

# SHEIRDRIM RENEWABLE ENERGY DEVELOPMENT

## Technical Appendix 8.2: Fish Habitat Assessment

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## Summary

This report has been prepared by SLR Consulting Limited (SLR) on behalf of Scottish Power Renewables (SPR). It presents the findings of a Fish Habitat Assessment (FHA) carried out during May 2019 within the Sheirdrim Renewable Energy Development site and a review of existing fish data for the larger catchments further downstream of the site. As part of the FHA a separate River Habitat Survey (RHS) was undertaken within the four largest catchments in order to provide further data for each watercourse.

The data collected were used to determine the potential of each watercourse to offer suitable habitat for fish species of conservation importance (e.g. salmonids and lamprey). This report also draws upon data previously collated by Argyll Fisheries Trust (AFT) as part of their baseline fisheries monitoring within the Clachan Burn, Allt Mor and Larachmor Burn catchments.

The Clachan Burn exhibits a wide range of salmonid habitats both within the site and further downstream within the catchment. Juvenile salmonid fish were observed within the Clachan Burn, although several barriers to fish migration in the form of chutes and falls were recorded. Salmonid fish were however observed both upstream and downstream of these barriers, though it is unknown what the effect of these barriers is upon the resident fish population. In 2005 the AFT recorded brown trout, Atlantic salmon, river lamprey, brook lamprey, European eel, rainbow trout, minnow and flounder in the Clachan Burn catchment, downstream of the site boundaries. Overall the Clachan Burn and Clachan Burn NE were considered to provide medium habitat suitability for migratory fish.

The Allt Mor catchment provided areas of good fish cover, though these were limited to short sections of channel associated with Loch Ciaran. Several barriers to fish migration upstream of Loch Ciaran were recorded in the form of chutes and falls. No suitable fish spawning habitat was identified within the site, and no fish were observed within the Allt Mor as part of the habitat survey. Data provided by the AFT indicate that Atlantic salmon, brown trout, European eel, flounder and rainbow trout were present within the lower Allt Mor catchment in 2005. Loch Ciaran is used for trout fishing and so it is reasonable to assume that trout from the loch (rainbow or brown) will enter the Allt Mor during periods of elevated river flow e.g. winter. The part of the Allt Mor catchment closest to Loch Ciaran was considered to provide medium habitat suitability for migratory fish while all other sections of the Allt Mor catchment within the site boundary were considered to provide low habitat suitability.

Within the Claonaig Water catchment the Larachmor Burn provided limited fish cover and no fish were observed. No suitable spawning habitat was identified within the site and water levels within the burn were low at the time of survey. Several falls and chutes were impassable to fish and data provided by the AFT indicate that whilst juvenile brown trout and Atlantic salmon are present further downstream within the Claonaig Water, the distribution of fish is restricted by a waterfall 2km downstream of the site boundary. The Larachmor Burn was therefore considered to provide low habitat suitability for migratory fish.

The remaining watercourses and burns within the site provided poor instream habitat, no spawning areas were identified, and these watercourses were considered to be only suitable for minor fish species such as stickleback and minnow. These include the Alltan Fhearachair, Allt a'Chreagain and Allt a'Chreagain catchments, as well as the burns entering Loch Freasdail, Lochan a' Chreimh, Loch nad Gad and Lochan Fraoich. Of these watercourses only the Alltan Fhearachair catchment provided any potential fisheries habitat downstream of the site, though it is likely that the majority of any fish population is located only where the burn meets Loch Tarbert.

<sup>1</sup> The site boundary has changed since completion of the FHA, with some areas previously included within the site now excluded. The survey area used for the FHA therefore includes some areas which no longer form part of the site. The survey area boundaries are shown in Figure 8.2.1 alongside the current site boundary.

## 1.0 Introduction

SLR was commissioned by ScottishPower Renewables (SPR) in May 2019 to undertake a Fish Habitat Assessment (FHA) of the watercourses within the Sheirdrim Renewable Energy Development Site (the proposed Development)<sup>1</sup> (Figure 8.2.1) to inform the Environmental Impact Assessment (EIA) for the proposed Development.

The purpose of this report is to determine the potential of each watercourse to offer suitable habitat for fish species of conservation importance (e.g. salmonids and lamprey). The FHA was supported by a River Habitat Survey (RHS) at six locations to characterise land-use and sensitive aquatic receptors within 50m either side of each watercourse channel.

### 1.1 Background

In April 2019, SPR submitted an EIA scoping report and a request for a scoping opinion from the Scottish Government Energy and Consents Unit (ECU) in respect of the proposed Development, in line with Regulation 12 of The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017.

As part of stakeholder response to this scoping opinion request Marine Scotland (MS), Fisheries Management Scotland (FMS) and the Argyll District Salmon Fishery Board (ADSFB) highlighted that the proposed Development may have the potential to affect watercourses that contain migratory fish populations. The species of interest within the responses are Atlantic salmon (*Salmo salar*) and sea trout/brown trout (*Salmo trutta*). It is also noted via the generic development advice issued by FMS and MS that other species, such as lamprey (*Petromyzon sp.* and *Lampetra sp.*) and European eel (*Anguilla anguilla*) may also be of concern. All these fish species are of conservation importance within Scotland.

