool has been developed to identify, assess and prioritise potential barriers to fish passage. The New Zealand Fish Passage Assessment Tool (FPAT) helps to assess the likely impact of an in-stream structure such as a culvert, weir or ford on fish movements along a waterway. The tool is a freely available mobile application for both iOS and Android operating systems.



## Who should use the tool?

FPAT has been designed for regulators, government agencies, asset managers, consultant ecologists, maintenance contractors, landowners and citizen scientists.

## How to install the app

Visit the [Google Play Store](#) or [Apple App Store](#) using your mobile device and search for 'NIWA Citizen Science'. Alternatively follow the direct links to the **Android** or **iOS** versions of the application and install it on your device.

**Advice note:** You will need a Google account to log in. If you do not have a Google account, you can create one by visiting [google.co.nz](https://google.co.nz).



Department of  
Conservation  
Te Papa Atawhai



Te Kāwanatanga  
o Aotearoa  
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## Complete a survey to assess a structure

- › Open the NIWA Citizen Science mobile app and tap on the **Fish Passage Assessment Tool** to start. Make sure you are logged in via your Google account.
- › Answer all questions in the survey (\* identifies compulsory fields). For additional guidance on how to answer, go to the full FPAT User Guide at [fishpassage.niwa.co.nz](http://fishpassage.niwa.co.nz).
- › Once **Structure type** is chosen, a set of specific questions relevant to that structure type will be asked.
- › Add photographs that show the upstream and downstream sides of the structure.
- › Record any fish passage improvements that have been attempted to enhance fish passage at the structure and rate their effectiveness. If you are unsure, rate the effectiveness as **Not assessed**.
- › Barriers can sometimes protect native species or habitats from the impacts of invasive species, including exotic and native fishes. This can be recorded in the app under the **Protecting native species or habitats** field.
- › If you want to record a structure that has been removed, go to the **Structure type** list and tap on **Structure removed**.

The screenshot shows the 'Fish Passage Assessment' app interface. At the top, there is a blue header with a back arrow and the text 'Fish Passage Assessment'. Below the header, the 'Structure type' field is highlighted with a red asterisk and the text 'What type of structure is being assessed? Flap gate = flood/tide gate'. A red '- required' label is positioned below the field. A dropdown menu is open, displaying a list of structure types: Culvert, Ford with culvert, Ford without culvert, Weir, Dam, Flap gate with culvert, Flap gate without culvert, Pump station, and Natural. The 'Upstream' and 'Downstream' sections are partially visible below the dropdown.

## What do I need to take with me?

You will need to take a:

- › charged phone or tablet with built-in camera, GPS and stopwatch (if not available on your phone, bring these separate items)
- › tape measure
- › tennis ball, orange or mandarin (for the flow velocity check)
- › back-up paper survey form (find a link to this form at the bottom of the page at [niwa.co.nz/freshwater/management-tools/fish-passage-assessment-tool](http://niwa.co.nz/freshwater/management-tools/fish-passage-assessment-tool))
- › pen or pencil.

**Advice note:** Take a buddy to help you complete the survey, and make sure you have covered all the health and safety requirements before going to the site.

## Working offline

You can work offline in FPAT by taking the following steps.

- › Tap on a new **Fish Passage Assessment** on the Citizen Science app home page and load a survey.
- › When you have loaded a survey, if you know the area that you will be surveying, tap on **Location** to open the map. Zoom in to the area where you will be doing surveys. This will cache the maps for that area. Once you have completed this, tap **OK**.
- › Next, tap on **NZSegment** to open the map of digital river network reaches. Zoom in to the area where you will be doing surveys. This will cache the maps for that area. Once you have completed this, tap **OK** or the **Back** button.
- › You are now ready to carry out an offline assessment.

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## How to submit a survey

- › Once you have completed the survey, you can either submit your survey or save it for later.
- › To submit your answers to the **fish passage database**, tap **Submit**. Note that submitting surveys will use mobile data. If you do not have a Wi-Fi connection, consider saving your surveys for later and submitting them once you have a Wi-Fi connection.
- › To save your answers so that you can return to them later, tap **Save for later**. Your saved surveys will appear at the bottom of the home screen under **Saved surveys**. The most recent one will be at the top. You can rename your draft surveys by swiping left and selecting **Rename**.
- › To upload all saved surveys at once, tap **Upload all**. Individual surveys can be also uploaded or deleted by swiping left and using **Delete/Upload**.

