ARGYLL FISHERIES TRUST
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Argyll & the Islands

Strategic Fishery Management Plan




PHASE 1; 2009 - 2015

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ACCOMPANYING DOCUMENTS

Cover Pictures: *Top left – Lower River Creran, Top right – juvenile salmon, Bottom right – Sweep-netting for sea trout, Bottom left – Catch & release of a Fyne salmon*

Acknowledgements
We thank the Scottish Government, Fisheries Research Services (FRS) and Rivers And Fisheries Trusts of Scotland (RAFTS) for funding, guidance and facilitation of this plan.

1. Introduction

The diverse freshwater resource of Argyll and the Islands sustains a variety of fish species and habitats that are an important part of the region's biodiversity. Fish resources offer a range of fishery opportunities that have the potential to be a significant contributor to the local economy and recreational amenity. Angling also provides social benefits for all age groups, fostering a degree of self reliance, exploration for young people and an understanding and respect for the environment by all. Currently, this potential is not being realised due to a range of factors affecting the productivity of the resource and the subsequent performance of fisheries.

This strategic plan is founded on a wide range of information collected at the local scale that has been collated and interpreted as part of a national fishery management planning initiative supported by Scottish Government and facilitated by River And Fisheries Trusts of Scotland (RAFTS). Further information on the Argyll Fishery Trust (AFT) and the data collected can be accessed via the AFT website.

This plan also seeks to link with other plans and policies to maximise the benefits of a partnership approach to management. At the national scale there are a range of initiatives with common goals that offer benefit to fisheries that include a Strategic Framework for Scottish Freshwater fisheries developed by Scottish Government. The management and improvement of the freshwater resources of Argyll are influenced by the Water Framework Directive administered by the Scottish Environment Protection Agency (SEPA) through the development of River Basin Plans. Management of biodiversity is an important aspect of fisheries management, particularly threatened aquatic species such as the Freshwater pearl mussel. Additionally, at the regional scale there are a number of established and emerging initiatives that are relevant to the management of fisheries including the Argyll & Bute Biodiversity Action Plan and the management of marine resources in Loch Fyne and the Sound of Mull.

There are also a range of other plans and policies that require engagement from fisheries interests to ensure the resource is conserved. These activities include aquaculture, forestry, farming, renewable energy and local development.

1.1. Management mission

This plan seeks to provide a framework for the strategic approach to improving management and regeneration of this unique and renewable resource. As a working document, the plan provides a platform for the fishery management fraternity to engage all stakeholders into the fishery management process. Where appropriate, the plan aims to prescribe activities identified as being beneficial to the performance of fisheries and that promote biodiversity while delivering economic and social benefit to the wider community.

The mission for the strategic plan is to engage all stakeholders into the on-going process of management with an aim to **conserve and restore all native fish populations and their habitats** in Argyll & the Islands for the **benefit of local biodiversity and the fisheries resource**.

1.2. Approach to management

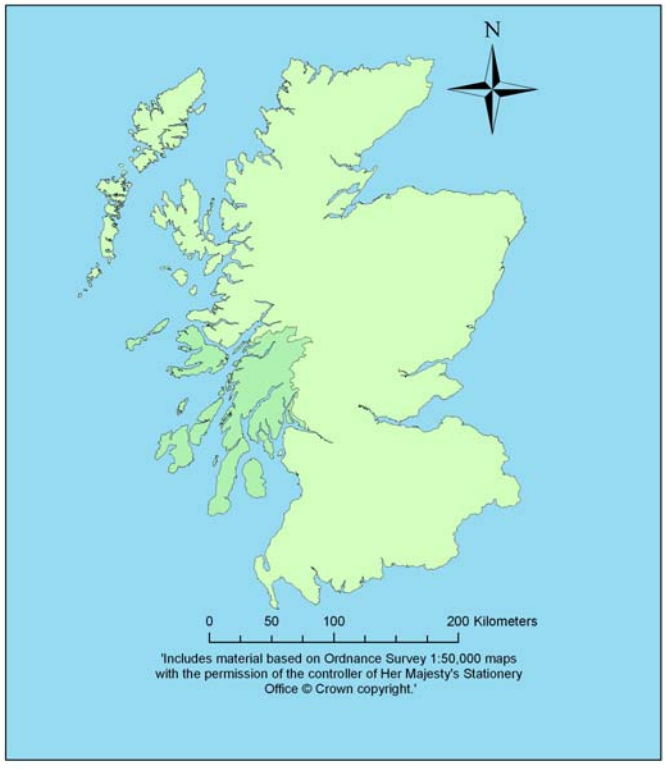
This initial draft of the plan has been formulated on the basis of our current limited knowledge of the fishery resource. Continued science-based investigation of the resource and factors affecting productivity will be essential to improve our understanding and steer our approach to management and provide the best cost benefit.

The current poor status of many fisheries requires a pro-active approach to management, but it is essential to avoid inappropriate activities that may undermine the long-term health of native fish and their habitats. It is also important to recognise where it may be a more effective strategy to take an informed hands-off approach. While taking a pro-active approach to fishery restoration it is also important to react to and defend fisheries from new threats.

An inclusive approach to management is essential to fostering the cross-sector communication required to tackle the many diverse issues affecting fisheries. Gaining widespread support will be essential to securing the level of resources required to tackle significant issues.

1.3. Scope of management

The scope of the plan covers all fish species within the county of Argyll and the islands of the Inner Hebrides. Native fish species utilise a range of diverse habitats epitomised by migratory salmonids that exploit mountain streams and major rivers to coastal waters and the wider ocean. Some of the issues affecting the performance of fisheries, such as marine survival of sub-adult salmon are not well understood and are unlikely to be tackled by local and regional management. Therefore, this plan prioritises activities within freshwater catchments and coastal marine waters, while cooperating with those working to understand the issues affecting the wider marine survival. The plan also seeks to promote beneficial policies developed by national and international management groups at the local scale.



Many of the management activities prescribed require effective sharing of information and resources between fishery interests. Therefore while the plan has been prepared by Argyll Fisheries Trust it will require agreement and cooperation from a range of fishery bodies such as District Salmon Fishery Boards, River and Loch Improvement Associations and riparian owners if it is to play a role in the management of fisheries.

1.4. Plan structure

The contents of the plan are set-out in five sections to provide an insight into the management process and the range of information that has been collated and assessed to establish the proposed management strategy and activities.

Background information on the **fisheries resource of Argyll** (section 2) illustrates the complexity of the fishery resource and its current status. The **factors affecting productivity** (section 3) identify the significant issues that are understood to be affecting the performance of fisheries as well as the gaps in our knowledge that highlight our data and research requirements.

The **Management strategy** (section 4) further describes the basis for management and identifies the potential benefits of management and challenges to be overcome. This section also identifies factors affecting fisheries that will be difficult to overcome in short or medium time scales. The priorities for management and activities that deliver best cost benefit are also considered.

On the basis of current understanding, the management strategy identifies a number of **Management goals and objectives** (section 5) that are perceived to be most beneficial. The range of **Recommended actions** required to meet the plan objectives are summarised (section 6) and the proposed work programme outlined in the appendices (Appendix II). The current status and likely timing of activities have also been defined over the initial six year period to link with the first phase of the River Basin Planning Process.

1.5. Management of the plan

It will be important to ensure that the recommended actions are effective and that the progress of the plan is assessed and adapted accordingly over time. Delivery of the wider benefits of the plan will require a broad ownership and participation by all interested parties. Therefore, the first draft of the plan is likely to be amended according to the level of input from stakeholders through consultation.

The plan seeks to engage and involve a wide range of decision makers operating at the local, regional and national scales (Appendix I), most of which have their own policies and plans that influence or cross-over with fishery management issues. The main organisations with management and planning influence are summarised below;

- **Fisheries interests** – Anglers, owner/managers, River & Loch Improvement Associations (RIA) and District Salmon Fishery Boards (DSFB)
- **Land & water resource users** – Forestry Commission (FC), Argyll Agriculture Forum interests, Aquaculture companies and Renewable energy developers
- **Regulatory bodies** – Scottish Environment Protection Agency (SEPA), Scottish Natural Heritage (SNH) and Argyll & Bute Council (A&BC)
- **Research & management** – Marine Scotland (MS), Colleges & Universities, and Atlantic Salmon Trust (AST)
- **Policy directors** - Scottish Government (SG), Tripartite Working Group (TWG), North Atlantic Salmon Conservation Organisation (NASCO)
- **Resource & wildlife management** (NGO's) – Scottish Native Woods and Scottish Wildlife Trust
- **Resource providers** – Leader, Argyll & Islands Enterprise (AIE), Scottish Agriculture College (SAC) and Argyll RPAC

2. The Fishery Resource of Argyll & The Islands

Argyll & the Islands host a diverse range of freshwater habitats and a mixture of native and introduced fish fauna. There are over 100 rivers supporting migratory fish populations such as Atlantic salmon or sea trout. There are also over 1,000 lochs in the region, most of which support simple communities of native species, such as brown trout and eels. Some support unique Arctic char and Powan populations.

Atlantic salmon support fisheries with economic potential

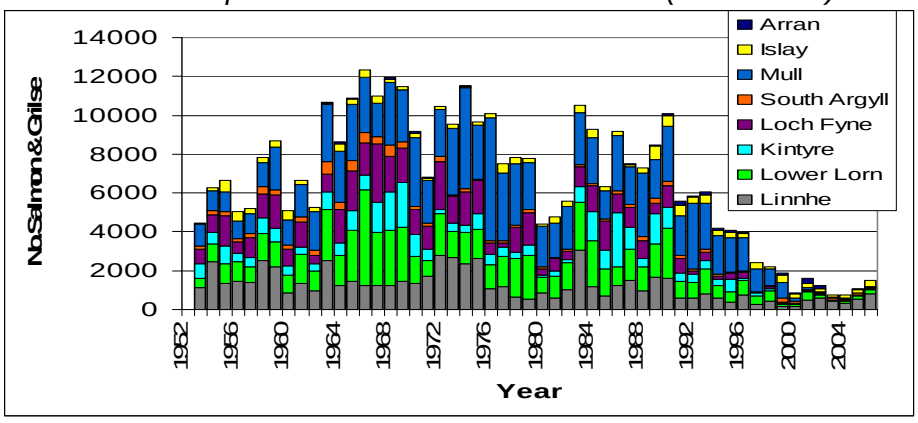
Sea trout are widespread and the focus of many fishery restoration activities

The wealth of the fishery is underpinned by genetic diversity, particularly trout and salmon. Differences between populations of salmonids are expressed in their appearance, performance (growth and longevity) and the timings with which they appear in fisheries, which is of economic importance. Where investigated, this variety has been demonstrated within single catchments in salmon, trout and char populations in Argyll. The unique combinations of genes and environment are therefore a significant biological consideration in the long-term management of native fish.

2.1. Atlantic salmon and sea trout fisheries

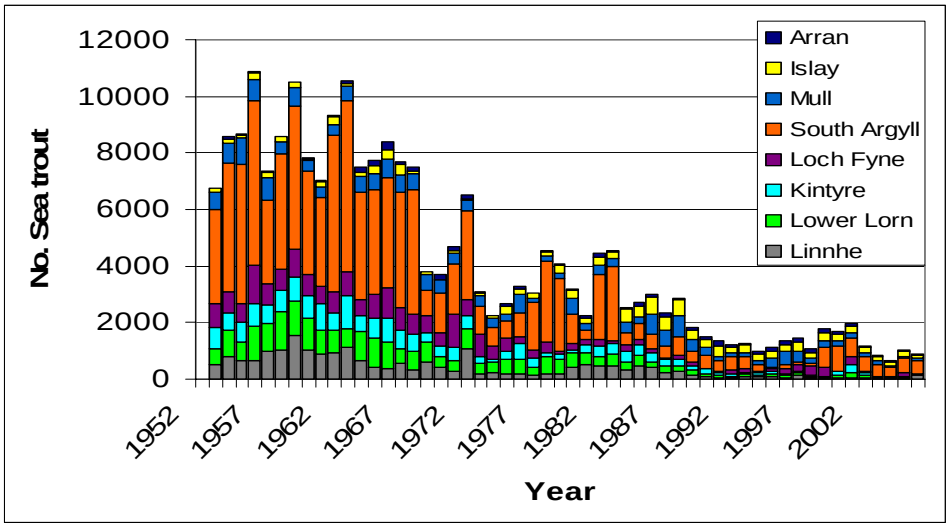
Migratory salmonid fish have formed the basis of the net and rod & line fisheries resource in Argyll & the Islands. Historically these fisheries have been an important source of employment and tourist related income for local communities, but fishery catches of salmon and sea trout have decreased substantially over recent times. Data collected by Marine Scotland (formerly Fisheries Research Service) indicate that the recorded numbers of Atlantic salmon landed in Argyll have declined from a peak of 12,000 fish in the early 1960's to less than 2,000 in recent years.

Trend in reported catches of Atlantic salmon (all methods)



Similarly, the reported number of sea trout landed in Argyll has also declined significantly since the 1960's, although the decline in catches appeared to begin earlier in the 1970s compared to that of salmon.

Trend in reported catches of sea trout (all methods)



The decline in reported catches is understood to reflect a general decline in fish abundance, but in response to falling catches there has also been a reduction in fishing effort.

Fishery responses to declines in catches

Many fisheries have reduced their fishing activity in reaction to long term declines in fish abundance for both economic and conservation reasons. Most coastal net fisheries (net & coble and fixed engines) have closed, partly due to an increase in farmed fish production, which has reduced demand for wild fish for the table. There are also investigations underway for potential to reduce the effect of the remaining mixed stock fisheries that exploit fish from more than one population. Therefore, it is in the interest of conservation that such fisheries in Argyll remain closed and where active, exploitation of fragile stocks avoided.