### 1.2 Site Description

The site, centred on NGR 181302 657098 and shown in Figure 8.2.1, is located at the northern end of the Kintyre Peninsula, and wholly within the Argyll and Bute Council administrative area (the Site). The western part of the Site comprises commercial plantation forestry and existing forestry tracks around Sheirdrim Hill (186m AOD). Upland moorland/wet grassland is dominant within the eastern and south eastern extent of the Site. Topography generally rises to the south from circa 70m AOD at the Site entrance to circa 270m AOD in the south east, particularly around Cruach nam Fiadh. There are two lochs within the Site (Loch Chorra-riabhaich and Loch Lurach) and several others in the immediate vicinity, including Loch Freasdail (north east), Loch Cruinn (north east), and Loch Ciaran (south west). Other large hills to the south include Cnoc Creagach (215m AOD), Cnoc an t-Seallaidh Bhig (248m AOD), Cruach Achaidh Ghlais (244m AOD) and Cruach Tamalabh (242m AOD).

### 1.3 Purpose of this Report

The primary aims of the FHA and the RHS were to:

- provide data on the physical characteristics of the watercourses within the Site along with an assessment of fish habitat within these watercourses;
- identify the extent of natural and artificial (man-made) features along the banks of the watercourses and



- provide an indication of the main geomorphological processes operating in these watercourses;
- identify the extent of any potential salmonid spawning and nursery areas; and
- provide an assessment of the quality of riverine habitats present within each catchment.

This report presents the findings of the FHA and the RHS. The assessment of impacts resulting from the proposed Development and the development of mitigation, compensation and enhancement measures (if required) is beyond the scope of this report and is presented separately within the main EIA Report.

## 1.4 Evidence of Technical Competence and Experience

The survey and reporting were led by Steve Coates BSc (Hons), CWEM, CBiol, MIFM, Principal Aquatic Ecologist with SLR. Steve has over twenty-five years' experience in conducting fish habitat surveys and was assisted on-site by Ben Heath, who is an Ecologist at SLR Consulting.

## 1.5 Relevant Legislation and Policy

Atlantic salmon and their spawning areas are afforded protection under the Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003 which, amongst other actions, makes it an offence for any person who injures or disturbs any salmon spawn; or disturbs any spawning bed or any bank or shallow in which the spawn of salmon may be<sup>2</sup>. Three species of lamprey in Scotland, namely sea lamprey (*Petromyzon marinus*), river lamprey (*Lampetra fluviatilis*), and brook lamprey (*Lampetra planeri*) are listed on Annex IIa of the Habitats Directive<sup>3</sup> and Appendix III of the Bern Convention<sup>4</sup>.

Water pollution offences within Scotland are contained in the Water Environment (Controlled Activities) (Scotland) Regulations 2011 (known as the Controlled Activities Regulations or 'CAR')<sup>5</sup>. It is an offence to carry out a controlled activity (unless it is authorised under these Regulations) and controlled activities include:

- activities liable to cause pollution of the water environment;
- any activity likely to cause a direct or indirect discharge, into groundwater of any hazardous substance or other pollutant; and
- any other activity which directly or indirectly is likely to have a significant adverse impact on the water environment.

Within the Site boundary two watercourses have been designated by the Scottish Environment Protection Agency (SEPA) as surface water bodies under the EU Water Framework Directive (WFD)<sup>6</sup>. These are:

- The Clachan Burn is a river (WFD ID: 10246), the main stem is approximately 8.2 km in length; and
- Allt Mor (u/s Loch Ciaran) is a river (WFD ID: 10248), the main stem is approximately 3.5 km in length.

Fisheries data are used from both the Clachan Burn and Allt Mor to derive WFD biological classification results<sup>7</sup>. The WFD establishes a framework for the protection of inland surface waters (rivers and lakes), transitional waters (estuaries), coastal waters and groundwater. The aim is that all aquatic ecosystems and their water needs should attain 'good' WFD status through the delivery of River Basin Management Plans (RBMP).

The Clachan Burn in 2017 was classified overall as 'poor' WFD status. At a biological WFD tool level fish have been classified as being 'poor' and in relation to barriers to fish migration this has also been assessed as being 'poor'. As such SEPA would aim to improve the current WFD status for the Clachan Burn via their programme of measures described within the RBMP for Scotland 2015-2027<sup>8</sup>.

Allt Mor (u/s Loch Ciaran) in 2017 was classified as 'high' WFD status. As such, the water body should not deteriorate in relation to its WFD biological classification (including barriers to fish migration) and should not deteriorate in relation to its chemical and hydromorphological status.

## 2.0 Methodology

This section of the report sets out the methods of gathering the information to support the preparation of this report.

### 2.1 Scope of the Report

The objectives were to provide baseline information to inform the EIA, as follows:

- Desk-based review targeting data for salmonid and lamprey species within the river catchments associated with the site;
- Fish habitat assessment; and
- A River Habitat Survey (RHS) within the main catchments in order to support the fish habitat assessment.

### 2.2 Desk Study

A desk-based review of all available information was undertaken. The Argyll Fisheries Trust (AFT) was contacted in May 2019 in order to gain an understanding of the fish populations within the catchments identified in Table 2-1. Reports and data provided by the AFT were reviewed along with other national resources, which include:

- The SEPA Water Classification Hub<sup>9</sup>; and
- Ordnance Survey (OS) base mapping.