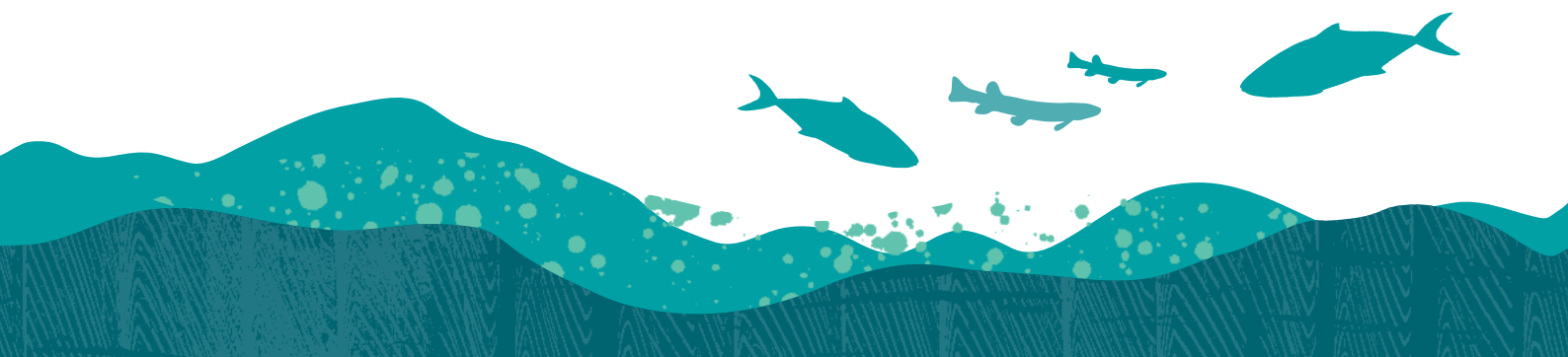
## How can you use this information?

- › The information is automatically uploaded to a national fish passage database and can be viewed and downloaded from the Citizen Science website [fishpassage.niwa.co.nz](http://fishpassage.niwa.co.nz), where you can look at particular catchment areas, structure types, fish passage risk ratings and national statistics.



**Advice note:** Risk rankings and prioritisation scores are calculated overnight and will not be available until the day after the records have been submitted on the mobile application.

Information on the following pages will help guide your answers to the questions in your fish passage assessment. For additional guidance on how to answer, go to the full FPAT User Guide at [niwa.co.nz/freshwater/management-tools/fish-passage-assessment-tool](http://niwa.co.nz/freshwater/management-tools/fish-passage-assessment-tool).



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## Structure type

(Left to right) V-notch weir, broad-crested weir, stepped weir, sharp-crested weir.



Photo: NIWA



Photo: NIWA



Photo: Paul Franklin



Photo: Sjaan Bowie

(Left to right) Culverts (images 1–2), flap gates (images 3–4).



Photo: Sam Ammon



Photo: Mark Pennington



Photo: Paul Franklin



Photo: Paul Franklin

(Left to right) Ford (with culverts), ford (without culverts), pump station.



Photo: NIWA



Photo: NIWA



Photo: NIWA

(Left to right) Multi-span bridge, single-span bridge, dam (more than 4 m high), natural barriers (images 4–5).