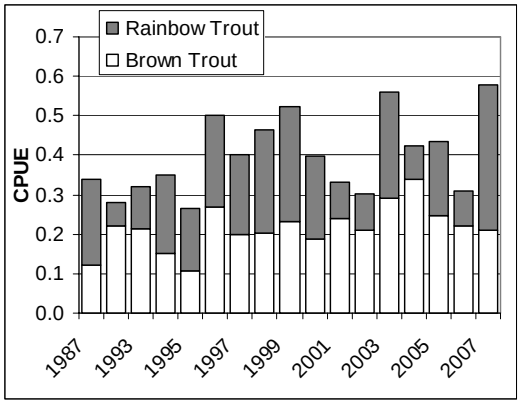
There is an increasing use of catch & release angling as a management tool in many fisheries in Argyll

Most commercial net fisheries in Argyll have now ceased to operate (Loch Fyne, 1974), but a small number are still fishing

In response to poor catches in the rod & line fishery, some fisheries have ceased to operate, while other fisheries are operated on a catch & release basis in an attempt to conserve remaining stocks. There are still a small number of rod fisheries that do not employ conservation measures, which may further retard recovery of fish populations and the performance of the fishery. There are other fisheries for salmon and sea trout that have historically operated outside of the legislation. Where active, such fisheries require regulation, and two-way communication between the fishery users and managers need to be established if the resource is to be managed in a sustainable manner. These resources offer further opportunity to develop valuable fisheries, but some existing legislation and management structures are likely to hinder development and diminish economic and recreational potential.

2.2. Brown trout fisheries

Fisheries for non-migratory fish are primarily based on the brown trout resource present in Argyll's stillwaters, many of which are lightly exploited as fisheries. Catch data are not available for most brown trout fisheries, but information collected on the most active fishery, Loch Awe, indicates that the status of stocks have remained relatively healthy in recent times compared to that of migratory fish. There is also a bycatch of escapee rainbow trout in Loch Awe, which attracts excessive angling activity and subsequently increases pressure on wild fish populations.



Trends in Catches of brown & escapee farmed rainbow trout

Loch Awe brown trout support the most active and economically important fishery in Argyll with over 10,000 rod-days fished each season.

Unlike fisheries for salmon and sea trout, recent angling activity for brown trout has remained more stable, although declines in permit sales have been recorded in some fisheries. With over 1,000 lochs in the region, most of which will be inhabited by brown trout, this resource is likely to provide the most potential to further develop sustainable fisheries in the future. Where studied, fishing effort appears to have a significant influence on the quality of the angling experience (catch rates). Managing exploitation of this resource is an important element of sustaining the health and performance of the resource, particularly for rare morphs and genotypes such as the large ferox trout present in some of the major lochs in Argyll.

2.3 Coarse fisheries

The fisheries for coarse fish, such as pike, perch and roach, are limited by the distribution of these species to a small number of locations. Where present fisheries for coarse fish, particularly for trophy pike on Loch Awe and Loch Fad, are a valuable resource that attracts anglers from all over the United Kingdom. Tagging and catch return data from Loch Awe suggest that trophy pike are caught on repeated

occasions, indicating that the implementation of angling techniques to minimise rates of mortality caused by fishing gear are important in maintaining catch levels.

Pike fisheries require management to maintain performance

Roach are a relatively new species introduced to Loch Awe, but their potential affect on native species is not well understood

While introduced coarse fish species can provide recreational and economic benefits, there is also concern that they may potentially affect the productivity of native species. Direct competition for limited habitat and food resources and the potential to act as vectors for diseases and parasites indicate that it will be essential that the distribution of these species is controlled, particularly where their potential to impact on rare vulnerable species such as powan and charr is likely.

2.4 Stocked trout fisheries

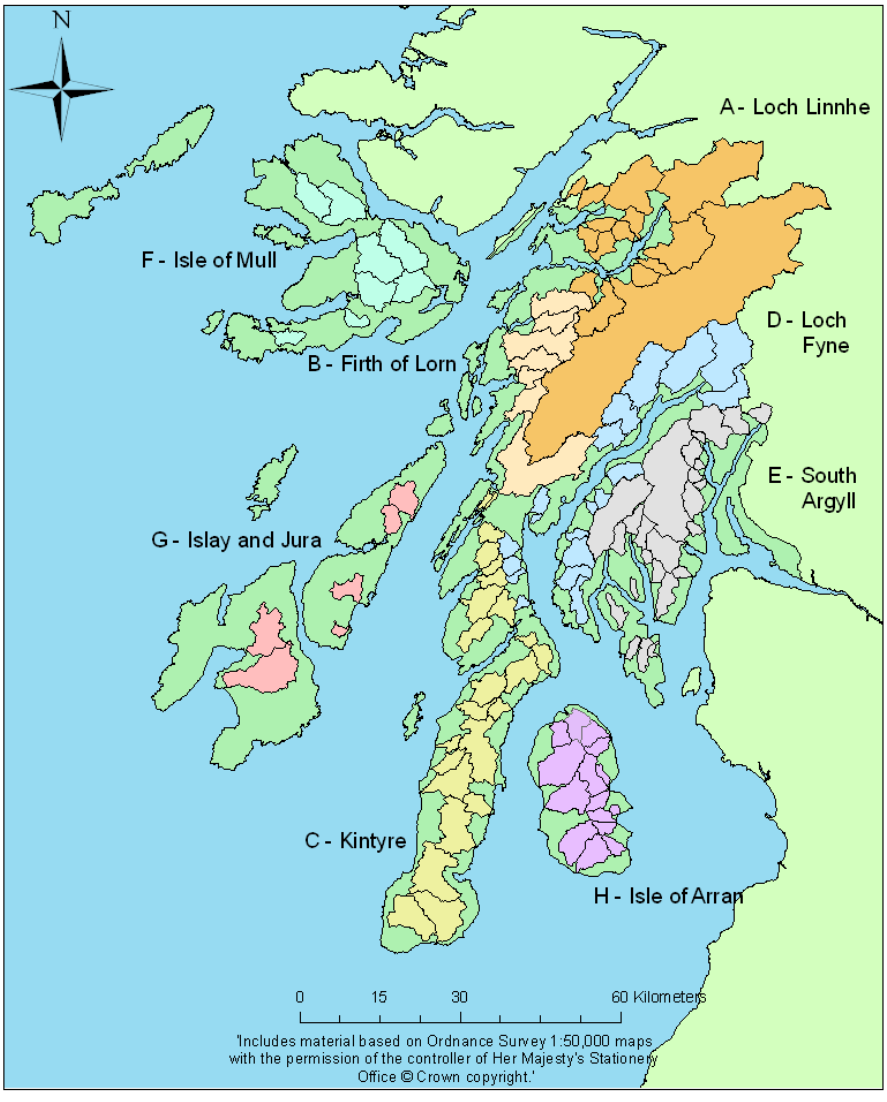
While not a priority for conservation, stocked brown and rainbow trout fisheries have a significant role in contributing to the angling opportunities in Argyll, public amenity and the local economy. Some self-contained fisheries are often open to the public outside of the usual fishing season and offer angling opportunities when conditions are unfavourable for wild fish. Such fisheries also have an important role in offering learning opportunities to inexperienced anglers, recruiting new generations of anglers to the sport.

Several trout fisheries in Argyll rely solely on stocked fish and are operated on a commercial basis. A number of trout fisheries managed by angling clubs also supplement wild fisheries with stocked trout. Identifying and minimising the potential for stocked fisheries to impact on the health and productivity of wild fish populations is a priority for management. The stocking of non-migratory fish is not currently documented or controlled at a local level, which is counter to aspirations of having holistic and comprehensive fishery management across the region.

2.5 Management of fisheries

The fisheries of Argyll are managed by a mixture of fishery interests, ranging from angling clubs, individual and organised groups of owners in River & Loch Improvement Associations, to District Salmon Fishery Boards (DSFBs) which have statutory powers and responsibilities. Along with these local fishery interests other parties with an interest in fisheries also contribute to the management process through representation on Argyll District Salmon Fishery Board and the Argyll Fisheries Trust (AFT). The activities of the DSFBs are restricted to the management of migratory fish, while resident fish such as brown trout are largely unprotected, with the exception of the protection order on Loch Awe. The AFT has interest in the management of all fish populations and their habitats.

Unit	Area	Priority Catchments	Fishery Management	DSFB
A	Loch Linnhe	Awe Etive, Kinglass Creran	ADRIA, LAIA, Owners Owners Creran RIA	Argyll
B	Firth of Lorn	Nell, Euchar Barbreck Add	Nell & Euchar RIA Owner/manager Lochgilphead & Dist. A.C.	Argyll
C	Kintyre	Barr Macrihanish Glenlussa Carradale	Barr Fishing Syndicate None Glenlussa Fishing Syndicate Carradale Angling Club	Argyll
D	Loch Fyne	Fyne, Shira, Aray	Loch Fyne RIA	Argyll
E	South Argyll	Eachaig Ruel, Finart Goil	Dunoon & Dist. Angling Club Ruel RIA Goil Angling Club	Eachaig Argyll
F	Isle of Mull	Ba, Aros, Lussa, Forsa		Mull
G	Isle of Islay Isle of Jura	Laggan & Sorn (L&S) Lussa	Owner/manager Owner/manager	L&S None
H	Isle of Arran	Iorsa, Machrie & Rosa	Arran RIA, Arran Angling Club	Argyll



3. Factors Affecting Productivity

The reasons for the sub-optimal performance of the freshwater fishery resource are many, some of which are documented, while others are implicated but not well understood. Although the information generated from studies of fish and their habitats is far from comprehensive, the evaluation of the freshwater resources by SEPA as part of the River Basin Planning process provides a critical assessment of their status in the Argyll and Clyde draft Area Management Plans.

3.1. Marine-based factors

The survival of migratory fish during the marine phase of their life-cycle has a dramatic and significant affect on the numbers of adult fish returning to support fisheries and recruit the next generation. While many of the factors influencing the wider marine environment are yet to be fully determined, there is some evidence that implicates marine factors as affecting the performance of fisheries. The marine derived factors are summarised below.

Factor	Pressure	Impacts
Climate change	Reduced productivity of marine habitats	Reduced or highly variable growth and survival of migratory fish
Marine fisheries	Bycatch of post-smolt salmon in commercial fisheries	Reduced abundance of post-smolt salmon at sea
Aquaculture Farming of Atlantic salmon	Fish farm escapes Disease and parasite transfer	Loss of genetic fitness Reduced productivity Increased mortality over natural levels
Coastal net fisheries	Exploitation of mixed stocks	Reduced reproductive capacity of vulnerable stocks

Fish health & containment are significant issues for aquaculture

Mixed-stock net fisheries threaten vulnerable stocks

There are other factors that are of concern to fishery interests, but are not well understood and therefore require investigation to assess their relative impact on the productivity of migratory species.

Factor	Pressure	Impacts
Benthic Fisheries	Loss of habitat diversity and productivity	Reduced growth & survival of migratory fish
Predation Seals & birds	Marine predators Aquaculture containment	Increased mortality over natural levels Escapee fish sustain predators in higher than natural numbers

3.2 Freshwater-based factors

Where identified, the main factors affecting productivity and fishery performance in freshwater habitats are derived from many pressures as a consequence of multiple and competing land and water resource users. Other elements that may contribute or exacerbate these factors such as climate change and biosecurity issues are less well defined. The implicated factors associated with changes to natural river processes and the consequences for fish and general biodiversity are summarised for a number of pressures; morphological alterations, flow regulation and abstraction, water quality, land use and riparian habitats.

Factors affecting river processes

Alterations to natural channel morphology are a significant historical pressure on the resource, most of which began over 200 years ago. Many changes to morphology are apparent when historical maps (Roy maps 1747-1755) are compared to current day versions. These pressures are particularly in river reaches where there is relatively intensive use of land resources. More recent land drainage and flood defence issues for the farming and forestry sectors have been a common driver for channel straightening, substrate removal and bank clearing. Loss of habitat diversity in modified channels significantly decreases the productivity and carrying capacity for fish and degrades biodiversity.

Factors	Pressures	Consequential Impacts
Farming **Forestry** **Hydro & urban development** **Infrastructure**	Dams, culverts, weirs Morphological alteration Land Drainage Bank protection Flood defence Mining of substrate	Habitat fragmentation (accessibility) Reduced area of habitat Reduced morphological diversity Increased peak flow & mobilisation of bed substrates Reduced quality of substrate matrix Reduced availability of substrates

Development and maintenance of the roads network and urban infrastructure also affect aquatic habitats. The inappropriate design and instalment of stream crossings can have a significant effect on fish passage, rendering stretches of habitat unavailable for fish recruitment.

Poorly conceived and engineered stream crossings are a common pressure

Channel modifications are a significant pressure driven by land drainage

Factors affecting water quantity and flow

There are significant existing and increasing demands on water resources, particularly from renewable energy development, domestic water supply and the aquaculture industries. Changes to the natural flow dynamics of heavily modified waterbodies can impact on the amount and quality of habitat available to fish, particularly during low summer flows. Changes to flow also alter natural river processes such as substrate recruitment and movement that is essential to replenish spawning grade material.