AFT data provided information for the fish populations and fish habitat associated with the river catchments that flow through the site, i.e. the Clachan Burn, Claonaig Water and Allt Mor rivers. The desk-based review also assessed catchment data and reports for these watercourses downstream of the Site boundary.

The AFT survey sites are generally located within the lower catchment and these survey locations are typically downstream of the Site. Therefore, one of the main aims of the desk-based assessment was to identify watercourses and channels that had no baseline fisheries data or habitat assessments, which in turn formed the focus of the site-based surveys. Satellite and geodetic mapping were studied prior to undertaking any field work, with watercourses and survey sites identified using these sources. Locations and sites requiring further investigation were transferred to a field GPS prior to the site visit.

As part of the desk-based review a watercourse coding system was developed specifically for the project and

<sup>2</sup> [http://www.legislation.gov.uk/asp/2003/15/pdfs/asp\\_20030015\\_en.pdf](http://www.legislation.gov.uk/asp/2003/15/pdfs/asp_20030015_en.pdf)

<sup>3</sup> <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:01992L0043-20070101>

<sup>4</sup> <https://www.coe.int/en/web/conventions/full-list/-/conventions/treaty/104>

<sup>5</sup> <http://www.legislation.gov.uk/ssi/2011/209/contents/made>

<sup>6</sup> <http://www.legislation.gov.uk/asp/2003/3/contents>

<sup>7</sup> <https://www.sepa.org.uk/data-visualisation/water-classification-hub/>

<sup>8</sup> <https://www.sepa.org.uk/media/163445/the-river-basin-management-plan-for-the-scotland-river-basin-district-2015-2027.pdf>

<sup>9</sup> <https://www.sepa.org.uk/data-visualisation/water-classification-hub/>

each proposed sampling site was given a unique code. The first two letters relate to the river or watercourse e.g. CB = Clachan Burn. In all cases UB = Unidentified Burn and relates to a watercourse that has no name within OS base mapping or within the SEPA Water Classification Hub. Numbers after the letters within the coding system relate to the position of the site within the catchment i.e. the lower the number the further up the catchment the site is. Thus, CB7 is the lowest site surveyed within the Clachan Burn catchment and CB1 is the highest upstream site. Full details of the fish habitat survey and site codes can be found within Appendix 1.

**Table 2-1**  
**River Catchments Identified within the Sheirdrim Renewable Energy Development Site**

River Catchment	Watercourse Name	Supporting Information	Site Code(s)
Allt a'Chreagain	Allt a' Chreagain	One survey site identified.	AC1.
Alltan Fhearachair	Alltan Fhearachair	Five survey sites identified.	AF1, AF2, AF3, AF4 & AF5.
	Unnamed Burn 1	One survey site identified.	AFUB1.
	Unnamed Burn 2	One survey site identified.	AFUB2.
	Unnamed Burn 3	One survey site identified.	AFUB3.
Allt Mor	Allt Mor (u/s Loch Ciaran)	SEPA WFD water body ID: 10248; Two survey sites identified.	AM1 & AM2.
	Loch Ciaran	Six survey sites identified around the lake.	AMLC1, AMLC2, AMLC3, AMLC4, AMLC5 & AMLC6.
	Unnamed Burn 1	One survey site identified.	AMUB1.
	Unnamed Burn 2	One survey site identified.	AMUB2.
	Unnamed Burn 3	One survey site identified.	AMUB3.
Clachan Burn	Clachan Burn	SEPA WFD water body ID: 10246; The NE tributary is named on OS base mapping as Clachan Burn but is not designated as a WFD water body. Seven survey sites identified.	CB1, CB2, CB3, CB4, CB5, CB6 & CB7.
	Clachan Burn NE	NE tributary of Clachan Burn is upstream of NGR NR78427 56396 Three survey sites identified.	CBNE1, CBNE2 & CBNE3.
	Unnamed Burn 1	Two survey sites identified.	CBUB1 & CBUB11.
	Unnamed Burn 2	One survey site identified	CBUB2.
	Unnamed Burn 3	One survey site identified	CBUB3.
	Unnamed Burn 4	Two survey sites identified.	CBUB4 & CBUB44.

River Catchment	Watercourse Name	Supporting Information	Site Code(s)
Claonaig Water	Larachmor Burn	Watercourse is named on OS base mapping but is not designated as a WFD water body. 6 survey sites identified.	LB1, LB2, LB3, LB4, LB5 & LB6.
	Unnamed Burn 1	One survey site identified	LBUB1
	Unnamed Burn 2	One survey site identified	LBUB2.
Loch Cruinn	Unnamed Burn 1	One survey site identified	LCUB1.
	Unnamed Burn 2	One survey site identified	LCUB2.
Loch Freasdail	Unnamed Burn	Two survey sites identified	LFUB1 & LFUB2.
Lochan a' Chreimh	Unnamed Burn	Two survey sites identified	LaCUB1 & LaCUB2.
Loch nad Gad	Unnamed Burn 1	One survey site identified	LNG1.
	Unnamed Burn 2	One survey site identified	LNG2.
Lochan Fraoich	Unnamed Burn 1	One survey site identified	LoFUB1.