Photo: NIWA



Photo: NIWA



Photo: NIWA



Photo: NIWA

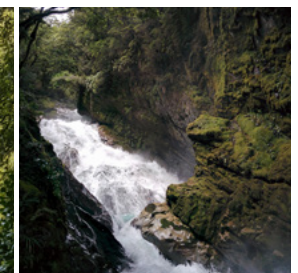


Photo: NIWA

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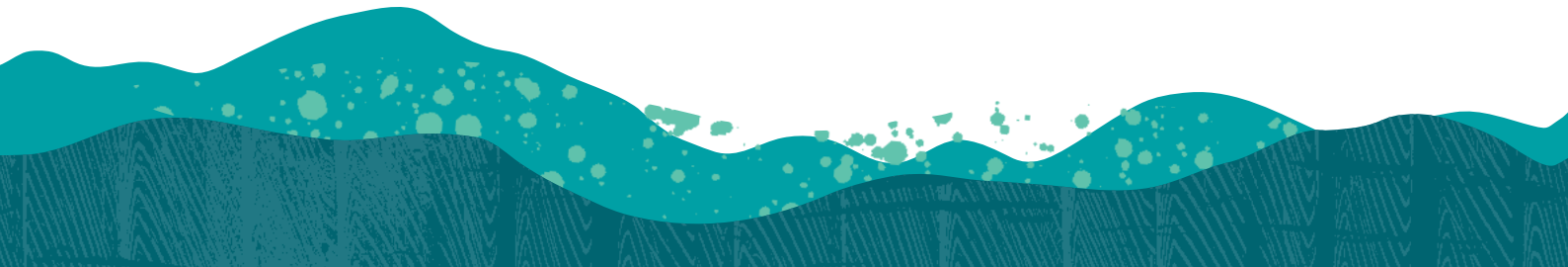


Survey question	Quick guide
<b>Location</b>	<ol style="list-style-type: none"> <li>1. The application uses your phone's GPS to determine your location.</li> <li>2. Stand as close to the structure you are about to assess as is safely possible.</li> <li>3. Tap on the <b>Location</b> icon to confirm the location of the site to be assessed.</li> <li>4. A map of the local area will open, with a red dot marking your location.</li> <li>5. You can move the map by dragging it with one finger.</li> <li>6. You can zoom in and out on the map using a two-fingered pinching motion.</li> <li>7. Tap and hold the exact location on the map where the structure you are assessing is located. This will move the red dot to that location.</li> <li>8. When the red dot is in the right place, tap <b>OK</b> to confirm the location.</li> </ol>
<b>NZ Segment</b>	<ol style="list-style-type: none"> <li>1. A map will be displayed with the digital river network and NZSegment numbers overlaid.</li> <li>2. Tap on the nearest stream to highlight that section.</li> <li>3. Tap on <b>Select river segment</b> to confirm the NZSegment number the structure is located on. Click on the box and the segment should change from blue to red. You should then return to the main stream.</li> </ol> <p><b>Advice note:</b> This information is required to calculate priority scores. However, there is an option to select <b>Not on the digital river network</b> if needed.</p>
<b>Re-survey</b>	<ol style="list-style-type: none"> <li>1. Tap on <b>Previous survey point</b> if you are repeating a survey at a site that already exists in the database.</li> <li>2. If you do not know if your site has previously been assessed, you can also check by clicking on the re-survey section.</li> <li>3. A map will be displayed showing your location and the location of any records that are already in the database.</li> <li>4. If you are re-surveying an existing site, tap on that site to select it.</li> <li>5. This will load the existing location data and link this assessment to the existing record in the database.</li> <li>6. You will still be required to select the NZSegment.</li> <li>7. Tap on the icon next to <b>NZSegment</b>.</li> <li>8. A map will be displayed with the digital river network and NZSegment numbers overlaid.</li> <li>9. Tap on the nearest stream to highlight that section (it will change from blue to red and a box will come up with a number that you will need to tap on).</li> <li>10. Tap on <b>River segment</b> to confirm the NZSegment number that the structure is located on. You will then return to the main screen and a number will be in the NZ Segment area.</li> </ol>

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<p><b>Stream width / bankfull width</b></p>	<p><b>Structure add-ons</b> Ancillary structural elements that are part of the overall structure (eg headwalls, wing walls, fish ramps and debris screens).</p>
<p><b>Asset ID / Asset owner</b></p>	<ol style="list-style-type: none"> <li>1. If you know the <b>Asset ID number</b> for the structure, enter it using the keypad.</li> <li>2. Select an <b>Asset Owner</b> from the drop-down list if you know who owns / is responsible for the structure.</li> </ol>
<p><b>Culverts</b></p>	<p><b>Advice note:</b> <i>If there is more than one culvert barrel (ie you are assessing a multi-barrel culvert), you will have to complete the questions on <b>Culvert barrel characteristics</b> for each culvert barrel. You can do this by tapping on the + next to <b>Repeat this question</b> to repeat the questions for the next culvert barrel.</i></p>
<p><b>Culvert slope options</b></p>	<p><b>Key dimensions of a culvert</b></p>
<p><b>Culvert alignment options</b></p>	<div style="display: flex; justify-content: space-around;"> <div data-bbox="643 1585 938 1915"> <p><b>Wetted margins</b></p> </div> <div data-bbox="1121 1585 1417 1915"> <p><b>Recirculation zones</b></p> </div> </div>