Factor	Pressure	Consequential Impacts
Hydro **Potable** **supply** **Aquaculture**	Abstraction Impoundment Regulation of flow & sediment dynamics	Habitat fragmentation (accessibility) Reduced area of habitat Reduced morphological diversity Storage of fine substrates (silt and sand) Reduced quality of substrate matrix

Poorly designed and managed intakes may also entrap fish, particularly during periods of migration of both incoming adults and outgoing smolts.

Changes in flow dynamics alter fluvial processes

Abstraction can impede fish migration and reduce habitat availability

Factors affecting water quality

While freshwater is generally of good quality in the region there are a range of diffuse and point sources of pollution arising from the use of land and water uses. Large and small scale disturbance of land from forestry and farming activities are significant issues for water quality. Impacts of road and infrastructure development can also be exacerbated by associated drainage networks that deliver run-off direct to watercourses. Diffuse pollution episodes from inappropriate placing of cattle feeders close to watercourses that encourage poaching of banks and delivery of fine sediments into watercourses are relatively common.

Factor	Pressure	Consequential Impacts
Farming **Forestry** **Roads network**	**Point-source;** Septic tanks, silage storage, milking parlours and urban drainage **Diffuse;** clear-felling, cattle feeders, road construction	Lethal and sub-lethal effect on aquatic life Sedimentation of in-stream matrix; suffocation of ova and loss of cover for juveniles Change and loss of distribution of native flora and fauna through sedimentation, enrichment or acidification

Detectable impacts on aquatic life from point source pollution are less common but appear to be a factor on an occasional basis. Potential sources are associated with the run-off from milking parlours, sheep dip and urban drainage (faulty septic tanks and other chemicals).

Disturbance of land during forestry harvesting & infrastructure development impact on water & habitat quality

Point-source pollution from poorly maintained septic tanks and livestock yards can be lethal to fish

Factors affecting nutrient cycling

The upstream migration of migratory fish from the sea to spawn provides a conduit for the import and deposition of marine-derived nutrients (particularly nitrogen and phosphorous) into freshwater systems. The loss or significant reduction of Atlantic salmon, sea trout and sea lamprey in Argyll is likely to have reduced the delivery of nutrients and subsequently reduced productivity in freshwater habitats. Deposition of eggs and carcases of migratory fish fuel invertebrate populations, providing food for the subsequent generation of juvenile fish. Similarly, loss of nitrogen-fixing native trees and plants on river banks is likely to have wide-spread affect on productivity, particularly through delivery of leaf litter which fuel invertebrate and plankton communities in streams and lochs.

Factor	Pressure	Consequential Impacts
Migratory fish **Riparian habitat** **Airborne pollutants**	Marine survival of salmonids and lamprey Over-grazing - Conifer plantations Acid rain	Reduced productivity due to:- Loss of marine derived nutrient Loss of terrestrial derived nutrient Potential loss recruitment due to poor egg survival

Naturally high rates of post-spawning mortality of migratory fish provide nutrients to support aquatic productivity

Large-scale loss of tree cover in upland rivers is likely to reduce productivity

There are some catchments with base-poor geology in Argyll that may be susceptible to acidification. This may be exacerbated by large-scale conifer plantations that scavenge airborne pollutants. Although there is a recorded decline in these pollutants, there are still some undetermined reductions and losses of fish populations that may be partly due to low pH water conditions and other nutrient-based issues. These theoretical aspects of the potential decline in productivity require investigation to quantify the relative significance of these issues and provide guidance for management.

Factors affecting riparian habitats

Land use is a significant influence on the quality and diversity of vegetation present on stream and loch banks. Waterside plants and trees are an important element in providing cover and terrestrial food items for fish and regulating water temperature and in-stream productivity. In-stream habitat diversity is also affected by riparian vegetation, fallen waterside trees, providing cover for fish and storage of spawning grade substrates and leaf litter.

Factor	Pressure	Consequential Impacts
Farming **Forestry** **Urban development** **Bio-security**	Over-grazing and trampling by livestock Over-shading by trees Non-native invasive plants Removal of large woody debris	Loss of bankside cover for fish Reduced productivity due to lack of light Reduced terrestrial food availability Loss of temperature regulation

Loss of native riparian vegetation through over-grazing by livestock and over-shading by conifer plantations can reduce the carrying capacity of freshwater habitats and significantly affect fish recruitment. Additionally, there is an increasing influence on fisheries and biodiversity from non-native invasive plants and other changes due to climate change.

Forestry and farming are significant factors that influence riparian habitat

Non-native invasive plants are a growing threat to habitat productivity

Factors affecting fish health and ecology

The influence of fishery management and aquaculture activities on the productivity of fisheries is of growing concern as the biological and ecological affects on fish populations are becoming better understood. The introduction and spread of non-native species, non-local genotypes, diseases and the enrichment of freshwaters from aquaculture are understood to be the most significant factors.

The culture of stocking of salmonid fish has been a common approach to enhancing the performance of fisheries. Some stocking practices and interbreeding with escapee farmed fish have potential to impact on productivity through loss of genetic fitness and increased competition between wild and hatchery derived juveniles. Continued unsustainable exploitation of adult fish in some catchments is also a pressure that threatens the health of salmon and trout populations that undermine the restoration of fisheries, particularly where their number are already reduced as a result of other pressures.

Factor	Pressure	Consequential Impacts
Aquaculture	Fish farm escapes Diseases and parasites	Loss of genetic fitness Reduced productivity
Fisheries	Stocking of inappropriate fish Over exploitation	Reduced growth and increased mortality over natural levels Increased competition for limited resources

The cage-based culture of fish is active in a number of freshwater lochs, which has the potential to enrich the naturally nutrient poor waters with associated discharge and waste food. The long term consequences of habitat enrichment on the dynamics of brown trout populations and its potential to affect migratory behaviour that supports sea trout fisheries is of concern, but has not yet been fully investigated.

The historical use of live fish as bait and deliberate introduction by anglers has meant that non-native species, such as the minnow and the stone loach, have become established in a large number of catchments. The introduction of non-native fish increases competition for limited resources impinging on the productivity of native fish habitats.

The management of stocking activities is essential to avoid biological & ecological risks to native fish

The minnow is a non-native species that has been distributed widely by anglers as bait or prey fish for trout. Such species compete for limited resources with juvenile trout and salmon reducing productivity of these species

Emerging factors

As well as existing pressures, there are also new emerging factors that have the potential to further affect fishery performance. There are potential threats from numerous biosecurity issues and habitat disturbances caused by climate change and the introduction of parasites. The consequences of these factors are perceived with varying degrees of understanding, ranging from the certainty of catastrophic losses from the introduction of some parasites (e.g. *Gyrodactylus salaris*) to the relatively poorly understood consequences of climate change. Other factors such as the re-

introduction of the European Beaver have potential for habitat changes, but whether these will be positive or negative in terms of fish ecology and fishery performance is not yet fully understood.

Factor	Pressure	Consequential Impacts
Biosecurity **Climate change** **New species**	Diseases and parasites Habitat change Habitat connectivity	Closure of fisheries Loss of biodiversity Decrease range of native species Increased competition for limited resources

It is likely that changes brought by climate change or the introduction of new species will not be beneficial to many habitats and native species, but the relative degree of change is as yet unknown.

3.3. Significance of factors affecting productivity

The many factors affecting freshwater and local marine species and habitats have varying degrees of influence on the fishery performance and biodiversity. The significance of each factor is related to different life-stages of specific species that are summarised below;

Summary of significance of factors affecting productivity

Factor	Species	Significance
Climate change	All	Unknown, but likely to be increasing
Marine fisheries	Atlantic salmon	Potential, but not well understood
Benthic Fisheries	Sea trout	Potential, but not well understood
Aquaculture	Atlantic salmon Sea trout	Highly significant Highly significant
Freshwater fisheries	Atlantic salmon Sea/brown trout	Localised - decreasing
Predation	Atlantic salmon Brown trout	Potential, may be locally significant
Farming	All	Significant and widespread
Forestry	All	Significant and widespread
Hydro	All	Potentially significant, localised but increasing
Abstraction	All	Potentially significant, localised
Urban development	All	Less significant, localised
Roads Infrastructure	All	Significant and widespread
Airborne pollutants	All	Potentially significant, localised
Bio-security	All	Significant, of increasing importance

4. Management Strategy

To deliver effective management and improvement of the resource over the long term, it is essential to employ a management strategy that stimulates activities that tackle the causes of decline. It is understood that short-term activities (e.g. stocking) may be necessary to stimulate fishery performance or restoration of threatened stocks until the most significant factors affecting productivity can be tackled. Such intensive management activities require on-going investment and are not likely to deliver best cost benefit over time and therefore more holistic options are required to sustain fisheries in the future.

4.1. Aims of management

To deliver the management mission a number of aims are defined as essential elements of maintaining and improving biodiversity and the sustainability of fisheries.

Conservation of the diversity present in the native fish community

Identification of the distribution and relative abundance of native fish species and their population structures is a fundamental requirement to inform management. Protection of fishery resources from a wide range of factors is also important to retain productivity.

Have self-sustaining populations of fish

Ensuring fish populations are present throughout their natural range and that recruitment of juveniles is optimal is a primary aim of management. Working with land and water resource users to mitigate and improve freshwater habitats needed to attain adequate levels of natural fish recruitment.

The variety of charr (lower)and brown trout (upper) genotypes are an important part of the biodiversity and fishery potential of Argyll

Little is known of the distribution and abundance of many native species, such as lampreys. Securing resources to collect information on all native species requires support from a wide range of stakeholders.

Having a sustainable and economically viable fishery

Establishing and maintaining controlled fisheries that are managed on a sustainable basis requires up-to-date information on trends in fish abundance to inform management. Where the numbers of fish do not sustain viable fisheries it is an aim to establish initiatives that conserve and restore populations.

Have a well informed, resourced and effective fishery management structure

Attaining sufficient awareness, skills and cross sector influence within the fishery sector is a key aim that is required to achieve a holistic all-species and catchment-scale approach to management if factors affecting the productivity and performance of fisheries is to be tackled.

4.2. Priorities of management

The limited resources generated by an underperforming fishery dictate that some prioritisation of management activities is required to deliver best cost benefit.

Fisheries priorities

The brown trout, its migratory form, the sea trout and Atlantic salmon are the most widely distributed species that support rod & line fisheries in Argyll and are therefore the priority for many local interest groups. Where present, coarse fish, such as pike, perch and roach support significant fisheries, but these non-native species are of lower priority. Commercial, stocked fisheries for rainbow and brown trout are not a priority for conservation, but management of biosecurity and genetic issues require attention to prevent impact on wild fish.

Conservation priorities

In the face of climate change and a growing demand on water resources there is a growing interest in the conservation of native fish that are not a priority for fisheries. Of particular note are European eel, Arctic charr and Powan. Sea, river and brook lamprey are also recognised as having high conservation value. Although not as valuable to the economy, they are important elements of the native fauna and there are some concerns over population trends. The conservation of all native fish will have benefits for wider biodiversity as healthy fish populations support other important species of mollusc, mammals and birds. Preventing introductions of non-native species that can compete directly with native species is a priority for conservation. Healthy wild salmonid populations are also especially important for maintaining and enhancing the distribution of freshwater pearl mussel.

Restoration priorities

The collapse in Argyll's salmon and sea trout fisheries has stimulated remedial actions to tackle the causes of decline. The establishment of the Tripartite Working Group (TWG) by fishery interests, aquaculture and the Scottish Government has fostered several Area Management Agreements aimed at tackling sea lice, farm stock containment and other fish health issues that affect wild fish. To date, the initiative has delivered some progress, improving marine survival of post-smolt salmon and sea trout to the point where the potential benefits of fishery restoration initiatives may be realised. Implementing restoration is a priority and will require continued support and improvement from the aquaculture sector in managing sea lice and containment of farm stock.

Screening of potential broodfish for hatchery support programmes are a priority in fishery restoration initiatives

Effective management of sea lice on farmed fish is a priority which will influence restoration of fisheries

It is also essential to avoid inappropriate activities such as indiscriminate stocking of fish from unsuitable sources and exploitation of valuable returning adults that undermine recovery. The priority for management is to develop and support restoration plans and activities.

Habitat priorities

Maintaining and improving the productivity of key habitats that support active fisheries and vulnerable species is a high priority for management. The reinstatement of connectivity in fragmented habitats by removing barriers to fish migration has the highest potential to contribute to recruitment of native species. Protection and improvement in the quality of degraded spawning and nursery habitats also offer significant benefit to fisheries. Establishing a mechanism for engaging significant water and land resource users into catchment-scale management is a longer term priority. It is a priority of a growing number of stakeholders to initiate measures to control and eradicate non-native flora in key fish habitats. The protection of habitats against inappropriate development through the planning and consultation process is essential to maintaining productive habitats.

Research priorities

Robust and up-to-date knowledge of the fishery resource is fundamental to informing the management strategy and the on-going process of decision making. The many gaps in our knowledge are summarised.

Conservation and management of fish populations – knowledge gaps;
• The full distribution of species and their trends in abundance over time • Genetic variation within and between native fish populations and its maintenance • Intensity and frequency of monitoring required to detect significant changes • Variation in biological and behavioural traits linked with genetic structuring • Impacts of aquaculture escapes and stocking on local fish populations • Recolonisation dynamics of locally extinct salmon populations • Impacts of introduced non-native fish species

Management and restoration of freshwater habitats – knowledge gaps;
• Likely effects of climate change on freshwater and marine habitats • Links between river processes and fish ecology in a local context • Factors affecting functionality of freshwater habitats • Impacts of modified hydrological flow patterns (e.g. abstraction and hydro) • Development of predictive management tools (e.g. habitat improvement works) • Impacts of habitat disturbance (e.g. reintroduction of beavers and non-native species)

Management of marine habitats – Knowledge gaps;
• Factors affecting biological productivity of marine habitats • Influence of wind and tide on sea lice distribution and infection patterns of wild fish • Development of predictive management tools for aquaculture activity on wild fish • Impacts of habitat disturbance (e.g. benthic trawling) • Impacts of protecting marine predators on migratory salmonids (e.g. seals)

It is likely that knowledge gaps will be tackled through a partnership approach with other fisheries trusts, research institutes and agencies that have common goals.

