Fish Passage

in the

Tasman District

Update report

May 2006

Tasman District Council

Fish Passage in the Tasman District

Document Status: Final Draft

This report provides results of a survey of culverts, bridges and flapgates in coastal Tasman and Eastern Golden Bays to assess the extent of restriction or impedance to passage of fish to and from the sea. A summary of the fish barrier inventory is also provided.

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Cover Photos: Top left: Tidal Floodgates in Golden Bay. Top Right: Overhanging culvert creating a fish barrier in Golden Bay, Below Left: A glass eel Bottom right: Inanga

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Executive Summary

New Zealand's indigenous freshwater fish are a significant part of our country's biodiversity. The majority of these fish species migrate from freshwater environments to marine environments and return to spawn. Man-made in-stream structures can severely impede and in some cases prevent fish passage of both indigenous and introduced fish. In these cases this may isolate potentially productive upstream habitat. Therefore, to maintain or enhance the distribution, diversity and abundance of freshwater fish it is important to address the issue of fish passage.

This report provides results of a fish passage survey carried out by Tasman District Council in the summers of 2004-05 and 2005-06 as well as providing a summary of information held in the TDC Fish passage inventory. These surveys assessed a total of 209 structures on waterways in Tasman Bay and Golden Bay. All major floodgates and stream crossings by roads were assessed in much of this area within 0.5 km of the coast.

The aim of the survey was to identify in-stream structures and assess their ability to allow passage for indigenous freshwater fish according to established assessment protocols. **Thirty-three percent of structures (70) assessed were found to have a high potential to restrict fish passage at some or all flow conditions**. The remaining 67 percent allowed unrestricted fish passage at all flows. The total number of potential barriers listed in the inventory now stands at 126 (including results of this survey, Fish & Game, TDC Inventory of floodgates and tidegates and hydrology weirs).

The majority of structures which imposed restriction on fish passage were culverts which overhung the water surface on the downstream side of the structure at medium to low flows. Blockages around and within structures was also a contributing factor in restricting fish passage in this survey and could be alleviated by increased monitoring and maintenance of in-stream structures.

It is recommended that greater consideration should be given to consenting and maintenance of structures such as culverts that affect fish passage. Features such as wetted margins and low flow velocity channels need to be incorporated into the design of in-stream structures to improve the potential of fish passage. Once surveys in coastal Tasman and Golden Bay are complete, a plan to restore fish passage should be drawn up to prioritise fish barriers for modification or removal. Streams nearest the coast are considered most important because the biodiversity of streams is greatest within 5km of the sea. Priority should also be given to removing barriers which restrict access to areas of high quality habitat.

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1 Introduction

1.1 Background

New Zealand's indigenous freshwater fish are a significant part of our country's biodiversity and native fauna. The majority of these fish species are diadromous (18 of the 35), meaning that they migrate from freshwater environments to marine environments and return to spawn. Potential barriers like waterfalls, rapids and chutes are natural, however the majority of barriers found in the district are man-made. Man-made in-stream structures can severely impede and in some cases prevent fish passage of both indigenous and introduced fish. In these cases this may isolate potentially productive upstream habitat. Therefore, to maintain or enhance the distribution, diversity and abundance of freshwater fish it is important to address the issue of fish passage and provide for effective fish passage to link the coastal environment to the fresh water environment present in streams and rivers. By maintaining or enhancing the life-supporting capacity of waterways for fish we also do the same for birds that feed off fish such as Kingfishers and Herons.

Within the Resource Management Act (1991) and Conservation Act (1987) provisions have been made that protect the habitat of introduced and indigenous freshwater fish. Regional and Unitary Councils have clear responsibility under the Resource Management Act (RMA) to monitor the effectiveness of its management of structures built within waterways and to maintain the aquatic habitat and life-supporting capacity of these water bodies. The provision of fish passage for in-stream structures has been a legislative requirement in New Zealand since 1983, and there has been a requirement since 1991 to ensure the sustainable management of natural and physical resources. The erection and on-going use of any structure in, on, or over the bed of lakes and rivers can only be undertaken where expressly provided for in a regional or proposed regional plan or by virtue of a resource consent. Currently the only proposed or operative regional plan pertaining to in-stream structures in the Tasman District is the Transitional Regional Plan (TRP). With the exception of small dams, the TRP does not provide for the construction of any in-stream structures as of right and a resource consent is required. A dam is only allowed as a Permitted Activity subject to meeting certain conditions, including that the catchment area above the dam is under 20 hectares and the dam crest is less than 2 metres high . Most of the regional councils in New Zealand have carried out extensive surveys of in-stream structures that may restrict fish passage. Several Councils have advanced region or catchment-wide plans that prioritise structures for removal or modification to enable fish passage.

In-stream structures, including those located on land owned by TDC and stream flow monitoring weirs, must comply with the requirements of the RMA. Where structures do not comply with the RMA, fish passage should be restored across a catchment in a staged fashion. Such a programme should be defined by a schedule of works which defines the number and location of structures to be repaired over what timeframe.