## 2.3 Field Surveys

A walk over survey of the Site was undertaken between 13<sup>th</sup> - 16<sup>th</sup> May 2019 to assess the fish habitat and identify any potential spawning and nursery areas for salmonids and lampreys. Measurements of water depth, substrate size and relevant instream and riparian habitat features were noted, with photographs taken at each site. The locations of survey sites were identified during the desk study and are shown in Figure 8.2.1, with the results of the FHA at each location found in Appendix 1. Within each of the WFD catchments and their main tributaries a RHS and FHA were undertaken alongside each other.

### 2.3.1 Fish Habitat Assessment

At each survey site location identified as part of the desk study (Table 2-1), a FHA was undertaken details of which are provided below. Standard FHA methodology was used following guidance published by the Scottish Fisheries Coordination Centre (SFCC)<sup>10</sup>, the Loughs Agency in Northern Ireland<sup>11</sup> and lamprey habitat assessment guidance developed by the European Commission's LIFE Nature programme (Life in UK Rivers)<sup>12</sup>.

Where sites were subject to a RHS then a minimum stretch of 500 m was walked as part of the fish habitat assessment. For sites not subject to RHS SFCC guidance was followed, which recommends that survey stretch lengths should be:

- No more than 100 metres long for rivers of 0 to 4 metres wide.
- No more than 250 metres long for rivers of >4 to 10 metres wide.

<sup>10</sup> Habitat Surveys Training Course Manual (2007). Scottish Fisheries Coordination Centre (SFCC), Marine Scotland Freshwater Laboratory, Pitlochry.

<sup>11</sup> Kennedy G.J.A (1984). Evaluation of Techniques for Classifying Habitats for Juvenile Salmon (*Salmo salar* L.). Proceedings of the Atlantic Salmon Trust Workshop on Stock Enhancement.

Department of Agriculture Northern Ireland (2005). The Evaluation of Habitat for Salmon and Trout. Advisory Leaflet No. 1. Fisheries Division, Stormont, Belfast.

<sup>12</sup> Maitland PS (2003). Ecology of the River, Brook and Sea Lamprey. Conserving Natura 2000 Rivers Ecology Series No. 5. English Nature, Peterborough.

- No more than 500 metres long for rivers of >10 metres wide.

In practice most of each river corridor was walked between survey sites (Figure 8.2.1) with any major barriers to fish migration noted along with any relevant fish habitat features. For example, over 6 km of the Clachan Burn was walked and over 2 km of the Allt Mor was walked upstream of Loch Ciaran.

At each site location sections were assessed via walking the channel and recording detailed information in a standardised way as follows:

- Water depth;
- Water flow type;
- Instream characteristics;
- Bankside characteristics;
- Riparian vegetation; and
- Surrounding land use.

Additional supporting information was also collected as follows to identify the potential causes of unsuitable habitat or lack of fish at each site:

- Bankside fencing and grazing;
- Bankside erosion and collapse;
- Obstacles to fish movement;
- Pollution sources; and
- Bankside and channel modifications.

### 2.3.2 River Habitat Survey

To support the FHA and contextualise the data within a 50 m buffer of each WFD watercourse and the other two largest watercourses within the Site, standard Environment Agency (EA) River Habitat Survey (RHS) methodology<sup>13</sup> was used during the FHA at six sample locations. RHS methodology requires that each length of river is divided into standard 500 m sections of river channel. Each RHS section is walked by a surveyor (either upstream or downstream), from either the left or right bank though this is dependent upon safe/suitable access. For every 500 m section a comprehensive range of physical information and other data are gathered covering the following:

- Bank - composition (material), artificial modifications and other (natural) features (such as side and point bars and eroding cliffs);
- Channel - composition of substrate (if visible), modifications and other features (including for example, exposed boulders, mid-channel bars, islands);
- Flow types – including number of riffles and pools per 500 m section;
- Land use - extending to 50 m distance of bank top;

- Presence of specific artificial features (e.g., culverts, weirs, dams, bridges and fords);
- Presence and extent of alders (diseased or otherwise);
- Presence and degree of shading;
- Presence and extent of woody debris;
- Vegetation – banktop / bankface and in-channel vegetation types;
- Vegetation – invasive species e.g. Himalayan balsam (*Impatiens glandulifera*);
- Channel dimensions;
- Evidence of recent management; and
- Observations of riverine birds, mammals and other associated species.

### 2.3.3 Limitations

#### Desk Study

Desk study data is unlikely to be exhaustive, especially in respect of species, and is intended mainly to set a context for the study. It is therefore possible that fish populations not identified during the data search do in fact occur within the vicinity of the site.

#### Field Survey

The watercourses were surveyed during very dry conditions and several channels were almost completely dry and/or had no perceivable flow. Given the flow-requirements and instream habitats requirements for both salmonid and lampreys throughout the year it is considered that any channel which was completely dry or with no perceivable flow at the time of survey offered limited habitat potential for these species.

Many of the channels within the Site proved to be inaccessible due to the presence of dense coniferous forestry adjacent to each watercourse. These channels were generally small and narrow in nature, had no gravel/cobble substrate and were often dry. As such, they were considered to have low fish habitat potential and be unsuitable for salmonid and lamprey species.

## 3.0 Results

### 3.1 Desk Study

A review of the reports and data made available by the AFT indicate that there are Atlantic salmon, brown trout, European eel and lamprey present within the Clachan Burn, Claonaig Water and Allt Mor catchments<sup>14</sup>.