Organisational and communication priorities
Much work has already been undertaken to streamline and coordinate fishery management in Argyll. To continue to improve effective use of limited resources, further initiatives will be required to implement beneficial all-species and catchment-scale management. Increasing the participation in cross-sector management initiatives, particularly in the management of habitats and biosecurity, is also a high priority for fisheries. Establishing and maintaining the flow of information between fishery management groups, wider interest groups and the general public are also a priority to increase wider understanding and support of the many activities undertaken to improve fisheries and biodiversity. Landowners, managers and farmers have a central role to play in riverine habitat improvement and can contribute to fisheries management when undertaking SRDP and similar schemes. A focused input into this sector via the Scottish Agricultural College, Argyll Agricultural Forum and Argyll RPAC could bring benefits to Argyll fisheries.

4.3. Benefits of management

The potential benefits of investing resources into protecting, maintaining and restoring the fishery resource are understood to be a mixture of conservation of biodiversity and improving the contribution of fisheries to the local economy.

Fisheries and the economy
Sustainable fisheries offer recreational and economic opportunities for the local community. Visiting anglers and their families bring a demand for a wide range of services into rural areas, supporting jobs and economic activity for other businesses. Strong community links to fish populations are beneficial to sustaining the long-term health of fish populations. The current value of fisheries to the Argyll economy is difficult to estimate, but recent evaluation of fisheries at the national scale indicate that a productive fishery in Argyll may contribute significantly more than it currently does.

Raising awareness
Engaging with the wider community through consultations and educational programmes will foster a better understanding of aquatic environments and the role of individuals, groups and agencies in management. Establishing links with a wide range of interests and management groups will stimulate a wider understanding of issues affecting fisheries and deliver a more holistic approach to management of the resource.

Biodiversity
Trout, salmon and other native fish form an important part of the biodiversity of the area and are part of an ecosystem that supports many other species of birds and mammals. The restoration of habitats will improve riverside habitats for the benefit of a wide range of flora and fauna. River corridors are also pathways for the spread of non-native invasive flora and fauna. Engaging the fishery community in management of non-native species is likely to promote best cost benefit in the delivery of control and eradication measures.

Intangible benefits
The importance of a part of the wildlife present in any locality may not be understood until it is threatened or no longer present. Applying holistic management practices will help ensure that the fish community will continue to thrive in the region and provide a measure of ‘well being’ to local people and provide a visible measure as to the relative health of the environment.

4.4. Challenges to management

The potential benefits of a management plan are many, but implementing the plan will require that challenges facing the fishery sector which will need to be overcome or mitigated against.

Factors	Challenges
Biological and ecological	Loss of genetic variation and fitness from fish farm escapes and inappropriate stocking Many factors affecting productivity of habitats lie outside the control of fishery managers Effects of climate change on the productivity of freshwater and marine habitats
Economic	Insufficient resources to invest in management The relative economic contribution of freshwater fisheries is currently depressed Fisheries does not always attain a high priority with decision makers
Fisheries research	Gaps in our knowledge undermine our ability to manage the fishery resource effectively.
Biosecurity	Threats of the introduction of new non-native species, diseases and parasites Control and eradication of species currently affecting biodiversity Developing and implementing guidelines necessary to protect and improve the health status of the fishery
Management structures	Current management of the resource is fragmented into multiple groups. The lack of multi-species regional and local management hinders effective delivery of improvement initiatives and may not make best use of the limited resources available. Streamlining and improving professionalism of management will require cooperation and willingness to change from a range of individuals and groups.

Establishing effective management practices to guard against the potential of Large and small scale hydroelectric generating schemes to affect productivity of fisheries is a challenge to long-term management goals.

Escapee farm fish are a significant threat to the genetic fitness of wild salmon population requiring improvement in the containment of farmed fish.

5. Management Goals and Objectives

A number of goals are identified in different fields of management that will need to be achieved to fulfil the aims of the plan.

5.1. Management goals

Goal A – Improving knowledge of the fishery resource

The management of the fishery resource requires up-to-date and robust data upon which to make informed decisions;

1. Improve understanding of the biology and ecology of wild fish populations
2. Understand fish distribution and trends in abundance over time
3. Understand the factors affecting the productivity of wild fish populations

Goal B – Protecting fisheries from new and existing threats

1. Prevent inappropriate development of land and water resources affecting fish
2. Prevent unsustainable exploitation of the fishery resource
3. Prevent loss of productivity and biodiversity through introductions of alien species, parasites and diseases

Goal C – Restore productivity of fisheries

If the loss of productivity of the fishery resource in Argyll is to be reversed, improved management and restoration of priority fish populations is essential.

1. Maintain and improve the quality and accessibility of habitat
2. Where necessary, develop restoration programmes
3. Tackle fish health issue affecting recovery of fish populations

Goal D – Improve management of fisheries

The delivery of effective management initiatives requires participation from a wide range of stakeholders. Steering the management plan and assessing the relative progress of the strategy and activities undertaken will also be important.

1. Create and maintain public awareness of fisheries issues
2. Provide relevant training, funding and support to fishery workers and managers
3. Optimise administration of fisheries and include all species

Goal E – Implement the delivery of plan objectives

To achieve the aims of the plan a number of objectives are identified. Each objective has a strategy to employ and challenges to overcome.

1. Develop working partnerships with relevant stakeholders
2. Deliver cross-sector funded projects to implement recommended actions
3. Assess the effectiveness of management activities and implement changes where appropriate

Different strategies to achieve the objectives are summarised below.

5.2. Improving Knowledge of the Fishery Resource

Objective1: Improve understanding of fish populations
Increasingly, there are concerns over the long term viability of native fish populations in the face of climate change, habitat degradation and competition from non-native species. The loss or decline of native fish populations in Argyll highlights that improvements in our knowledge and management of the resource is essential to avoid further losses. A key element of this will be to conserve biodiversity and genetic variability that underpin the productivity of the fishery resource.

Issues/Challenges – Study programmes are important, but expensive.
- Limited existing information on species distribution across the region
- Limited genetic and life history information for native fish populations
- Possible disruption of wild populations through genetic and other impacts
- Lack of resources to fund work on all native species and all populations
- Lack of information on the effects of existing management activities
- Translating information into effective management strategies

Strategy – Develop studies and consult with centres of expertise to:
a. Identify species distribution and relative abundance across the region
b. Identify priority species and populations supporting fisheries and biodiversity
c. Identify factors affecting species distribution and abundance
d. Identify priority genetic population units and their associated life history variation
e. Assess data and inform management of the resource
f. Work with centres of expertise to improve survey strategy & methodology

Electrofishing & other surveys provide information on fish biology and ecology that informs the decision making process

Collection of genetic information will improve our understanding of the structuring of wild fish populations

Some information on the resource has been collected, but improving our understanding and management will require an on-going program of data gathering.

Actions already underway
- Existing baseline information on the distribution of species in a number of catchments across the region
- Existing information on trends in salmon and trout abundance over time in some priority river catchments and lochs
- Limited information on genetic structuring of salmon and trout populations
- Limited information on fish habitat in priority catchments
- Limited information on the different life-stages of priority species

Objective 2: Improve understanding of factors affecting productivity
As we learn more of the biology and ecology of native fish populations it is apparent that some of the factors affecting productivity are not well understood. Therefore, it is important to undertake further study to establish the significance of a number of issues that lack definition.

Issues/Challenges – Identifying the relevance and significance of factors.
- Limited understanding of a number of factors likely to affect productivity
- Lack of resources to develop research programmes
- Lack of data derived from a local or national context
- Likely accumulation of a number of factors requires broad-based investigation
- Lack of information to assess current loss of productivity
- Translating information into effective management strategies

Strategy – Develop research programmes with centres of expertise to:
a. Identify range of factors affecting productivity
b. Identify relative significance of each factor in relation to management priorities
c. Engage research organisations with relevant skills and resources
d. Engage other interests to co-fund research programmes
e. Assess data and inform management of the resource
f. Work with centres of expertise to establish and improve research methodology

The significance of potential affects of habitat change caused by the re-introduction of beaver on native fish is not yet understood in a Scottish context

The influence of wind and tidal movements on sea lice distribution in local sea lochs is little understood. Locally derived data is required to inform management of marine aquaculture

Some information on the resource has been collected, but improving our understanding and management will require an on-going program of data gathering.

Actions already underway
- Existing study programme to assess affects of beaver re-introduction on native fish
- Existing information on sea lice population dynamics in local sea lochs
- Limited genetic information on wild salmon populations likely to be affected by farm escapes and stocking
- Limited information on fish populations in rivers affected by use of water resources
- Limited information on fish populations in lochs affected by use of water resources

5.3. Protecting fisheries from new and existing threats

Objective 3: Prevent inappropriate developments likely to affect fishery performance

Defending fisheries and biodiversity against new developments that are likely to have a significant impact on the productivity of wild fish populations is essential to maintain the current level of performance of fisheries. Where identified, it is also necessary to mitigate against existing threats to minimise impacts on the fishery resource.

Issues/challenges – Retaining current levels of performance in the fishery.

- There are a wide range of issues affecting fishery performance in Argyll
- Raising awareness of conservation issues with developers
- Establishing relevant expertise within the fishery sector
- Political drivers for development often override those of fisheries
- Funding time consuming, but important consultations with developers
- Non-fishery related native fish are often overlooked in legislation and consultation

Strategy – Work with fishery interests and centres of expertise to:

a. Engage with the WFD interests to highlight fishery issues in Area Advisory Groups
b. Work with developers to raise levels of awareness over native fish
c. Improve understanding of potential impacts of developments on native fish
d. Undertake a full role in development consultation process
e. Collect baseline data on fish and habitat pre and post development
f. Assess potential of short and long-term impact of developments on fish
g. Work with centres of expertise to develop effective survey methodology

The increasing development of renewable energy schemes has the potential to disrupt fluvial processes and reduce habitat abundance.

Development of urban flood defence schemes has potential to undermine accessibility and productivity of freshwater habitats.

Creating and maintaining awareness of fish and fisheries issues with developers and regulators is an on-going process, which has been aided by the River Basin Planning process and the introduction of Controlled Activities Regulations.

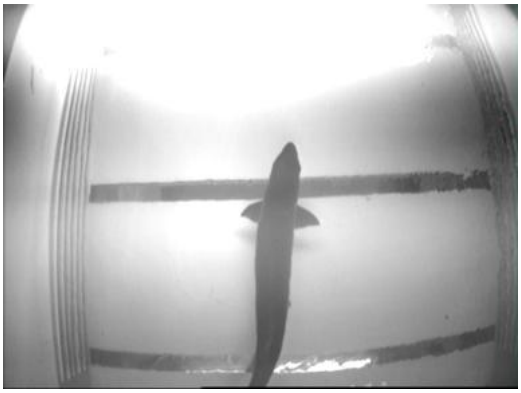
Actions already underway

- Fisheries participation in the consultation process
- Raised awareness of regulators and some developers
- Pre development surveys undertaken for significant projects
- Post development evaluation of fish populations and habitats

Objective 4: Prevent unsustainable exploitation of fisheries
The management of a sustainable fishery requires an understanding of fish abundance and where necessary application of effective controls on exploitation of target species with the aim of maintaining the recruitment of juveniles.

Issues/challenges – Loss of potential spawning adult stock.
- Limited information on the abundance of adult fish and changes over time
- Raising awareness of conservation issues in the net & rod fishing sectors
- Poor technique of catch & release fishing may reduce survival of released fish
- Loss of potential spawning stock through poaching
- Predation by non-native species (e.g. mink)
- Predation exacerbated by stocking and aquaculture activities

Strategy – Work with fishery interests and centres of expertise to:
a. Monitor and assess fish abundance for target species in priority catchments
b. Monitor and assess fishing methods, effort and catch over time
c. Develop concept and estimates of conservation limits
d. Promote conservation strategy and employ effective methods of catch & release
e. Train, equip and manage an effective bailiffing effort
f. Develop and implement control programme for non-native predators
g. Work with fishery and aquaculture sectors to protect vulnerable fish populations



Real-time fish counter data can be used to monitor adult fish abundance & inform policy on exploitation

Effective catch & release angling techniques can promote survival of rod caught fish and maximise spawning escapement

Maintaining the local interest and momentum for restoring fisheries where populations are currently of sub-optimal status requires that maximising the spawning escapement is essential.

Actions already underway
- Real-time assessment of fish counter data at the Awe barrage
- Adult fish abundance monitored by snorkel surveys in priority catchments
- Catch & release fisheries operational in a high proportion of catchments
- A small number of trained bailiffs undertake patrols for illegal fishing
- Predator control measures (i.e. mink trapping) underway in few catchments
- Fishery representation on aquaculture and seal management groups

Objective 5: Prevent loss of productivity from biosecurity issues
There are many threats to biodiversity and productivity of fisheries from invasive non-native species (INNS). Diseases and parasites can also be introduced unwittingly alongside new species or culture of fish, which can profoundly influence native flora and fauna and affect productivity.

Issues/Challenges – Prevention, control and eradication of non-native invasive species.