To design a new culvert or structure that allows for regular fish passage is straight forward and no more expensive than those that act as barriers. Some examples of well-designed culverts are shown in Figure 1 A, 1C & 1D below. Modification of existing structures can be achieved. For example spoilers can be bolted on to the base of the culvert (see Figure1B).

Figure1; A: Top left: A fish-friendly culvert showing the natural stream bed filling the base. Figure B: Top right: The use of spoilers can be used to create resting places for fish that can only sustain short bursts of swimming in high velocity water. Figure C & D: With multiple barrels some can be set deeper to ensure passage at low flows.

Until recently only limited information about fish passage barriers in the Tasman District has been collected. However, this has been supplemented by a database produced by Fish and Game (Deans, N. *pers comm*.) and a listing of 'v'-notch weirs for stream flow monitoring. This data as well as experience from other regions show that fish passage barriers are common and in many cases an important limiting factor for stream productivity and biodiversity. In a report commissioned by TDC about the Motueka Delta, it was suggested that some of the lower Motueka River's former values could be restored or enhanced with some imaginative and adaptive management (Tuckey et al, 2004). An example of this would be the installation of control structures that both protect productive land from flooding but also allow better fish passage. Other than the main channel of the Motueka River, all creeks are controlled by some form of floodgate or flood control such as a stopbank. Tidal floodgates are designed to open only when there is sufficient head of water behind them to open the gate as the tide drops. Once the head is lowered the gates close. This means that for a migratory fish wanting to get past this structure there is only a small opportunity in time in which to break through the opening. In many cases the velocities generated at the outlets are more than most migratory species can cope with.

Fish and Game have some examples of where fish barrier removal can lead to a large increase in fish density such as in the Baton River. However, it must be emphasized that fish barriers should not be removed in many cases. It has been shown in many cases that barriers that exclude trout can enhance native fish biodiversity as trout over 130cm are well known to prey on native fish.

This TDC survey aims to build on this knowledge and, if warranted, find ways to minimize and manage the problem of fish passage. An inventory of potential barriers and impedances has been compiled and will be updated as new information comes to light.

1.2 Aims:

1. To record the presence of potential fish barriers in an inventory to assist in the planning of stream restoration projects for biodiversity enhancement and the prioritization thereof.
2. To assist in explaining fish distribution patterns which is critical information for many Assessment of Environmental Effects provided for Resource Consent Applications.
3. Once enough information is collected fish barriers can then be prioritized for rehabilitation.

1.3 Methods:

The area of the survey was limited to coastal streams from Richmond to Golden Bay but due to time constraints the area of central and west Golden Bay and Motueka-Riwaka was not assessed. For each individual potential fish barrier the following was recorded: river name, descriptive location, grid reference, type of barrier (e.g. over-hanging culvert, weir, or ford), water velocity and flow estimate, photographs and comment about quality of fish habitat upstream and downstream of the structure. Information was gathered to a modified version of the NIWA '*Fish Passage at Culverts'* publication (see field sheet in Appendix 1). Each site surveyed was classified on the likely severity of Fish passage restriction, the following categories where used: none/minimal, low flows, most flows and high flows. The 'most flows' category was subdivided into fish passage impedances (those that may limit some fish from getting through) and fish passage barriers. This assessment took about 20-25 minutes per site.

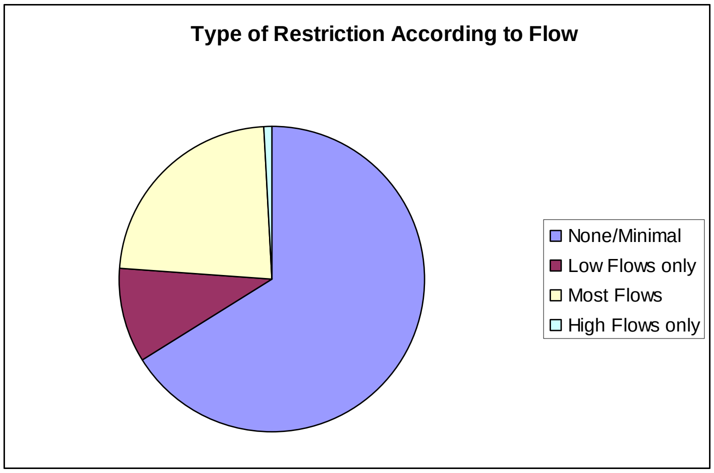
TDC stormwater reticulation plans were consulted to define the locations of reticulated waterways. The TDC Roading Asset Monitoring and Management Database (RAMM) was consulted to determine the location of Council-owned and operated culverts.