Within the Clachan Burn AFT Site 7 is closest to the Site and lies approximately 250 m downstream of the application boundary. The fisheries data for the Allt Mor is from the lower catchment (downstream of Loch Ciaran), very close to its confluence with the Clachan Burn in the village of Clachan. Data obtained for the Larachmor Burn are from locations at least 3km downstream of the application boundary<sup>15</sup>.

<sup>13</sup> Environment Agency (2003). River Habitat Survey in Britain and Ireland – Field Survey Guidance Manual: 2003 version, Environment Agency, Scottish Environment Protection Agency (SEPA) & Environment & Heritage Service (NI).

<sup>14</sup> Argyll Fisheries Trust (2007). Clachurn Burn fish population baseline survey report (2005). Knapdale & Kintyre Rivers Survey. Argyll Fisheries Trust Report.

<sup>15</sup> Argyll Fisheries Trust (2000). Unpublished data.

Web-based searches and angling forums were reviewed after the field survey and these suggest that Loch Freasdale (to the east of the Site) and Loch Ciaran (to the west of the Site) are used for trout fishing.

The following is a summary of relevant data and survey reports obtained from the AFT.

### 3.1.1 Clachan Burn

During October 2005, electric fishing surveys were undertaken by the AFT at ten survey sites on the Clachan Burn with the aim of establishing the current distribution and relative abundance of fish and lampreys present in the catchment. Of these six were juvenile fish survey sites and three were lamprey survey sites. These surveys included two 'quantitative area' sites and three 'timed surveys' (AFT Site Codes 1 to 7). Lamprey sites were also sampled for five minutes (AFT Site Code A to C). The sites surveyed are described in Table 3-1.

A total of 94 juvenile Atlantic salmon and 79 juvenile brown trout were sampled during the survey. The mean length of young of the year trout (74.3 mm) was larger than that of salmon (66.1mm). This difference was also consistent across older age groups. A total of five hatchery-reared rainbow trout were sampled at sites AFT2 (131, 136 & 137 mm), site AFT4 (153 mm) and AFT6 (125 mm). A single minnow was sampled at site AFT1. Eels were sampled at all sites except for site five.

A total of nine lamprey ammocoetes of the *Lampetra* species were sampled at two sites in the lower and middle reaches of the Clachan Burn. No lampreys were sampled at Site A, but small eels were present. Two lamprey transformers were sampled at Site B, one brook lamprey (133 mm) and one river lamprey (125 mm). No sea lamprey ammocoetes or transformers were identified in the samples at any of the sites surveyed. Juvenile lampreys are notoriously difficult to identify in the field hence ammocoetes are recorded to family level only.

**Table 3-1**  
**Summary of AFT fish data for the Clachan Burn**

AFT Site Code	Sub catchment	Site	Easting	Northing	Species Present
1	Lower Mainstem	Lower Bridge	175724	656186	Salmon (fry & parr), Brown trout (fry & parr), Eels, Rainbow trout & Minnow.
2	Lower Mainstem	Caravan Park	176248	656111	Salmon (fry & parr), Brown trout (fry) & Rainbow trout.
3	Lower Mainstem	U/S of Footbridge	176389	656058	Eels
5	Middle Mainstem	U/S of Road bridge	177147	656295	Salmon (fry) and Brown trout (fry).
6	Upper Mainstem	D/S of Footbridge	177382	656299	Salmon (fry), Brown trout (fry & parr), Eels & Rainbow trout
7	Upper Mainstem	D/S of Ford	177870	656278	Salmon (fry) and Brown trout (fry & parr) & Eels.
A	Lower Mainstem	Lower Bridge	175724	656186	No lamprey were recorded.

AFT Site Code	Sub catchment	Site	Easting	Northing	Species Present
B	Lower Mainstem	Dunskeig	175787	656207	6 Ammocoetes ( <i>Lampetra</i> sp.); 1 brook lamprey & 1 river lamprey
C	Mainstem	Strathnafanaig	177870	656278	3 Ammocoetes ( <i>Lampetra</i> sp.);

### 3.1.2 Allt Mor

One juvenile fish survey site was sampled by the AFT in October 2005 and Atlantic salmon (fry & parr), brown trout (fry & parr), European eel, flounder and one hatchery-reared rainbow trout (153 mm) were sampled. A summary of the results is found in Table 3-2.

**Table 3-2**  
**Summary of AFT fish data the Allt Mor**

AFT Site Code	Sub catchment	Site	Easting	Northing	Species Present
4	Allt Mor	Upstream of Clachan Burn confluence	176385	656035	Salmon (fry & parr), Brown trout (fry & parr), Eels, Rainbow trout & Flounder.

### 3.1.3 Larachmor Burn

Unpublished data from the AFT also indicate that juvenile Atlantic salmon and brown trout are present with the Larachmor Burn. It is understood that a waterfall between AFT Site 7 and AFT Site 8 limits the access of migratory fish to the upper catchment<sup>16</sup>. It would therefore be reasonable to assume that the majority of the salmonid fish population within the Larachmor Burn and their spawning areas are downstream of this waterfall.