- Raising awareness of general resource users of potential impacts of INNS
- Potential for catastrophic impacts through the introduction of *Gyrodactylus salaris*
- Potential for chronic or acute impacts through the introduction of other diseases and parasites by anglers and other water users
- Potential for introduction of alien fish and other species that directly compete or predate on native species
- Finding resources to control and eradicate INNS

Strategy – Identify & work with relevant partners to:

a. Develop a broad-based biosecurity management plan for Argyll fisheries
b. Raise awareness of biosecurity issues through management forums
c. Implement effective mechanisms to prevent introduction of *Gyrodactylus salaris*
d. Assist government agencies to monitor presence of diseases and parasites
e. Develop and support plans for control and eradication of INNS
f. Work with fish farmers to prevent escapes of farmed fish
g. Prevent stocking of fish likely to affect or threaten productivity of native fish

Invasive non-native plants such as Japanese knotweed & rhododendron out-compete native plants and reduce productivity of fish habitats

Some non-native fish (e.g. stone loach) are already present in Argyll. It is essential to prevent further introductions to minimise loss of productivity & biodiversity

Non-native invasive species are known to reduce biodiversity & productivity, but little is know about their distribution and abundance across the region

Actions already underway

- Pilot biosecurity management plan for Argyll fisheries is underway
- Non-native fish populations identified in some catchments
- Invasive non-native plants now identified and recorded in habitat surveys
- Assistance provided to fish disease testing and regulatory authorities
- Raised awareness of fisheries role in management of parasites and diseases

5.3. Restore productivity of fisheries

Objective 6: Maintain and improve habitats
The productivity of the fishery and conservation of biodiversity is based on a healthy environment. By maximizing the accessibility and potential productivity of fish habitats, particularly spawning and nursery habitats, it is possible to make improvements in productivity over current levels and help improve and sustain fisheries.

Issues/challenges – Limitations on recruitment of fish populations.
- Some habitat degraded or rendered inaccessible due to inappropriate developments or lack of management
- Lack of information on key fish habitats within catchments and across the region
- Raising awareness of the importance of habitat issues amongst resource owners, managers and users
- Mitigating the impacts of the usage of land and water resources

Strategy – Identify & work with relevant stakeholders to:
a. Undertake habitat surveys and identify factors limiting productivity
b. Remove or ease man-made obstacles to fish passage
c. Raise awareness and stimulate change amongst land and water resource users
d. Engage with WFD and other initiatives to promote good ecological status
e. Establish a network of habitat improvement demonstration sites
f. Review options for land managers to improve fish habitats through SRDP
g. Facilitate and develop catchment-scale management planning process

Overgrazing by livestock can reduce productivity. Engaging land users through catchment scale planning is necessary to promote better management of land and water resources

Some fish habitat has been degraded through morphological alteration. There is potential for improved management under the Controlled Activities Regulations, but this will require engagement from fishery interests

By optimising the quality spawning and juvenile rearing habitats it is possible to protect and improve future levels of recruitment and support sustainable healthy spawning populations.

Actions already underway
- The habitat of some priority catchments surveyed
- Factors affecting the productivity identified in a number of catchments
- Man-made obstacles to fish passage identified in some catchments
- A small number of habitat management plans are under development

Objective 7: Restore lapsed fisheries on a sustainable basis

Catch data and investigative work indicates that the status of a number of salmon and sea trout populations are threatened or sub-optimal and are currently not able to support fisheries. Fishery owners and managers undertake a range of restoration activities with the aim of improving the status of fish populations and the performance of fisheries.

Issues/challenges – Work with fishery owners, managers and users to overcome:

- Lack of awareness of factors affecting fish abundance amongst fishery interests
- Lack of catchment specific information on fish populations and habitat quality
- Some inappropriate stocking activities suppress recovery of fish abundance
- Lack of cohesion between multiple owners on single catchments
- Unsustainable exploitation of remaining fish in some catchments
- Potential interaction of farmed fish genotypes in wild populations with consequential loss of performance

Strategy – Develop and deliver fishery restoration plans.

a. Collect relevant information on priority fisheries that currently under-perform
b. Develop fishery restoration plans for priority catchments
c. Maximise spawning success through control of exploitation
d. Identify and tackle significant habitat issues suppressing smolt production
e. Where necessary, develop well-informed hatchery support programmes
f. Monitor progress and adapt restoration activities accordingly

Screening of broodfish collections in hatcheries is essential to eliminate farm origin fish.

Supporting data on redd distribution is essential to avoid over-planting of hatchery fry that increases competition between juveniles.

River management and fishery restoration plans have been developed to guide and co-ordinate management activities in a small number of catchments where the status of wild fish populations is sub-optimal

Actions already underway

- Aquaculture related factors contributing to collapse of fisheries are being tackled through the TWG initiative
- Template for strategic restoration plans have been developed
- Restoration plans and activities underway in some catchments
- Protocols to avoid genetic problems in place in a number of hatcheries
- Support and guidance for restoration activities available from centres of expertise
- Assessment of current restoration activities undertaken in some catchments

Objective 8: Tackle fish health issue affecting recovery of fish populations
Fish health issues related to aquaculture and fishery management activities have significant potential to prevent the recovery of the fishery resource. Management of sea lice and containment on fish farms in the aquaculture sector has a primary role in restoring lapsed fisheries for salmon and sea trout. Similarly there are fish health and ecological risks associated with inappropriate stocking by fishery managers.

Issues/challenges – Aquaculture and stocking have potential to impact on wild fish.

- Aquaculture is a relatively young and expanding industry with a number of fish health issues to overcome
- On-farm sea lice controls are hampered by farmed fish developing resistance to medicines
- Mechanisms for transfer of lice larvae between farmed and wild fish is poorly understood at a local scale
- A low percentage escape of farm stock has significant potential to undermine vulnerable wild fish populations
- The local effects of fishery related stocking activity is poorly understood
- Implemention of effective guidance and control of stocking activities is required
- Some legislation governing aquaculture is not supportive of wild fish issues

Strategy – Develop and deliver fishery restoration plans.
a. Improve health of wild and farmed fish through Area Management Agreements
b. Undertake monitoring of sea lice burdens of wild fish
c. Inform management groups of trends in stock abundance and fishery performance
d. Where appropriate, support development when benefit to wild fish is likely
e. Raise awareness and develop hatchery and stocking plans for individual fisheries
f. When necessary, undertake activities to recapture escaped farm fish

Sampling of sea trout in sea lochs is important to monitor the health status of wild fish.

Regular lice counts of farmed fish is essential to inform treatment and production strategies

A number of actions to mitigate effects of aquaculture on wild fish are already underway through the auspices of the Tripartite Working Group.

Actions already underway

- Area Management Agreements established in six of the seven areas in Argyll
- Changes in farm production strategy to improve lice management
- Information exchange through Management groups
- Relocation of some farms that were poorly sited in relation to wild fish
- Guidance for best-practice stocking under development

5.4. Improve management of fisheries

Objective 9: Create and maintain awareness of fish and biodiversity issues
The participation of all the community in the management of fisheries can help to ensure that plan initiatives are delivered effectively. Cooperation between resource users, decision makers and public agencies is essential to the plan and therefore informing the public of fishery related activities and conserving biodiversity is a priority.

Issues/challenges – Raising the priority of fishery issues in the community.

- Lack of general awareness of fish and other biodiversity issues
- Low priority of fish issues amongst the general public
- Communicating effectively with a wide range of authorities and agencies
- Keeping stakeholders informed and involved in the management process
- There is a varied degree of understanding of issues affecting fisheries within the fishery users and owners community

Strategy – Engage stakeholders and the general public

a. Distribute up-to-date information through the AFT website and circulate reports widely
b. Contribute to cross-sector management groups that provide benefit to fisheries and aquatic biodiversity
c. Raise awareness through educational projects and workshops for all age groups
d. Raise the profile of fish and fisheries with the general public through the media and local gatherings
e. Contribute to planning process for other sectors, such as Forest Design Plans
f. Engage the farming community through forums to promote habitat management

The Rivers in the Classroom Project is a key element of raising awareness of fish issues in schools

Raising the awareness of stakeholders such as foresters and farmers can avoid damage to aquatic habitats

Engagement and consultation with an increasingly wide range of interest groups has been undertaken to date.

Actions already underway

- Fisheries input to multi-sector management groups (e.g. WFD)
- Established school based 'Rivers in the Classroom' project across Argyll
- Established website and distribute newsletters
- Representation at local community events

Objective 10: Maintain and improve fishery management structure

The effective delivery of fishery management activities and the development of the fishery resource will require an efficient management body. Cross transfer of information between local, regional and national fishery interests requires significant administration. Investment in personnel, training and equipment are also required to action the strategy. Additionally, the delivery of national policies of the Strategic Framework for Freshwater Fisheries Management also requires modernisation.

Issues/challenges – Managing fisheries professionally with limited resources.

- Poor financial incentives to improve management due to lack of fishery activity
- Existing fishery management structure is fragmented
- Some existing legislation streamlining of the management structure
- Low profile of fishery management sector prevents effective communication
- Increasing use of fishery resources to implement existing and new legislation
- Delivering effective management over multiple catchments across the region

Strategy – **Improve fishery management structure and administration**

a. Develop an effective and user-friendly fishery management body for Argyll
b. Establish all-species approach to management
c. Develop high levels of expertise in regional management organisations
c. Develop a network of local river and loch improvement associations
d. Develop marketing and encourage sustainable use of fisheries
e. Coordinate plans and policies (LBAP, WFD, SRDP) and deliver benefit to fisheries
f. Support the development of personnel to carry-out management activities

Training & development of fishery staff in many disciplines such as spawning site identification is essential to improve management

Some of Argyll's fishery resources are under-developed, such as the many hill-loch based angling for brown trout. Development and marketing of such fisheries run on a sustainable basis can bring long-term benefits

Significant progress has been made in developing the existing management structure.

Actions already complete or underway

- Consolidation of District Salmon Fishery Board structure
- Formation of a number of local Loch & River Improvement Associations
- Training and development of Fishery staff
- Expansion of Trust and Board network across the region
- Links with national and local management groups are being developed

5.5. Implement the delivery of plan objectives

Objective 11: Inform and fund activities to meet management aims
The resources required to deliver the management goals are significant and funding will be required from within and without the fisheries sector. Therefore, management activities will need to deliver wider biodiversity benefit to other sectors as well as tackling fisheries specific issues. The developments of cross-sector projects that address a wide range of aims are therefore essential to funding costly survey and management activities.

Issues/challenges – Providing adequate resources.
- Insufficient resources generated from sub-optimal fisheries
- Funding of equipment, staff training and data collection is expensive
- Delivering up-to-date robust data on the fishery resource across a large region
- Providing best-practice management advice on fishery and other sectors
- Managing the administrative requirements of externally funded projects
- Accessing new skill sets to meet demands of a wide range of interests

Strategy – Establish cross-sector support for relevant project-based work programmes
a. Identify and develop relevant projects that fulfil requirements of fishery management
b. Engage and secure cross-sector support for projects
c. Establish national-scale projects through RAFTS and other agencies
d. Secure on-going funding from within fisheries to support core activities
e. Undertake consultancy work where benefits to fishery management are realised

Confront biosecurity issues that affect fisheries such as signal crayfish will be an on-going activity that requires resources

Engaging other sectors in commonly beneficial activities is essential to tackle significant issues facing fisheries

Important baseline data on the distribution and abundance of fish populations and the status of their habitats has already been collected through cross-sector funded projects.

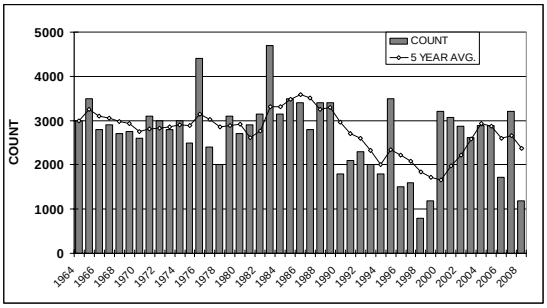
Actions already complete or underway
- Delivery of cross-sector funded projects in Mull, Kintyre, South Argyll and Arran
- Development of national fishery management structure to assist regional groups
- Assistance from Scottish Government secured to establish management plans
- Pilot biosecurity plan underway through cross-sector support at a national level
- Participation in Area Management Agreements and related TWG projects

Objective 12: Assess the effectiveness and progress of the plan
On-going review of the many activities recommended in this plan is essential to assess their effectiveness. To ensure that progress is made against the aims and objectives of the plan, a review process will be required. Regular update and amendment of the plan will be required on a 6 year cycle according to assessments.

Issues/challenges – Providing relevant information to assess and review progress.
- Assessment and review activities require time and resources
- Measurable response to initiatives may take relatively long periods of time (10 yrs)
- Obtaining information on general trends in the health of migratory fish
- Some factors affecting sea survival are outside of local fishery influence
- Setting realistic targets upon which to assess progress
- Managing expectations and gaining wide-spread support for all plan objectives

Strategy – Gather and assess relevant information to inform plan progress
a. Assess the status of the resource and fishery performance on a regular basis
b. Assess local and regional results against the national and international perspective
c. Foster a wider ownership of the plan and its strategy through management forums
c. Establish an executive management group to monitor and review plan progress
d. Communicate initiatives and progress of the plan to local management groups

Monitoring of the health of fish in local marine waters is a vital part of assessing progress of AMA initiatives



Working collaboratively with S&SE allows accurate assessment of trends in adult fish abundance from fish counter data (Awe barrage) to be undertaken. This data is one of a number of ways to assess progress.