2 Results

2.1 Identified Fish Passage Restrictive Structures

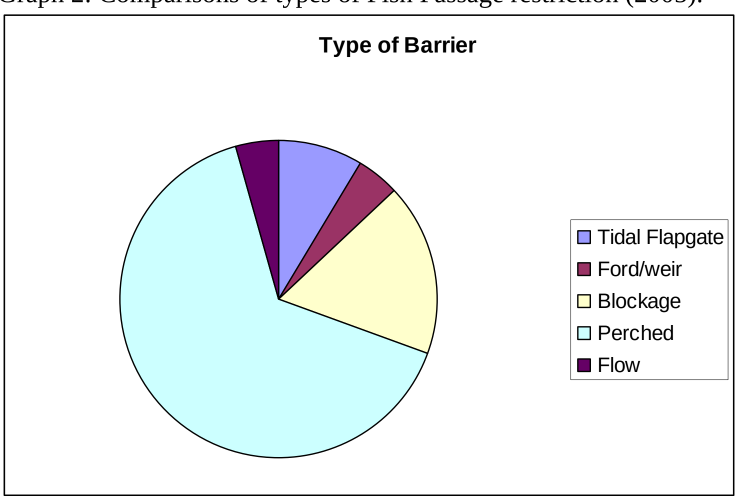
A total number of 209 sites where surveyed, of these 33% (70 individual structures) were considered to restrict fish passage to some degree. Of the structures assessed as barriers, 67% were identified restrictions at most flows, 30% were barriers at low flows and only 3% were barriers at high flow (see Graph1). High flow barriers form usually as a result of high velocity through the barrel of a culvert.

Graph 1: Percentage graph of Fish Passage Survey Results (to March 2006).



The majority of structures that where assessed as significant barriers to fish passage were overhanging or perched outlets to culverts (46). In addition the other fish passage restrictions can be grouped into blockages within structure (12), weirs/fords (5), tidal flap gate's (6), culvert size impeding flow velocity (3) (Graph 2).

Graph 2: Comparisons of types of Fish Passage restriction (2005).



The fish habitat including riparian vegetation, channel sinuosity and profile heterogeneity was often poor for the reaches that were assessed up and down stream of the barrier. However, there were numerous examples of where such habitat was being enhanced. The removal of a significant barrier on Reservoir Creek is planned for the middle of 2005 and another has been removed from a tributary of Reservoir Creek. The majority of native bush and natural ecosystems in the Tasman District are inland, yet it is nearest the coast where the highest potential fish biodiversity is located. Therefore, maintaining fish passage to these areas will provide significant improvements in the available freshwater habitat for fish..

2.2 Examples of Urban Fish passage Barriers/ Impendence:

Figure 2 and Figure 3 are examples of concrete structures which are acting as fish passage barriers due to a number of factors, but in particular the limitation of flow and vertical height differential.

Figure 2: Reservoir Creek, Marlborough Terrace Easby Park.

Figure 3: Jimmy Lee Creek at upstream Washbourne Gardens.

Figure 4 is an example of a riprap rock structure which has been placed in-stream to increase water level above to form a pond. As the wetted surfaces are very undercut at low flows this becomes a fish passage impedance for small fish with poor climbing ability such as Inanga. In this particular case the pond formed is also a potential thermal barrier due to the shallow un-shaded nature of the pond created behind it.

Figure 4 Reservior Creek Rock structure, Near Salisbury Rd.

Figure 5 is an example of a culvert which is a fish passage barrier due to its vertical height above the creek and its overhanging nature. This particular structure has since been removed in a redevelopment.


Figure 5: Reservior Creek Culvert, tributary Kareti Dr (now removed).

2.3 Examples of Rural Fish Passage Barriers/Impendence:

Figure 6 is an example of a culvert which is poorly maintained and is dilapidated to a state that it has become a fish passage impendence. This particular culvert also inhabits flow limiting the wetland behind it from being flushed.

Figure 6:Kaiteriteri inlet, wetland outflow.

Figure 7 and Figure 8 are examples of culvert pipes which have a large vertical drop creating a fish passage barrier, due to the distance from the creek bed. These particular examples have a low flow during dry periods; the upstream habitat is an important feature to take into account when considering improving fish passage.

Figure 7: Reservior Creek, Walkway

Figure 8: Memorial Carin Park, Riwaka-Kaiteriteri Rd

Figure 9 is an example of a culvert system which is a fish passage impendence due to flow velocity in the culvert pipes. If flow velocity exceeds 3.5 ms^{-1} it is considered a potential barrier for fish passage. In this example the culverts are considerably narrower than the creek width creating the problem associated with flow velocity. This is only a barrier for 2- 4 hours at near-low tide. Fish gather below the culvert trying to move upstream and are then vulnerable to predation.