**Table 3-3**  
**Summary of AFT fish data the Larachmor Burn**

AFT Site Code	Sub catchment	Site	Easting	Northing	Species Present
7	Larachmor Burn	Lower, 250m above junction	184900	658300	Salmon (parr), Brown trout (fry & parr).
8	Larachmor Burn	Middle, above waterfall	184800	568100	Brown trout (parr).
9	Larachmor Burn	Upper, Sheepfold	184700	657800	Brown trout (parr).

<sup>16</sup> Argyll Fisheries Trust (2019). Alan Kettle-White, Personal Communication.



## 3.2 Field Survey

### 3.2.1 Fish Habitat Assessment

In total, 53 sites within 10 catchments and one sub-catchment were assessed for their suitability in relation to fish habitat and spawning areas. Descriptions of each section of each watercourse within the survey area are provided in Appendix 1, with a summary of findings for each catchment found in **Table 3-4** and an evaluation of fisheries habitat within **Figure 8.2.2**.

Suitability in relation to fish habitat is scored on an arbitrary scale of low, medium or high and is based upon consideration of a range of factors such as flow type, water depth, substrate type and extent, bankside cover and the presence of potential barriers to fish movement.

**Table 3-4**  
**Summary Fish Habitat Assessment**

Catchment	Observations	Potential Barriers	Suitability
Allt a'Chreagain	No perceivable water flow at time of survey; channel provided poor instream habitat, no spawning areas identified and were considered only to be suitable for minor fish species such as sticklebacks and minnows.	Low flow; Channel generally small and narrow with steep gradients	Low
Alltan Fhearachair	Channel mostly dry at time of survey; channel provided poor instream habitat, no spawning areas identified and were considered only to be suitable for minor fish species.	Low flow; Channel generally small and narrow with steep gradients	Low
Allt Mor	Good fish cover directly upstream of Loch Ciaran (between AM2 and AM1); No suitable spawning habitat observed; No fish observed. Several barriers to fish migration in the form of chutes and falls observed further upstream of Loch Ciaran.	Several barriers to fish migration in the form of chutes and falls observed upstream of Loch Ciaran.	Medium
	The watercourses flowing into Loch Ciaran only provided fish habitat where they met with the loch. Further upstream the channels provided poor instream habitat, no spawning areas identified and were considered only to be suitable for minor fish species.	Low flow; Channels generally small and narrow with steep gradients	Low
Clachan Burn	Water levels were low in the Clachan Burn. Salmonids were observed within the lower reach between sites CB7 & CB6 and potential spawning areas were observed in this reach.	Several low falls and chutes near CB5 were impassable to fish at the time of survey.	Medium
	The unnamed burns surveyed were either dry or had no perceivable flow at the time of survey. These burns were considered to be unsuitable for fish at the time of survey and no spawning areas were identified.	Low flow	Low

Catchment	Observations	Potential Barriers	Suitability
Clachan Burn NE	Water levels were low. Salmonids were observed between sites CBNE1 and CBNE2. Due to the low water levels within the burn these fish were effectively confined within short sections of channel. No spawning areas were observed.	Low flow and chutes and falls downstream of CBNE3	Medium
Claonaig Water	Water levels were low within the Larachmor Burn at the time of survey and no spawning areas were observed.	Several low falls and chutes below LB3 were impassable to fish at the time of survey.	Low
Loch Cruinn	Channel mostly dry at time of survey; channel provided poor instream habitat, no spawning areas identified and were considered only to be suitable for minor fish species.	Low flow; Channel generally small and narrow with steep gradients	Low
Loch Freasdail	No perceivable water flow at time of survey; channel provided poor instream habitat, no spawning areas identified and were considered only to be suitable for minor fish species.	Low flow; Channel generally small and narrow with steep gradients	Low
Loch nad Gad	No perceivable water flow at time of survey; channel provided poor instream habitat, no spawning areas identified.	Channel dry and generally small and narrow with steep gradients	Low
Lochan a' Chreimh	No perceivable water flow at time of survey; channel provided poor instream habitat, no spawning areas identified and were considered only to be suitable for minor fish species.	Low flow; Channel generally small and narrow with steep gradients	Low
Lochan Fraoich	No perceivable water flow at time of survey; channel provided poor instream habitat, no spawning areas identified.	Channel dry and generally small and narrow with steep gradients	Low

### 3.2.2 River Habitat Survey

In total six RHS surveys were undertaken, two within the Clachan Burn catchment, two within the Claonaig Water catchment, one within the Alltan Fhearachair catchment and one within the Allt Mor (upstream of Loch Ciaran) catchment. Details of the RHS site locations are found within Table 3-5 and descriptions of each RHS reach are provided thereafter. Photographs of each RHS reach are provided in Appendix 2.