The response of wild fish to some management initiatives are already being assessed, but significant changes in wild fish populations are likely to be measured over a number of generations (e.g. 3-5 years for each generation of salmon).

Actions already underway
- Monitoring and feedback of AMA initiatives undertaken across the region
- Data on juvenile fish collected regularly in some priority catchments
- Analysis of accurate counter data undertaken in the Awe catchment
- Formation of Fishery Trust Executive committee
- Established website used to deliver updates on progress

6.0. Actions Recommended

The implementation of new initiatives as well as sustaining and improving existing activities are required to achieve the aims of the plan. Some of the individual actions recommended will fulfil more than one management objective and therefore are likely to be a priority over those that may have a lesser contribution. Each action prescribed is described with reference to the current status and the likely time-scale in which it will be established. A detailed work programme is given in Appendix II.

The current status of activities:
Potential activities are not yet embedded into the work programme, some more recently developed activities are already **underway** and more established aspects of the work programme are **on-going**. The time-scale of implementation is shown in three categories; **1 -** essential and achievable in the short term (1 to 5 years); **2 -** essential in the short-term, but may take longer to accomplish (1-10 years); and **3 -** important, but will realistically take significant time to complete (1-20 years).

6.1. Improving Knowledge of the fishery resource

Collection and analysis of information on priority species across the region will be a key element in the first cycle of the plan. Many of these activities will be undertaken by Argyll Fisheries Trust in partnership with a wide range of stakeholders.

Activities	Status	Timing
1. Improve understanding of fish populations		
a. Baseline surveys of rivers and lochs across the region	Underway	2
b. Repeat sampling of priority fisheries & conservation issues	Underway	3
c. Collect and assess genetic and biological data	On-going	3
2. Improve understanding of factors affecting productivity		
a. Collect data in relation to aquaculture activity	On-going	1
b. Collect data in relation to use of water resources	Potential	2
c. Collect data in relation to use of land resources	Potential	2
d. Assess potential for beaver re-introduction to affect fisheries	Underway	1
e. Review and assess data with centres of expertise	Potential	1
f. Identify knowledge gaps and inform sampling strategy	Potential	2

6.2. Protect fisheries from new and existing threats

Regulatory bodies such as District Salmon Fishery boards and the provision of data and management advice from AFT are required to implement the fishery protection elements of the plan effectively.

Activities	Status	Timing
3. Prevent inappropriate developments likely to affect fishery performance		
a. Engage and contribute to River Basin Management Plans	Underway	1
b. Undertake consultation with developers and agencies	On-going	3
c. Engage in Forest Design Planning process	Underway	3
d. Undertake pre and post development assessment	On-going	3
4. Prevent unsustainable exploitation of fisheries		
a. Assess adult fish abundance in priority fisheries	Underway	2
b. Assess rates of exploitation of fisheries	Underway	2
c. Identify conservation limits for fisheries	Potential	2
d. Educate anglers in effective catch & release techniques	Potential	1
e. Establish early warning system based on real-time data	Underway	1
f. Collect & assess data and where necessary, develop predator control programmes	Potential	1

Activities	Status	Timing
5. Prevent loss of productivity from biosecurity issues		
a. Identify issues and management options in a biosecurity management plan	Underway	1
b. Collect data on existing issues in habitat surveys	Underway	3
c. Develop projects to control and eradicate INNS	Underway	2
d. Prevent introduction of significant INNS	Underway	3

6.3. Restore productivity of fisheries

Many of the activities related to habitat issues will require cooperation from a wide range of stakeholders and be guided by the development of catchment management plans as part of the River Basin Planning process. Similarly fishery restoration activities require a close working relationship with fishery interests and a willingness to implement best practice guidance developed by centres of expertise.

Activities	Status	Timing
6. Maintain and improve habitats		
a. Conduct baseline habitat surveys across the region	Underway	2
b. Develop methods to assess influence of obstacles	Potential	1
c. Support process to remove or ease obstacles	Underway	2
d. Develop catchment management plans to tackle issues	Potential	1
e. Establish best-practice demonstration sites	Potential	1
7. Restore lapsed fisheries on a sustainable basis		
a. Develop restoration plans for priority fisheries	Underway	1
b. Raise awareness of stocking issues	Underway	1
c. Provide guidance for hatchery operation	Underway	2
d. Collect data to assess progress	Underway	3
8. Tackle fish health issues affecting recovery		
a. Develop Area Management Agreement process	On-going	3
b. Assess & inform sea lice management on marine farms	On-going	3
c. Implement escapee farm stock recapture plans	Potential	1
d. Consult with TWG partners to improve mitigation	On-going	2

6.4. Improve management of fisheries

Delivering the many objectives of the plan will require improvement in the effectiveness and efficiency of fishery management. Developing the management structure will require cooperation from government and modernisation of fisheries legislation. Utilisation of multi-media communications will also improve information transfer to a wide range of interests that effect fishery performance.

Activities	Status	Timing
9. Create and maintain awareness of fishery issues		
a. Develop public relations strategy	Underway	1
b. Disseminate information via website, newsletters and reports	On-going	3
	Underway	3
c. Undertake school-based educational programme	Underway	3
d. Contribute to local biodiversity awareness programmes		
10. Maintain and improve fishery management structure		
a. Consult with government to improve legislation	Underway	1
b. Establish all species region-wide management body	Potential	2
c. Establish local management groups and develop skills	Underway	3
d. Establish a web-based fishing access and permit system	Potential	1
e. Identify fishery development potential in trout lochs	Potential	1

6.5. Implement the delivery of plan objectives

Funding and maximising the benefits of the many activities prescribed will require cross-sector support. By engaging a wide range of stakeholders in partnership projects, it is more likely that the aims of the plan will be achieved and improved management of the resource secured. It is also essential that the plan remains as a working document and progress is reviewed on a regular basis.

Activities	Status	Timing
11. Inform & fund activities to meet management aims;		
a. Develop project and grant-based work programme	Underway	1
b. Incorporate a wide range of benefits to attract funding	On-going	2
c. Establish program to evaluate mitigation of developments	Potential	1
d. Secure fishery funding for core management activities	Underway	3
12. Assess the effectiveness & progress of the plan;		
a. Establish management group to assess progress	Underway	1
b. Review data & amend activities accordingly	Underway	3
c. Consult widely to maximise benefits	Underway	3
d. Develop second phase of the plan before 2015	Potential	1

APPENDICES

to the

Argyll & the Islands
Strategic Fishery Management Plan

PHASE 1; 2009 - 2015

I. Management partners

Fishery Management

International Research and Management
- North Atlantic Salmon Conservation Organisation (NASCO)
- International Council for the Exploration of the Seas (ICES)

National Research and Management
- Atlantic Salmon Trust (AST)
- Marine Scotland (MS, formerly Fisheries Research Service)
- Rivers And Fishery Trusts of Scotland (RAFTS)
- Association Salmon Fishery Boards (ASFB)
- Scottish Fisheries Coordination Centre (SFCC)

Regional Management
- Argyll Fisheries Trust (AFT)
- Argyll District Salmon Fishery Board (ADSFB)
- Eachaig District Salmon Fishery Board (EDSFB)
- Mull District Salmon Fishery Board (MDSFB)
- Laggan & Sorn District Salmon Fishery Board (L&SDSFB)

Local Loch & River Improvement Associations
- Awe District River Improvement Association (ADRIA)
- Loch Awe Improvement Associations (LAIA)
- Loch Fyne Rivers Improvement Association (LFRIA)
- River Ruel Improvement Association (RRIA)

Angling clubs and Associations
- Scottish Anglers National Alliance (SANA)
- Scottish Federation of Coarse Anglers (SFCA)
- Pike Anglers Alliance of Scotland (PAAS)
- Dunoon & District Angling Club (DDAC)
- Carradale Angling Club (CAC)
- Kintyre Angling Club (KAC)
- Lochgilphead & District Angling Club (LDAC)
- Oban & Lorn Angling Club (OLAC)
- Port Ellen Angling Club (PEAC)
- Tiree Angling Club (TAC)

Commercial stocked fisheries
- Loch Fad
- Inverawe Fishery

Commercial marine fisheries
- Clyde Fisherman's Association (CFA)
- Scottish Fisherman's Federation (SFF)

Resource management

Land resources
- Forestry Commission Scotland (FCS)
- Argyll Agriculture Forum (AAF)
- National Farmers Union (NFU)
- Argyll & Bute Council (ABC)
- Wind Farm Development
- Scottish Native Woodlands (SNW)

Water resources
- Scottish Water (SW)
- Large scale hydroelectric schemes
- Small scale hydroelectric generation schemes
- The River Restoration Centre (RRC)
- Centre for River Ecosystem Science (CRESS)

Biological and ecological resources
- Scottish Natural Heritage (SNH)
- Scottish Wildlife Trust (SWT)
- Deer Commission Scotland (DCS)

Regulatory bodies

- Scottish Environment Protection Agency (SEPA)
- Scottish Government (SG)
- Fisheries Electricity Committee (FEC)

Aquaculture

- Tripartite Working Group (TWG)
- Kames Fish Farming (KFF)
- Lakeland Group (LG)
- Lighthouse Caledonia Scotland (LCS)
- Marine Harvest Scotland (MHS)
- Scottish Sea Farms (SSF)
- Landcatch (LC)
- Scottish Salmon Producers Organisation (SSPO)
- Dawnfresh (DF)

II. Work Programme

Delivery of the recommended activities summarised in the Strategic Fishery Management Plan require further detail to describe future work activities of fishery owners, managers, Trusts and boards. The amount of the work that is achievable is largely reliant on the resources available. Therefore, the work programme seeks to package activities that may be supported by a wide range of stakeholders while delivering benefits to fisheries and wider interests.

1. Improve understanding of fish populations

Having an understanding of the distribution of species and status of habitats is a fundamental requirement of fishery management. This baseline information is useful to a range of interests including fisheries, agencies (SNH & SEPA) and renewable energy developers.

1a. Conduct baseline surveys of rivers and lochs across the region

To date, information has been collected on a number of priority fisheries and area-based projects that have investigated a wide diversity of catchments. There remain a significant number of catchments yet to be surveyed and documented and historical data that requires updating. It is proposed that the continued development of both rivers and lochs projects is undertaken during the first phase of the plan to establish comprehensive baseline data for the region of Argyll & The Islands;

1ai. **Lochs projects** – With over 1,000 freshwater lochs in Argyll there is a priority to investigate the distribution of species and habitats, some of which have potential to support populations of rare species such as Arctic charr. There are also a number of loch habitats that are or will be associated with development of land and water resources. Additionally there are a significant number of lochs that support brown trout populations and fisheries that may be assessed through the development of a series of area based Loch projects that may be undertaken over the next two planning cycles;

Lochs Project	Loch groups	Requirement	Timing
Linnhe	Creran, Etive & Nant (7) Awe North (15) Awe South (23)	**To be developed** as three separate projects	2010-11 2010–11 2012-13
Lower Lorn	Scammerdale & Nell (9) Tralaig & Oude (9)	**To be developed** Glen Mor & Glen Beg 2000-02	2013 -14 2013-14
Knapdale & Kintyre	North Knapdale (14) South Knapdale (16) Kintyre (21)	**To be developed** North Knapdale sampling 2009-14 as part of beaver trial monitoring	2015 -16
Loch Fyne	West Loch Fyne (13) East Loch Fyne (6)	**To be developed** Part assessed as part of Powan sanctuary	2017 -18
South Argyll	Cowal (6) Bute (7)	**To be developed** Assessed as part of Powan refuge	2017 -18
Isle of Mull	North (6) & South (10)	**To be developed**	2012 -13
Islay & Jura	Islay (43), Jura South (15) & Jura North (35)	**To be developed**	2014 -16
Isle of Arran	Iorsa & Tanna (2)	**To be developed**	2017
Coll, Tiree & Colonsay	Coll (11), Tiree (7) & Colonsay (4)	**To be developed**	2018

1aii. **Rivers projects** - There is a need to establish baseline data on species distribution, habitats and factors affecting productivity. Some area-based rivers projects that investigate a number of catchments within a management area have already been undertaken while others are yet to be developed;

Rivers Project	Catchments	Status	Timing
Loch Linnhe	Stockdale Burn, An Iola, Creran, Dearg Abhainn, Glen Dubh, Esragan, Abhainn Dalach, Allt Easach, Etive, Allt Coire na Larach, Allt Ghiusachan, Kinglass, Liver, Noe, Nant, Awe Lusragan Burn	**To be developed.** Existing fish and habitat information on the Awe, Etive, Kinglass and Creran catchments - AFT (1997 – 2009)	2010-11
Lower Lorn	Allt Chriche, Nell, Euchar, Oude, Abhainn na Cille, Barbreck, Add	Fish data collected 2006-8. **Habitat data required.**	2010-11
Knapdale & Kintyre	Ormsary Water, Abhainn Learg an Uinnsinn, Abhainn nan Gillean, Clachan, Clachaig, Barr, Machrihanish, Strone, Breackerie, Conieglen, Glenlussa, Saddell, Carradale, Claonaig	**Surveyed** as part of the Knapdale & Kintyre Rivers project (2005-06)	2005-06
Loch Fyne	Crarae, Stronchullin, Inverneil, Cuilarstich, Abhainn Mhor Strathlachlan, Lephinmore, Lephinchapel, Kilail, Kilfinan, Auchalick, Allt Osda, Leacann & Douglas	**To be developed.** Fish and habitat data collected by AFT on the Aray, Shira, Fyne, Kinglas (2000-09)	2012-13
South Argyll	Ruel, Auchenbreck, Inverneil, Glenmore, Balliemore, Glentarsan, Invervegain, Inverchaolain, Ardyne, Balgaidh Eachaig, Little Eachaig, Stronchullin, Finart, Croe, Loin, Lettermay, Goil & Carrick Burn	South Argyll Rivers Project **Underway (2008-09)**	2008-09
Isle of Mull	Aros, Forsa, Lussa, Coilador, Ba Bunessan, Bellart & Mingary	**Habitat data.** Mull Project (2005-6)	2012-13
Islay & Jura	Laggan, Sorn, Glas, Drolsay, Glenegedale, Claggain, Lussa Abhainn Ghleann Aoistail Corran, Abhainn na h Uainaire	**To be developed**	2014-15
Isle of Arran	Glenrosa, Glenshurig, Glencloy, Benlister, Glenashadale, Torrylin, Iorsa, Machrie, Blackwater, Sliddery, Abhainn Mhor, Chalmadale, N. Sannox & Sannox	Arran Rivers Project **Underway (2008-09)**	2008-09
Coll, Tiree & Colonsay	Various	**To be developed**	2014-15

1b. Conduct repeat sampling of priority fisheries & conservation issues
There is a need to collect regular information on economically important species of salmonids such as Atlantic salmon and trout, but there are also other biodiversity issues related to other native species such as European eel and lampreys. Data collected regularly across the region will also provide data on general trends in fish abundance over time. Determining the frequency and resolution of sampling necessary will require input from centres of expertise and resources from stakeholders (see 2f).