Figure 9: Nieman Ck, Queens St

3 Discussion

The number of catchments affected by in-stream fish passage barriers in the Tasman District appears to be considerable, based on the initial findings of this survey. However the representativeness of this survey is questionable as the range of landuses, stream gradient, geology and erodability is not covered in the proportion that they exist in the working landscape. The disproportionate number of urban streams represented in this survey showed a higher density of barriers than is likely for the region as a whole. For example 10 barriers were found on Reservoir Creek alone. Streams with steeper gradient and softer geology are more likely to have in-stream structures that become barriers when contrasted with those having flat gradient and hard sediment such as cobbles. This assumption is based on fieldwork, which has found that hilly soft sediment areas where more prone to a fish passage restriction (this has also been indicated by other work Boubee *et al.* 1999, Barnes 2004).

Fish passage barriers are likely to affect abundance, distribution and diversity of fish species (including both indigenous species as well as introduced species such as trout). Potential fish passage barriers and impedance differ between species of fish, a potential barrier to a swimming fish will differ to a potential barrier to a climbing fish. Therefore it is desirable to identify the species in the waterway to assess fish passage restriction due to in-stream structures. This is an objective for this project once it has reached a greater level of survey coverage.

4 Conclusion

The maintenance of fish passage is very important in order to maintain or enhance the life-supporting capacity of waterways, particularly in terms of fish density and diversity. Fish passage barriers are prevalent in the Tasman District and many of these are likely to cause adverse ecological effects. The majority of structures which restrict fish passage are culverts which overhang the water surface on the downstream side of the structure at medium to low flows. These situations usually arise from poor initial culvert design and installation, and poor maintenance of the culvert resulting in bed erosion at the outfall (particularly during storm events). Culvert size, in relation to stream width and channel capacity, is an important feature as this affects the flow velocity and erosion potential. Many culverts have, in the past, been installed with considerations of hydraulic capacity only (i.e. avoiding flooding) and little thought given to the need of fish passage. However, the construction of fish friendly structures can easily be achieved by incorporating a number of simple measures when designing and installing such structures without compromising their hydraulic performance. Measures such as maintaining wetted margins, low flow velocity channels to avoid wide shallow flows (such as across a concrete apron), avoiding vertical drops by providing suitable ramps and/or cascading flows, should be incorporated into the design of in-stream structures to improve the potential of fish passage. Blockages around and within structures was also a contributing factor in restricting fish passage noted in this survey, which could be alleviated by increased monitoring and maintenance of in-stream structures.

5 Recommendations

It is recommended that the following be undertaken to improve the management of structures in waterways:

- Surveys of fish passage be completed for the Motueka-Riwaka areas and Coastal Golden Bay to 5km inland over the next 2 years.
- Increase the functionality of the inventory/database so photos and the inventory can be viewed as a GIS layer on Explore Tasman.
- Consideration should be given to fish passage effects as well as hydraulic effects when consenting the construction, maintenance, or removal of structures (under s13 or the RMA),
- Specific requirements for fish passage and provision for best practice guidelines be included in Part 4 of the Tasman Resource Management Plan (currently being drafted). This chapter of the Plan deals with structures within the beds of waterways.
- Greater provision should be made for maintenance of structures such as culverts that affect fish passage. Responsibility for maintenance should be clearly identified at the point of subdivision.
- In-stream structures that do not comply with the requirements of the RMA for fish passage should be restored across a catchment in a staged fashion. Such a programme should be defined by a schedule of works which defines the number and location of structures to be repaired over what timeframe. Where restoration of fish passage is not practicable or reasonable, then a resource consent should be sought to permit continued occupation. This is of particular relevance to TDC as a significant number of structures are owned or are located on land owned by TDC.
- Once surveys in coastal Tasman and Golden Bays are complete, a plan to restore fish passage should be drawn up to prioritise fish barriers for modification or removal. Streams nearest the coast are considered most important because the biodiversity of streams is greatest within 5km of the sea. Priority should also be given to removing barriers which restrict access to areas of high quality habitat. Some barriers should be retained due to one or more of the following:

- Structure prevents saline water adversely affecting productive land and groundwater eg tidal flap gates.
- Structures being prohibitively expensive or impractical to remove eg substantial dams and some urban culverts such as on Jimmy-Lee Creek.
- Barriers that exclude predatory fish such as trout or pest fish to preserve native biodiversity.

In these cases, a resource consent is likely to be required if one is not already held

- Run a predictive computer model, which includes fish barriers, for fish presence or absence in Tasman District's waterways. This will have particular use for consenting officers who need ecological information when processing resource consents.
- Tasman District Council resource science, compliance and engineering staff, Fish and Game and Department of Conservation field staff could be asked to record basic information about potential fish passage barriers such as the river name, descriptive location, grid reference, type of barrier (e.g. over-hanging culvert, weir, and ford), photograph and comment about quality of fish habitat. This information is very quick to collect and could be undertaken on a casual or incidental basis by personnel who have little technical knowledge of fish capability or behaviour. Engineering staff have this summer begun assessing such structures for different reasons but there is opportunity to integrate with fish passage assessments in the interests of efficiency.
- Department of Conservation runs a "Whitebait Connection Programme" Waimaori which we could cooperate with to fix barriers where this is due.