**Table 3-5**  
**Summary of River Habitat Survey Habitat Assessment**

River	RHS Reach	Site Code	Easting X	Northing Y	NGR
Clachan Burn	RHS 1	CB5	178428	656396	NR 78428 56396
		CB6	178186	656333	NR 78186 56333
		CB7	178033	656325	NR 78033 56325
Clachan Burn NE	RHS 2	CBNE1	179717	656784	NR 79717 56784
		CBNE2	179681	656813	NR 79681 56813
		RHS2 u/s	179334	656724	NR 79334 56724
Larachmor Burn	RHS 3	LB1	182472	655562	NR 82472 55562
		LB2	182918	655694	NR 82918 55694
		LB3	183039	655614	NR 83039 55614
Larachmor Burn	RHS 4	LB4	183106	655714	NR 83106 55714
		LB5	183617	656120	NR 83617 56120
		LB6	183711	656324	NR 83711 56324
Alltan Fhearachair	RHS 5	AF2	179825	658940	NR 79825 58940
		AF3	179677	659044	NR 79677 59044
		AF4	179557	659094	NR 79557 59094
		AF5	179384	659193	NR 79384 59193
Allt Mor (u/s of Loch Ciaran).	RHS 6	AM1	178426	653914	NR 78426 53914
		RHS 6 mid	178339	654088	NR 78339 54088
		AM2	178378	654432	NR 78378 54432

#### RHS Reach 1 - Clachan Burn

In total 648 m of the Clachan Burn was walked from site CB7 to CB5, and the channel form and structure were consistent with a natural burn located within this region of Scotland. There was no evidence of previous channel modification. River banks were generally steep, consisting of boulder, and the bed of the channel was predominantly cobble and boulder.

Filamentous algae was observed within the channel, and within deeper pools salmonids were observed (most likely brown trout). Riparian land use was a mixture of hill farming and broad-leaved woodland, and within 50m of the burn hill farming was prevalent consisting of grazing of livestock within the more improved grasslands of the valley floor. There was no obvious detriment to the structure or form of the channel within this section associated with the adjacent land-use.

Several chutes were observed within the upstream section of the RHS survey reach (Site CB5), which at the time were impassable to fish.

#### RHS Reach 2 - Clachan Burn NE

In total 505 m of the Clachan Burn NE was walked and the channel form and structure were consistent with a small natural upland highland burn located within this region of Scotland. There was no evidence of past channel modification and both banks consist of peat and cobbles, and boulders were evident in both the banks and bed of the channel. Filamentous algae was observed within the channel and salmonids (most likely brown trout) were observed within this reach.

Riparian land use was moorland/heath and hill farming is evident in the form of the grazing of sheep. There was no obvious detriment to the structure or form of the channel within this section associated with the adjacent land-use. Commercial forestry operations cover parts of the higher Clachan Burn NE catchment.

Upstream of RHS 2 the Clachan Burn NE tributary flows under the main access track within the Site via a pipe culvert. Given the channel gradient and instream habitat available it is highly unlikely that fish would be present within the Clachan Burn NE beyond this location.

#### RHS Reach 3 - Larachmor Burn

In total 612 m of the Larachmor Burn was walked as part of the Reach 3 survey. The channel form and structure were consistent with a small natural upland highland burn located within this region of Scotland. River banks were generally steep, and both banks consisted of boulders and peat and both bedrock and boulders were evident within the channel bed. Filamentous algae and club-rush was also observed within the burn.

Land use was moorland/heath and hill farming was evident in relation to the grazing of sheep. There was no obvious detriment to the structure or form of the channel within this section associated with the adjacent land-use. There was no obvious detriment to the structure or form of the channel within this section associated with the adjacent land-use.

Several chutes were observed within RHS Reach 3, which at the time were impassable to fish.

#### RHS Reach 4 - Larachmor Burn

In total 886 m of the Larachmor Burn was walked as part of the Reach 4 survey. The channel form and structure were consistent with a small natural upland highland burn located within this region of Scotland. River banks were generally steep, and both banks consisted of boulders and peat and both bedrock and boulders were evident within the channel. Filamentous algae and club-rush was observed within the channel.

Land use was moorland /heath and hill farming was evident in relation to the grazing of sheep. There was no obvious detriment to the structure or form of the channel within this section associated with the adjacent land-use.

Several large waterfalls (>5 m) were observed within the RHS survey, which were considered to be impassable to fish.

#### RHS Reach 5 - Alltan Fhearachair

In total 612 m of the Alltan Fhearachair was walked as part of the Reach 5 survey. Trees lined the channel and several small cascades were observed. Filamentous algae and mosses were observed within channel, though this was limited by the extent of shading created by bankside tree cover.

Commercial forestry operations were evident within this reach though there was no obvious detriment to the structure and form of the channel within this section. River banks were generally steep, and both banks consisted



of boulders and peat and both peat and boulders were evident within the channel. There was no obvious detriment to the structure or form of the channel within this section associated with the adjacent land-use.

Further upstream of RHS Reach 5 at Site AF1 the channel was dry and overgrown with vegetation. It is considered that it is highly unlikely that fish would be able to migrate any further than this point within the catchment.

#### RHS Reach 6 - Allt Mor (u/s of Loch Ciaran)

In total 500 m of the Allt Mor was walked as part of the Reach 6 survey. The channel form and structure were consistent with a small natural upland burn located within this region of Scotland. There was evidence of past channel modification and both banks exhibited areas of reinforcement in the form stone blocks and concrete. Filamentous algae were observed within channel and submerged fine-leaved plants were observed at the confluence with Loch Ciaran.

There was no obvious detriment to the structure and form of the channel within this section and the bed of the channel was predominantly boulder, with cobbles.

Directly upstream of the footbridge there was an increase in gradient and several small natural waterfalls were observed. The channel substrate above the bridge is a mix of bedrock and boulder and several large waterfalls (>5 m) were observed, which were considered to be impassable to fish.