1bi. **monitoring of priority salmonid fish populations** are required to inform wider catchment management (factors affecting productivity) and identify progress of initiatives undertaken to restore fishery performance.

Monitoring Project	Project partners	Status	Timing
Creran	CRIA	2004 On-going	2009 -15
Awe Kinglass Etive	ADRIA & LAIA	1997 On-going 1997 On-going 1997 On-going	2009 -15
Nell & Euchar	N&ERIA	2007-09 **To be established**	2009 -15
Add	L&DAC & AddRIA	2007-09 **To be established**	2009 -15
Fyne, Kinglas, Shira & Aray	LFRIA	1999 On-going	2009 -15
Carradale, Glenlussa & Barr	RO, KAC, GS	**To be established**	2009 -15
Ruel & Eachaig	EDSFB & RRIA	On-going	2009 -15
Ba & Aros (Mull)	MDSFB	**To be established**	2009 -15
Laggan & Lussa (Islay & Jura)	L&SDSFB, RO	**To be established**	2009 -15
Iorsa & Machrie	Arran RIA	**To be established**	2010 -15

1bii. **monitoring of other native fish populations** are required to inform wider management of biodiversity and identify progress of conservation initiatives.

Conservation Project	Project partners	Status	Timing
Lamprey	SNH	**To be established**	2009 -15
European Eel	SNH	**To be established**	2009 -15
Freshwater Pearl Mussel	SNH	2008 **To be established**	2009 -15

<u>1c. Collect and assess genetic and biological data</u>
Understanding population structuring in priority fish populations is an essential element of effective fishery management. Genetic samples may be collected as part of baseline and monitoring surveys (1a and 1b), but may also require additional or specific sampling in some locations. **Analysis and interpretation of genetic data** may be partly undertaken within wider international projects (AARC & SALSEA), while other fishery and restoration initiatives will require funding from elsewhere. Therefore it is necessary to develop projects to attract funding for this important work programme;

1ci. **Atlantic salmon genetic** information is currently the main focus of investigation for identifying population structuring within and between catchments to inform fishery management and restoration initiatives.

Genetic Project	Priority	Status	Timing
Creran	Restoration	Sampling underway	2009 -11
Awe	Fishery management	Sampling underway Sampling underway	2009 -15
Kinglass & Etive	Fishery management	Sampling underway	1997-09
Nell & Euchar	Fishery management	Complete 2006 -08	2009 -15
Add	Fishery management	Sampling underway	2009 -15
Knapdale lochs	Brown/sea trout	Sampling 2009	2009 -15
Fyne, Kinglas, Shira & Aray	Restoration	Sampling underway Sampling underway	2009 -15
Carradale, Glenlussa & Barr	Restoration	To be developed	2009 -15
Ruel, Finart & Eachaig	Restoration	Sampling underway	2009 -15
Ba & Aros, Lussa & Forsa (Mull)	Fishery management	To be developed	2009 -15
Laggan & Lussa (Islay & Jura)	Fishery management	To be developed	2009 -15
Iorsa, Rosa & Machrie (Arran)	Fishery management	Sampling underway	2009 -15

1cii. **Brown & sea trout** population structures are less well understood compared to salmon in the region and initial investigation is required to inform fishery management and restoration initiatives.

Genetic Project	Priority	Status	Timing
Awe (Brown trout)	Fishery management	Sampling underway	2009 -15
Knapdale lochs (Brown trout)	Beaver reintroduction	Sampling 2009	2009 -15
Fyne, Kinglas, Shira & Aray	Restoration	Sampling underway Sampling underway	2009 -15
Ruel, Finart & Eachaig	Restoration	Sampling underway	2009 -15

1ciii. **Charr** population structures are currently under investigation in Loch Awe by researchers for identifying population structuring within loch basins. Further sampling and analysis is required to establish the diversity present in local populations.

Genetic Project	Priority	Status	Timing
Loch Awe	Conservation	Underway by Glasgow University	2007 -10
Nell, Scammerdale, Tralaig, seil & Glenbeg	Conservation	Some sampling undertaken by Glasgow University	2006 -08 2009 -15
Eck	Conservation	Unknown	2009 -15

2. Improve understanding of factors affecting productivity

Some activities aimed at better understanding of the effects and management of factors affecting productivity of fisheries are underway, but there remains scope to develop our understanding of factors associated with the use of land and water resources on fish resources. Much of this programme will be informed by and partly undertaken by SEPA as part of the final Argyll and Clyde River Basin Plans.

2a. Collect data in relation to aquaculture activity

Some elements of the work programme related to aquaculture are underway, but there are other potential activities that may be undertaken to better inform management and mitigation measures;

2ai. Monitoring of **sea lice burdens of sea trout** in aquaculture management areas is already underway as part of the work for the Scottish Government and the Tripartite Working Group (TWG). Net sampling of sea trout provides important information on the health status of management areas over time and informs TWG partners of progress of the Area Management Agreement initiative.

Sea Lice Project	Sites	Partners	Status	Timing
Linnhe & Lorn	3	TWG, ADSFB	1997 On-going	2009 -15
Lower Firth of Lorn	2	TWG, ADSFB	2004 On-going	2009 -15
Sound of Jura	2	TWG, ADSFB	2006 On-going	2009 -15
Firth of Clyde & Arran	5	TWG, E&ADSFB	1999 On-going	2009 -15
West Mull	1	TWG & MDSFB	2004 On-going	2009 -15

2aii. Potential **interaction between escapee cultured and wild fish** is particularly significant for Atlantic salmon. While much work is being undertaken to reduce the frequency escape events, past information indicate that there is potential for some wild populations to have been affected through inter-breeding. To inform restoration efforts it is necessary to **establish the genetic profile of remnant stocks** compared to farm strains so that they may be managed and restored accordingly.

Genetics Project	Priority	Project Partners	Status	Timing
Fyne	High	AST, MS & LFRIA	To be developed	2009 -15
Ruel	High	AST, MS & RRIA	To be developed	2009 -15

2aiii. Additional information is required to inform the longer term strategy for aquaculture and fishery management, particularly for the location of new farm sites and potential relocation of existing sites. Understanding likely **sea lice dispersal** within and between management areas and **emigration routes of salmon and sea trout smolts** is important if potential impact between wild and farm fish is to be minimised.

Location Project	Priority	Project Partners	Status	Timing
Tidal & sea lice modelling	High	TWG, MS & SAMS	To be developed	2009 -15
Smolt tracking	Medium	TWG, MS & SAMS	To be developed	2009 -15

2b. Collect data in relation to use of water resources

As part of the **Argyll and Clyde River Basin Plans** a number of catchments have been or are currently being assessed for water quality, morphology and ecological status. Establishing the current status of fish populations associated with developments is required to inform on the effectiveness of mitigation measures.

2bi. **Heavily modified or artificial waterbodies** require initial investigation and on-going monitoring some of which may be undertaken by responsible agencies such as SEPA. The development of **catchment specific work programmes** in partnership with developers, agencies and AFT are required for a number of waterbodies in the near future;

HMWB Project	Heavily Modified Waterbodies	Timing
Awe & Nant	Awe Barrage (S&SE) Nant abstractions (S&SE) Allt Kinglass abstraction (S&SE) Cruachan pump storage (SP)	2009 -15
Liver & Noe	Cruachan pump storage (SP)	2009 -15
Nell	Loch Nell abstraction (SW)	
Add	Loch Glashan (S&SE)	2009 -15
Oude	Oude hydro scheme (S&SE)	
Shira & Fyne	Shira & Clachan hydro schemes (S&SE)	2009 -15
Kinglas	Loch Sloy (S&SE) Med-scale hydro development (Strone)	2009 -15
Douglas	Med-scale hydro development	
Ruel	Loch Tarsan (S&SE)	2009 -15
Glenlussa & Barr	Loch Lussa (S&SE)	

2bii. **Small-scale hydro schemes** are being developed in many catchments in Argyll & The Islands. **Pre and post development monitoring** is essential to ensure mitigation measures are sufficient to maintain healthy fish populations and habitats.

Small-scale hydro	Schemes	Timing
Awe	Braevallich, Blarghour, Balimeanoch, Ederline, Liever, Core alan, Mhoillie, Esragan	2009 -15
Fyne	Kinglas Water, Merk Burn	2009 -15
Jura	Lussa	2009 -15

2biii. **Abstraction** of significant water resources for use as domestic water supply and freshwater aquaculture is undertaken in a number of catchments in Argyll & The Islands. **The development of a monitoring programme** is essential to ensure mitigation measures are sufficient to maintain health fish populations and habitats.

Abstraction	Abstracted Waterbodies	Timing
Loch Nell / River Nell	Oban water supply (SW)	2009 -15
Loch a' Phearsain	Kilmelford Water supply (SW)	2009 -15
Leacann Water	Furnace fish farm abstraction (LS)	2009 -15
Kinglas Water	Ardkinglas fish farm abstraction (LS)	2009 -15

2c. Collect data in relation to use of land resources

The dominance of conifer plantations and grazing of livestock land use types in Argyll and the Islands provides opportunities to develop catchment or sub-catchment scale management plans that tackle issues affecting productivity of priority fisheries. Partnership working with fisheries, farming and forestry interests is required to develop a better understanding of the issues and development of effective mitigation measures.

Land use	Partners	Project	Status	Timing
Forestry & Farming	FC, LAIA, ADRIA, RO, SEPA	Eredine Forest	Underway	2008 -10
Forestry & Farming	FC, LAIA, ADRIA, RO, SEPA	Inverliever Forest	To be developed	2011-12
Forestry & Farming	FC, LAIA, ADRIA, RO, SEPA	Inverinan Forest	To be developed	2013-2015
Forestry & Farming	FC, RO, SEPA	Glen Creran	To be developed	2009-12
Forestry & Farming	LFRIA, RO, SEPA	Tom Bhrec (Aray)	To be developed	2009 -15
Forestry & Farming	FC, NFU, RO, SEPA	River Ruel	To be developed	2009 -15
Forestry & Farming	FC, NFU, RO, SEPA, SNH	Carradale Water	To be developed	2009 -15

2d. Assess potential for beaver re-introduction to affect fish populations

The potential of the re-introduction of **European Beaver** to affect native fish populations and their habitats is largely unknown in a Scottish context. Investigation and monitoring of fish populations at the trial site is essential to better inform decision makers.

Beaver Trial Project	Partners	Priority Management Focus	Timing
Knapdale SAC	SNH	Fish distribution & abundance Fish spawning distribution	2009 -14

2e. Review and assess data with centres of expertise

Data collection through fish, habitat and other surveys plays an important role in informing the planning and decision making process. Sampling strategy, data analysis and interpretation of data are important elements of quality control. Accessibility of a wide range of specialist skills is required by regional and local organisations to ensure the highest quality information is available for assessment. A network of centres of expertise is therefore required to provide assistance and guidance to local workers such as AFT.

Data Review Project	Partners	Priority	Timing
Data Review Panel	MS, SNH, AST, SEPA, RAFTS, SFCC	Electrofishing & habitat	2009 -15

2f. Identify knowledge gaps and inform sampling strategy

While our understanding of fish populations is improving, there remain significant gaps in our knowledge of factors affecting productivity and effective sampling strategies that are able to provide holistic information. A network of centres of expertise is therefore required to coordinate research, distribute information and provide assistance and guidance to local workers such as AFT.

Research Review Project	Partners	Priority	Timing
Research Review Panel	MS, SNH, AST, SEPA, RAFTS, SFCC, AFT	Factors affecting productivity	2009 -15

3. Prevent inappropriate developments likely to affect productivity

Consultation with and representation to a range of planning and development bodies is essential to ensure fish and aquatic habitats are considered fully as part of these processes.

3a. Engage and contribute to River Basin Management Plans

Argyll and Clyde Area Advisory Groups (AAGs) are established to inform the development of the River Basin Plans for Argyll and Clyde areas that cover Argyll & The Islands. Working in partnership with a wide range of interests such as developers, local authorities and agencies is essential to providing accurate information on fish resources to SEPA and other leading groups.