Suggested Criteria for prioritising fish barrier rehabilitation:

1. Length of waterway upstream of the barrier
2. Continuously flowing streams are generally a higher priority compared to ephemeral streams.*
3. Uniqueness and quality of habitat upstream of the barrier
4. Tidal flapgates are more important than flood gates*
5. Cost-effectiveness – if the barrier is already earmarked for repair* (as indicated on the engineering assets database) then this could be cost-effective to address multiple issues at the same time.

* This information is included in the Inventory of Engineering Assets

Table 5.1 below shows a proposed project management plan for fish passage.

THE KEY QUESTIONS:	TASKS TO ANSWER THESE QUESTIONS:	ORGANISATIONS RESPONSIBLE	TARGET COMPLETION DATE
1. How many suspected barriers are there in Tasman District? What is the make up of different types of barriers?	• Fish passage surveys mainly thru coastal areas– (note: this assessment will not be extensive in inland areas but may be extended)+ • Meeting with Fulton Hogan & TDC roading engineers to discuss future possibilities for ongoing fish passage assessment of road culverts	• TDC - TJ • TDC – TJ to lead. Steve Elkington to organise meeting	March 2007 June 2006
2. Are any fish getting up any suspected barriers?	Fish distribution surveys upstream and downstream of selected suspected barriers	TDC, DoC, F&G, Cawthron, iwi (Motueka ICM tidal flapgate survey)	Oct 2006
3. What is the priority of barriers to remove? Based on what criteria?	• Desktop analysis based on criteria listed • Regular meetings with TDC Engineers & key contractors to discuss removal of priority barriers	• TDC, with review from DoC, F&G, Cawthron, iwi (meeting to discuss) • TDC – TJ to lead	May 2007
4. Are tidal gates / floodgates actually serving the intended useful purpose? Eg protecting aquifers from saline intrusion, protection from flooding.	• Analysis of certain 'gates with conductivity loggers, and levels to find out likely extent of saltwater wedge. • Map GW zones and vulnerability to saline intrusion • Monitor groundwater in zones of various vulnerability	• TDC – TJ • JT, GS (TDC), Tim Davie (LR) • JT, GS (TDC), Tim Davie (LR)	May 2008 May 2008 May 2008
5. Are there other ways to manage saline intrusion or flooding? Eg manually or automatically closing or opening flapgates as needed.	• Trial alternative flapgate management & designs with willing owners of 'gates eg Motueka farmer near the sewage treatment plant. • Meeting with TDC engineers to discuss the findings.	• Mot ICM – RY (Cawthron) • (TJ & Cawthron)	May 2008
6. Are there fish behaviour factors that control fish passage? Eg size of gap or length/size of culvert barrel.	Use DIDSON camera to look at behaviour of various fish species in combination with the above trial.	Mot ICM – RS (Cawthron)	May 2008

6 Inventory of Potential Fish Passage Barriers

An inventory, or database, of potential fish passage barriers has been setup to assist with waterway management, including stream ecological rehabilitation. Included in this inventory are sites identified by Fish and Game (Nelson-Marlborough) and Department of Conservation as well as the Tasman District Council inventory of dams (including weirs used for hydrological gauging), consents database and data from the fish barrier survey of summer 2004-05. Currently the number of potential fish barriers on this inventory for Tasman District is 133.

While only a small part of the region has been surveyed to date it is hoped that in the future this programme could be continued so that a fuller picture of the issue of fish passage in the Tasman District is obtained. Other than the recent survey, most potential fish barriers in the inventory have yet to be inspected and properly recorded.

6.1 Road crossings

Rural road crossings have been identified as a potential source of fish passage barriers (Figure 10). Adequate culvert size, placement, as well as maintenance can provide problems for both water flow and fish passage. The Ministry for the Environment has produced a document with guidelines for appropriate farm culvert and bridge structures which allow for fish passage (Ministry for the Environment. Culvert and Bridge Construction: Guidelines for Farmers, 2004). There are a number of other suitable guidelines for design of culverts such as "Fish Passage at Culverts – A Review, with Possible Solutions for New Zealand indigenous species" (Boubee et al1999) and Fish Passage Guidelines for the Auckland Region, Auckland Regional Council Technical publication 131

6.1.1 Single Barrel Culverts

Single barrel culverts, such as shown in Figure 5 and 10 are the most common type of fish barrier, typically due to the overhang at the downstream end but also from high water velocity.

Figure 10: Farm crossing near the Motupipi Inlet, Golden Bay.

6.1.2 Fords

Fords can create large restrictions on water flow and fish passage (Figure 11), these can occur in both urban and rural environments. Forestry fords have been identified as a potential fish passage barrier problem (Figure 12).

Figure 11: Reservoir Creek Concrete Ford downstream Templemore Pond – Removed in 2005 (Scale 1.0 m).