## 4.0 Conclusions

The conclusions are presented here in relation to each catchment surveyed, which are ranked in their importance for fish habitat. The results of the FHA are also shown in **Figure 8.2.2**.

### 4.1 Clachan Burn Catchment

Nine sites were surveyed in relation to fish habitat along with two RHS sites. Salmonid fish were observed within the Clachan Burn during the fish habitat survey. Data provided by the AFT indicates that juvenile brown trout and Atlantic salmon were present lower in the Clachan Burn catchment in 2005 and that river lamprey, brook lamprey, European eel, rainbow trout (*Oncorhynchus mykiss*), minnow (*Phoxinus phoxinus*) and flounder (*Platichthys flesus*) were also present downstream of the site in 2005. It is likely that within the lower reach of the Clachan Burn at Site CB7 (RHS Reach 1) and further downstream that these species are present, particularly as this section provides good overall instream habitat for juvenile salmonids and suitable spawning areas were observed between.

Within the upstream section of RHS Reach 1 the Clachan Burn significantly changes gradient and several chutes and falls are considered to impede the movement of fish within the catchment. It is therefore likely that only juvenile salmonids and minor fish species are present within the upland section of the Clachan Burn and its NE tributary, especially as juvenile salmonids were observed within the Clachan Burn NE at sites CBNE1 and, CBNE2. Within the upland section of the Clachan Burn spawning areas were limited given that the channel banks and bed of the burn were predominantly peat.

Upstream of RHS 2 the Clachan Burn NE tributary flows under the main access track within the Site via a pipe culvert. Given the channel gradient and habitat present it is highly unlikely that fish would be present beyond this location.

Five un-named burns were surveyed within the Clachan Burn catchment. These channels were either dry or had no perceivable flow. These burns were unsuitable for fish at the time of survey and no spawning areas were identified.

### 4.2 Allt Mor Catchment

In total 11 fish habitat sites were surveyed in the Allt Mor (u/s Loch Ciaran) catchment along with one RHS site. Good fish cover was observed within the Allt Mor directly upstream of Loch Ciaran, but this was limited to a short section of channel after which the gradient changed significantly. Several barriers to fish migration in the form of chutes and falls were observed further upstream of Loch Ciaran. No suitable fish spawning habitat was identified, and no fish were observed within the Allt Mor as part of the survey.

Data provided by the AFT indicates that Atlantic salmon, brown trout, European eel, flounder and rainbow trout were present within the lower Allt Mor catchment in 2005. Loch Ciaran is used for trout fishing and so it is reasonable to assume that trout from the loch (rainbow or brown) will enter Allt Mor during periods of elevated river flow e.g. during winter.

The watercourses associated with Loch Ciaran only provided fish habitat where they met with the loch. The unnamed burns provided poor instream habitat, no spawning areas were identified and were considered only to be suitable for minor fish species.

### 4.3 Claonaig Water Catchment

In total eight fish habitat sites were surveyed within the catchment along with two RHS sites. The Larachmor Burn provided limited fish cover and no suitable spawning habitat was located given that the channel bed was predominantly bed-rock. No fish were observed, water levels were low at the time of survey and several low falls and chutes below Site LB3 were impassable to fish.

Data provided by the AFT indicates that juvenile trout and salmon were present further downstream within the Claonaig catchment in 2000. It is considered by the Trust that the distribution of the fish population is restricted by a waterfall 2 km downstream of the application boundary.

The un-named burns provided poor instream habitat, no spawning areas were identified and were considered only to be suitable for minor fish species.

### 4.4 Alltan Fhearachair Catchment

In total eight fish habitat sites and one RHS site were surveyed within this catchment and the channels were mostly dry at time of survey. Instream habitat was poor, no spawning areas were identified, and the catchment was considered only to be suitable for minor fish species.

### 4.5 Allt a'Chreagain Catchment

In total one fish habitat site was surveyed within catchment and no perceivable water flow was observed at the time of survey. The channel provided poor instream habitat, no spawning areas were identified, and this watercourse was considered only to be suitable for minor fish species such as sticklebacks and minnows.

### 4.6 Loch Cruinn Catchment

In total two fish habitat sites were surveyed within this catchment and the unnamed burns were mostly dry at the time of survey. The channels provided poor instream habitat, no spawning areas identified, and the sites were considered only to be suitable for minor fish species.

#### 4.7 Loch Freasdail Catchment

In total two fish habitat sites were surveyed within catchment and no perceivable water flow was observed at the time of survey. The channel provided poor instream habitat, no spawning areas were identified, and the unnamed burn was only suitable for minor fish species.

#### 4.8 Lochan a' Chreimh Catchment

In total two fish habitat sites were surveyed within this catchment and no perceivable water flow was observed at the time of survey. The channel provided poor instream habitat, no spawning areas were identified, and the unnamed burn was only suitable for minor fish species.

#### 4.9 Loch nad Gad Catchment

In total two habitat sites were surveyed within this catchment and no perceivable water flow was observed at the time of survey. The channel provided poor instream habitat and no spawning areas were identified.

#### 4.10 Lochan Fraoich Catchment

In total one fish habitat site was surveyed within this catchment and no perceivable water flow was observed at the time of survey. The channel provided poor instream habitat and no spawning areas were identified.

# FIGURES