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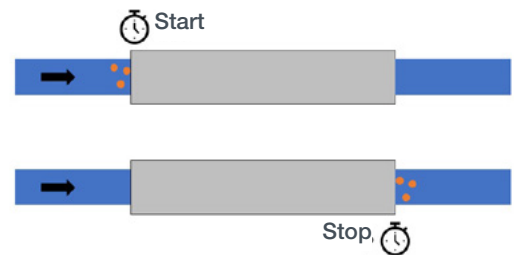
## Flow velocity

To measure flow velocity, place a tennis ball, mandarin or stick upstream of the structure and time how long it takes to float through the structure.

To get a more reliable estimate, repeat the measurement (or use several floats) to get an average water velocity.

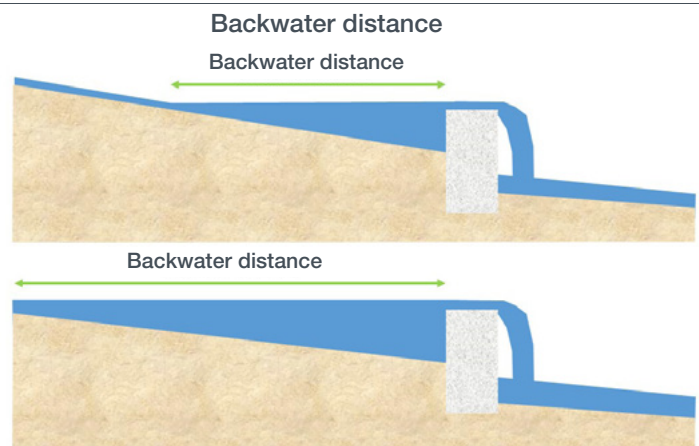
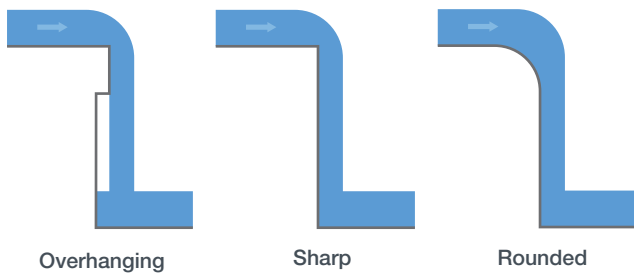
Having a hand net to catch the floats at the downstream end is useful.

Ensure the float is gently placed in the waterway and not thrown from a distance (as the 'bob and bounce' can cause a substantial lag in float time).



$$\text{Water velocity (m/s)} = \frac{\text{Culvert length (m)}}{\text{Time taken for float to pass through culvert (s)}}$$

## Crest types



## Key dimensions of a weir

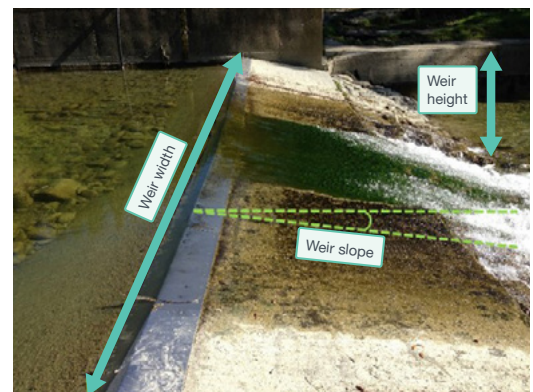


Wetted margins present



Wetted margins absent

## Wetted margin



For more information, visit [doc.govt.nz/fishpassage](https://doc.govt.nz/fishpassage) or contact your local council or Department of Conservation office.