This structure is due for removal in mid 2005.

Figure 12: Station Creek ford

Exotic Forests have many roads; many of these have structures which restrict fish passage due to poor design. Culverts and Drains can provide restricted fish passage access to waterways and creeks. Figure 13 is an example of a forestry culvert which is restricting fish passage.

Figure 13: Example of a forestry culvert acting as a barrier to fish passage.

6.1.3 Multi Barrelled culvert Bridges

Multi barrelled culvert bridges (Figure 14 and 15) can pose a potential Fish passage barrier for different reasons; flow velocity, blockage, Perched and overhanging heights.

Also having a concrete apron attached makes a shallow wide shelf which can inhabit passage by jumping fish which need to obtain thrust from deeper water. New designs are available which try to limit these factors e.g. Baigent Bridge.


Figure 14: Ford at Dart River, Wangapeka

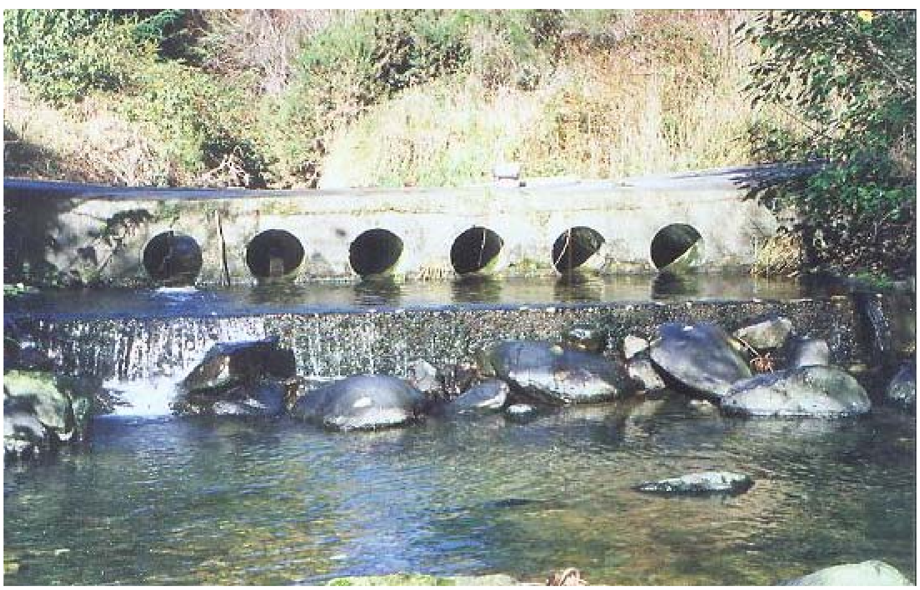


Figure 15: Ford at Middle Roughn's Creek.

6.2 Dams

Dams can be potential fish passage barriers due to the nature of the structure and design. There are approximately 260 dams in the Tasman District, the majority of which are within the Moutere. Although dams are usually a physical barrier to most fish species, with provision for reasonable residual flow, good habitat and good management they can have a positive effect on fauna. Currently a dam can be constructed as a Permitted

Activity if the catchment is under 20ha in size in the Tasman District. Most waterways with catchments of this size are ephemeral in nature and contain few natural pools and so are more likely to have limited habitat value for fish.

Figure 16: Emergency overflow spillway on Jimmy-Lee Creek at Retention Dam in Washbourne Gardens

6.3 Coastal Structures

Coastal structures such as tidal flap gates are potential fish passage barriers (Figure 17). The Engineering department has provided an inventory of known coastal tidal flap gates which will be surveyed as part of this ongoing project. There are 28 known and maintained tidal flap gates owned by the TDC, the majority of these structures are in the Waimea, Motueka and Riwaka coastal areas.

Figure 17: Wai Atua Stream Tidal Flap gate.

6.4 Hydrology Weirs

Within the region a number of river flow measuring sites utilise weirs that are potential fish passage barriers or impedances (Table 2), these structures can be easily retro fitted to minimize the impact that they have on fish passage. Figures 18 and 19 are typical flow measuring weirs which can impede fish passage due to flow velocity and vertical drop. There are 14 of these structures known to the TDC in this region.

Figure 18: Example of Hydrology Weir at the Maitai River (not in Tasman).

Figure 19: Tadmor River, TDC Hydrology weir

7 References

ARC 2000. Fish Passage Guidelines for the Auckland Region, Auckland Regional Council Technical publication 131

Barnes,G.E; 2004. Barriers to fish passage in Hunua Ranges and Waharau Regional Parks: a comprehensive survey. Auckland Regional Council.

Boubee, J, I. Jowett, S. Nichols, and E.Williams; 1993. Fish passage at culverts – a review with possible solutions for New Zealand indigenous species. NIWA and D.O.C.

Deans, Neil, Manager Fish & Game, Nelson and Marlborough. Fish Barrier Inventory in Waterbodies Database.

Tuckey, B; Robertson, B; and Strickland, R; 2004. Broad Scale Mapping of Motueka River Intertidal Delta Habitats using Historical Aerial Photographs. Cawthron Report No. 903 prepared for Tasman District Council.

8 APPENDIX

For Fish Passage Assessment Protocols refer to:

Fish Passage at Culverts, A review, with possible solutions for New Zealand indigenous species, NIWA Dec 1999.

For continuation of this project:

Aim:

4. To assist in explaining fish distribution patterns which is critical information for many Assessment of Environmental Effects provided for Resource Consent Applications.
5. To prioritise fish barriers for rehabilitation.

Methods:

Stage 3: Produce a map of Tasman District Council's instream structures (i.e. culverts, weirs, fords etc.) overlain by the NZ Freshwater Fish Database. Analyse patterns of fish distribution based on this and identify potential fish barriers and gaps in the data. Where gaps exist in this national database, predictive fish distribution models such as "Point-Click-Fish" could be used.

Stage 4: Collect fish data (diversity and abundance) upstream and downstream of potential barriers where such data does not exist already to determine whether the structure actually presents a barrier or significant impedance.

Stage 5: Prioritise fish barriers that are either proven to be a significant issue based on fish surveys or are highly likely from similar situations in nearby catchments or where there is significant public pressure.

For legal requirements:

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6. Matter of national importance

(c) The protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna.

7. Other matters

(h) The protection of the habitat of trout and salmon.

Freshwater Fisheries Regulations 1983

Part VI: Fish Passage

42. Culverts and fords –(1) Notwithstanding regulation **41(2)(d)** of these regulations, no person shall construct any culvert or ford in any natural river, stream or water in such a way that the passage of fish would be impeded, without the written approval of the Director-General [of Conservation] incorporating such conditions as the Director-General thinks appropriate.

(2) The occupier of any land shall maintain any culvert or ford in any natural river, stream, or water (including the bed of any such natural river, stream, or water in the vicinity of the culvert or ford) in such a way as to allow the free passage of fish:

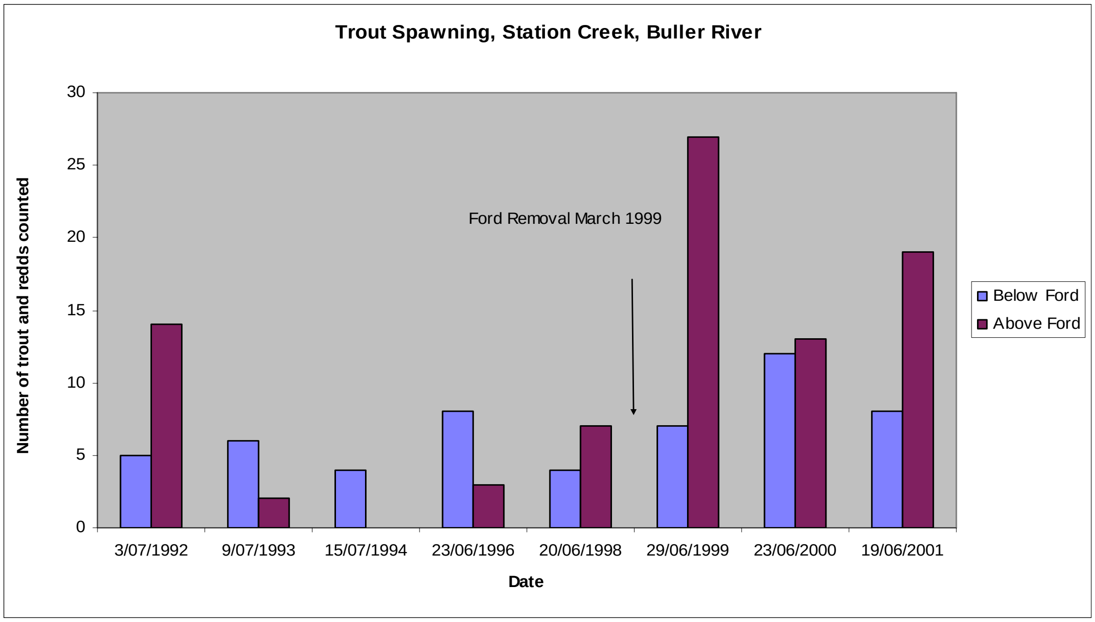
Provided that this requirements shall cease if the culvert or ford is completely removed or a written exemption has been given by the Director –General.

Tables and graphs:

Table 2: Hydrology Recorder site Weirs.

River	Site	Location	Weir type	Owner
Waikoropupu	Bubbling Springs	N25:908405	Flat Sharp edged	Envirolink
Kaiteriteri	Water Supply	?	?	Envirolink
Roding	Caretakers	O27:318832	Bedrock with some concrete	NCC
Roding	Water Supply	O27:323833	Concrete dam	NCC
Stanley Brook	Barkers*	N27:949877	120^o v-notch with a compound rectangular	NIWA
Hunters	Weir	N29:988479	“ “ “	NIWA
Roughns	Weir*	N28:980555	“ “ “	NIWA
Kiwika	Weir*	N28:979502	“ “ “	NIWA
Graham	Weir*	N29:959497	“ “ “	NIWA
Tadmor	Mudstone	M28:876728	Broad crested free drop	TDC
Wai-iti	Belgrove	N28:065726	Rock	TDC
Maitai	Forks	O27:407907	Natural bedrock	NCC
Collins	Drop Structure	O27:547052	Broad crested concrete “drop structure”	NCC
Waiwhero	Gravel Pit	N27:294869	90^o to 150^o v-notch	TDC
Moutere	Old House Road*	N27:102970	Broad crested v-notch	NIWA
Pigeon Nth Branch	Sharpes Road*	N27:116832	120^o v-notch	NIWA
Pigeon Sth Branch	Bradleys Road*	N27:098812	120^o v-notch	NIWA
Watercress	u/s Dairy Factory	N26:943390	rectangular	Envirolink

Graph 4: Fish and Game Example of fish abundance pre and post Fish Passage barrier removal (Fish & Game).



This graph displays the positive affect that removal of a fish passage barrier can have on the population of fish in a River system. The exact date of construction of the ford is unknown.

FIS<u>H PASSAGE EVALUATION SHEET FOR IN-STREAM STRUCTURES</u>

Site Details Date:……………. Monitoring Officer :…………………………….
Site No.: …………………….. Culvert Asset No. ……………………………
Stream Name:……………………………….. at ………………………………..

River System (Catchment):……………………………
Co-ordinates: (GPS) E…………………………… N……………………………

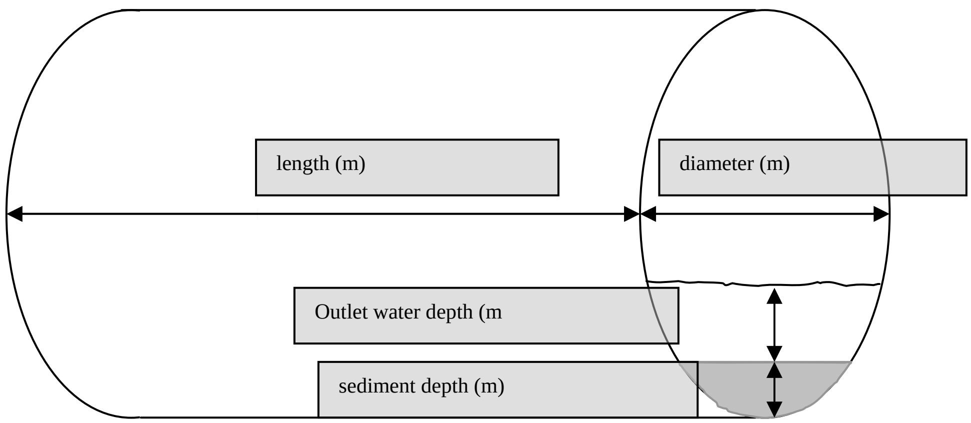
Photos: INLET: # ……….. ……… ……… OUTLET: # ………. ....

Barrier Description: Culvert Concrete Slab Ford with……/ without Culverts Other………

Culvert type: Pipe / Box / Arch / Corrugated Pipe / Tidal Flap-gate

Materials: Concrete / Steel / Corrugated iron / HDPE Plastic

Ford / Weir: V-notched / Vertical **Height (m): ………………..**



Estimate of Slope: ……….....................

Culvert cross section :

Inlet Flat Pooled Perched

Outlet Flat Pooled Perched

- For perched culverts provide an estimate of water fall (for multiple culverts note maximums only):

Overhang Height (m)……….… Undercut length (m)…………

Blockages: None Inlet Within Barrel
Incurrent Velocity Estimate (ms $^{-1}$) : ………….

Likely Severity of Fish Passage Restriction:
None/Minimal Low flows Most flows High flows

0.2

STREAM ATTRIBUTES

Stream Bed level: Above culvert invert / Same as culvert invert / Below culvert invert

Stream Width: Narrower than culvert inlet / Same as culvert inlet / Wider than culvert inlet

Stream Gradient: Flatter than culvert / Same as culvert / Steeper than culvert

Stream Alignment relative to culvert:
Straight in & out / Straight in & curved out / Curved in & straight out / Curved in & out

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Bed Material

	Plants%	Silt/mud%	Sand%	Gravel%	Cobbles%	Boulders%	Bedrock%
Upstream							
Downstream							

Water flow during inspection: Low Normal High

Other Attributes

Bank Erosion at Culvert Exit: Severe (undercut & collapsing) / Mod / Minimal

Other Comments:

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Plan view Sketch:

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