River Basin Plans	Priority Management Focus	Timing
Argyll & Clyde	Inform Area Advisory Groups	2009 -15
Consultation	Undertake consultation with RBP development	2009 -15
Project development	Establish requirement for project-based restoration and mitigation activities	2009 -15

3b. Undertake consultation with developers and agencies

AFT are required by statutory groups such as District Salmon Fishery Boards to supply information and give opinion during **consultation of new and existing developments** to developers and agencies. Therefore, AFT and DSFBs need to continue to develop their consultation activities.

Consultations	Priority Management groups	Timing
Renewable Energy	Developers, SEPA, & DSFB	2009 -15
Potable Water supply	Developers, SW, SEPA & DSFB	2009 -15
Infrastructure development	Developers, A&BC, SEPA & DSFB	2009 -15

3c. Engage in the Forest Design Planning (FDP) process

Initial engagement with Forestry Commission and the FDP process is underway, but much needs to be done in respect to **mitigation of forestry activities** and development of improved Forestry and Water Guidelines (F&WG). AFT and DSFBs therefore require resources to undertake consultation and joint initiatives to improve management over a wide range of public and private forests.

Activity	Priority Management groups	Timing
FDP Review	FC, SEPA, AFT & DSFB	2009 -15
Site-based mitigation	Developers, SW, SEPA, AFT & DSFB	2009 -15
F&WG consultation	ASFB, RAFTS & FC	2009-15

3d. Undertake pre and post development assessment

The implementation of Controlled Activities Regulations (CAR) by SEPA and a requirement to protect or improve the ecological status of water resources ensures that significant new developments are required to collect base-line data before development can take place. Subsequently, mitigation may then be advised and undertaken. Post-development monitoring is required to assess the effectiveness and further improve mitigation measures.

Activity	Priority Management groups	Timing
Assessment planning	Developer, SEPA, AFT & DSFB	2009 -15
Collect & analyse data	Developer, SW, SEPA, AFT & DSFB	2009 -15
Advise on mitigation	AFT & SEPA	2009 -15

4. Prevent unsustainable exploitation of fisheries

Ensuring the sustainability of fishery activity is a fundamental requirement of fishery managers. Continual assessment of fish populations and fishery effort and catch provide data to decision makers who are able to control exploitation levels. Therefore AFT, DSFBs, RIAs and anglers are required to work together to ensure sustainability of their activities through a range of initiatives;

4a. Assess adult fish abundance in priority fisheries

Atlantic salmon and sea/brown trout are a key component of fisheries in the region, but accurate information on their abundance over time is difficult to gather. There are a number of existing initiatives that require further development to improve the quality and delivery of stock abundance data in real time and over the longer term;

4ai. The **Awe Barrage Fish Counter** is the only facility in the region that is able to assess the strength of year classes of multi sea-winter salmon and grilse components of the Atlantic salmon adult returns each year. Such is the variability in recent returns that real-time information from this facility has become an important tool for providing recommendation on exploitation in fisheries.

Counter validation	Catchment - Management groups	Timing
Fish counter real time assessment	Awe Barrage Counter - S&SE, AFT & ADRIA	2009 -15

4aii. The **collection and assessment of fishery catch data** is a fundamental role of fishery managers and DSFBs. Unfortunately, economic and legal pressures sometimes lead to under-reporting of catches so it is essential to establish accurate catch information from a core of fisheries where accurate data can be guaranteed.

Catch Data	Catchment - Management groups	Timing
Collect fishery catch data	ROs, RIAs, LAIA & DSFBs	2009 -15
Analyse & report	DSFBs, LAIA, AFT & MS	2009 -15

4aiii. The **collection and assessment of snorkel & redd count data** is important to assess the strength of threatened Atlantic salmon populations in a number of catchments and to inform progress of fishery restoration initiatives.

Counts	Catchment	Partners	Timing
Snorkel counts	Fyne, Creran, Kinglass	RO, RIA & DSFBs	2009 -15
Redd Counts	Fyne, Aray, Creran, Kinglass, Ruel	RO, RIA & DSFBs	2009 -15

4b. Assess rates of exploitation of fisheries

Fish counter and snorkel survey data may be used alongside catch data to assess exploitation levels in salmon fisheries.

Exploitation	Catchments	Partners	Timing
Fishery Assessment	Awe, Fyne, Creran, Kinglass	S&SE (Awe) , LAIA, DSFBs & ADRIA	2009 -15

4c. Identify conservation limits for fisheries

A combination of the catch, counter and other survey data may be used to determine conservation limits for priority fisheries. Where available, genetic data may also be used to assess the potential exploitation levels of sub-populations of salmon within

larger catchments. On the basis of this information appropriate catch or fishing effort controls may be employed on the basis of good information.

Conservation limits	Catchments	Partners	Timing
Rod fisheries	Awe, Fyne, Creran, Kinglass	S&SE (Awe) , AFT & ADRIA, MS	2009 -15
Feochan net fishery	Nell & Euchar	N&ERIA, MS	2005-8

4d. Educate anglers in effective catch & release techniques

The return of rod caught fish to the water is becoming a common tool for controlling exploitation of fisheries for salmon and trout, particularly where stocks are threatened or under restoration. Ensuring that the catch & release is employed effectively is an important part of ensuring its sustainable use.

Activity	Catchments	Partners	Timing
C&R Workshops	All fisheries	AST, DSFBs & RIA	2009 -15
Information distribution	All fisheries	RO, DSFBs & RIA	2009 -15

4e. Establish early warning system based on real-time data

Analysis and effective distribution of real-time counter data is important to allow managers to control exploitation based on indicators from local fish counters during the fishing season.

Early warning system	Catchments	Partners	Timing
Distribute real time counter data	All fisheries	ADRIA, ADSFB, AFT, S&SE	2009 -15

4f. Evaluate & review data and where necessary, develop predator control programmes

There is little data available to assess potential impact of non-native and protected native fish-eating predators on vulnerable fish populations. Invasive non-natives such as mink may also have a significant impact on other elements of local biodiversity.

Activity	Catchments	Partners	Timing
Mink control Workshops	All fisheries	SNH, DSFBs, RSPB	2009 -15
Establish predator counts within restoration projects	Aray, Fyne, Creran	DSFBs, ROs	2009 -15
Review & assess count data	Aray, Fyne, Kinglass, Creran, Ruel	MS, DSFBs, ROs	2009 -15
Where necessary undertake control measures	Aray, Fyne, Kinglass, Creran, Ruel	DSFBs, ROs	2009 -15
Information distribution and reporting	All fisheries	SNH, DSFBs, RSPB	2009 -15

5. Prevent loss of productivity from biosecurity issues

The many threats posed by Invasive non-native species (INNS) and fish health issues require an effective response from fishery interests in partnership with a wide range of stakeholders.

5a. Identify issues and management options in a biosecurity management plan

The development of a strategic approach to biosecurity issues is required to identify priorities, raise awareness and engage relevant project partners to tackle the issue. The Argyll & The Islands Biosecurity Plan is now underway (2009);

Biosecurity Plan	Catchments	Partners	Timing
Biosecurity Plan	All	RAFTS	2009
Plan implementation	All	DSFBs, SNH & RIA	2009 -15

5b. Collect data on existing issues in habitat surveys

Prior to collection of data, survey protocols, database development and staff training is required to ensure data on INNS is collected to a high standard and stored and retrieved efficiently.

5ai. Developing specific **INNS survey protocols** and the development of a central database for use by a wide range of stakeholders is necessary to facilitate effective control and eradication measures.

INNS Survey Protocol	Activity	Partners	Timing
Protocol development	Consultation	SNH, RAFTS, SFCC	2009
Database development	Consultation	SFCC	20010 -12
Staff Training	Training Courses	SFCC	2009 -15

5aii. **Collection of INNS data** as part of existing fish and habitat survey activities is necessary to improve our understanding of the distribution of INNS species. Species specific surveys are also required to establish the distribution of priority INNS.

INNS Data Collection	Catchment	Partners	Timing
INN Plants	All	SNH, DSFBs, RO	2009
Signal Crayfish	Various	SNH	20010 -11

5c. Develop projects to control and eradicate INNS

Existing data indicates some potential and actual issues with the presence and potential spread of INNS. Identifying partners and resources required to control and eradicate existing INNS is an important element of preventing loss of productivity of fishery resources.

INNS C&E	Catchment	Partners	Timing
Japanese Knotweed	Awe	LAIA, ADRIA, SNH	2009-15
Priority INNS	All	SNH, DSFBs, RO	2009 -15

5d. Prevent introduction of priority INNS

Preventing introduction of priority INNS such as signal crayfish and Gyrodactylus salaris is essential to retain current levels of productivity in fisheries.

INNS Prevention	Catchment	Partners	Timing
Raising awareness	All	LAIA, DSFBs, MS	2009-15
Prevention measures	All	LAIA, DSFBs, MS	2009 -15

6. Maintain and improve habitats

Utilising habitat data collected as part of rivers and lochs projects (see 1a) it is important to identify methodologies to assess and improve accessibility of habitats to fish and develop cross-sector approaches to habitat management and improvement and ensure best-practice management are widespread across the region.

6a. Identify priority habitats across the region

Assessment of fish and habitat data is required to identify factors affecting productivity of fish populations in priority catchments. Consultation with agencies and a wide range of stakeholders is required to identify where habitat management and restoration activities may be appropriate.

Identifying priorities	Catchment	Partners	Timing
Analysis & Reporting	All	AFT, AST, MS, RO, SEPA	2009 -15
Habitat strategy	All	AFT, SEPA	2009 -15

6b. Develop methods to assess influence of obstacles

Agencies and centres of expertise are currently developing a methodology to assess accessibility of natural and man-made obstacles. Currently, limited data on fish distribution is available to assess obstacles, but where available this may be used to classify potential obstacles. Site specific fish surveys are also required to identify limits to fish distribution in priority catchments.

Identifying barriers	Catchment	Partners	Timing
Obstacles Database	All	AFT, MS, SEPA	2009 -15
Barrier assessment	Priority	AFT, MS, SEPA, FC	2009 -15
Survey	Priority	AFT, DSFBs, SEPA	2009 -15

6c. Support process to remove or ease obstacles

The SEPA restoration fund is currently in the process of removing or easing man-made obstacles that do not have a CAR licence. This will provide limited opportunity to improve fish access issues in Argyll & The Islands and therefore further work is required to remove or ease obstacles.

Removing barriers	Catchment	Partners	Timing
SEPA Restoration Fund	Euchar	AFT, ADSFB, RO, SEPA	2009 -15
Stream crossings Project	Forestry	AFT, FC, SEPA	2009 -15
Stream crossings Project	Local authority	ABC, AFT, DSFBs, SEPA	2009 -15

6d. Develop catchment management plans to tackle issues

Catchments with a wide range of factors affecting productivity require catchment specific plans to coordinate activities to mitigate use of land and water resources. Engaging and working with a wide range of partners will be necessary to achieve benefits for fisheries and biodiversity.

Catchment Management	Partners	Timing
Awe	AFT, ADSFB, ADRIA, LAIA, NFU, FC, SEPA	2011 -12
Nell & Euchar	AFT, ADSFB, N&ERIA, NFU, SEPA	2012 -13
Add	AFT, ADSFB, ARIA, FC, NFU, SEPA	2013 -14
Aray, Shira & Fyne	AFT, ADSFB, LFRIA, FC, NFU, SEPA	2010 -11
Ruel	AFT, ADSFB, RRIA, FC, NFU, SEPA	2010 -12
Carradale	AFT, ADSFB, CAC, FC, NFU, SEPA	2009 -10
Macrihanish	AFT, ADSFB, RO, NFU, SEPA	2011 -12
Glenmore (Bute)	AFT, ADSFB, RO, NFU, SEPA	2010 -11
Goil	AFT, ADSFB, NFU, FC, SEPA	2010 -11
Ba	AFT, MDSFB, NFU, SEPA	20123 -15

6e. Establish best-practice demonstration sites

To ensure best practice management is employed across the region, the creation of a series of demonstration sites to exhibit effective habitat management is required. The development of demonstration sites will require significant input from fisheries, riparian owners and agencies.

Demonstration sites	Partners	Timing
Tom Brech (Aray)	AFT, ADSFB, ADRIA, LAIA, NFU, FC, SEPA	2010 -15
Nell & Euchar	AFT, ADSFB, N&ERIA, NFU, SEPA	2010 -15
Add	AFT, ADSFB, ARIA, FC, NFU, SEPA	2010 -15
Shira & Fyne	AFT, ADSFB, LFRIA, FC, NFU, SEPA, S&SE	2010 -15
Upper Orchy	AFT, ADSFB, ADRIA	2010 -15

7. Restore lapsed fisheries on a sustainable basis

A number of priority fisheries for Atlantic salmon and sea trout populations have collapsed to the point where fisheries can no longer operate and local biodiversity is threatened.

7a. Develop restoration plans for priority fisheries

Catchment specific initiatives to restore health to fish populations and regenerate fisheries are underway, but require guidance and monitoring;

Restoration Plans	Status	Partners	Timing
Upper Loch Fyne	Underway	AFT, ADSFB, LFRIA, LCS	2005 -10
Creran	Underway	AFT, ADSFB, CRIA, SSF	2008 -12
Cowal Rivers	To be developed	AFT, ADSFB, RRIA, LCS	2010 -15

7b. Raise awareness of stocking issues

Stocking of salmon and trout in response to declining adult sea returns may not necessarily restore populations if factors affecting survival are not tackled. Stocking of non-native may also undermine recovery of native stocks. Raising awareness of the affects of stocking and providing guidance and administrative support to fishery managers is key to preventing inappropriate stocking and maximising the potential benefits of hatchery operations. There is also a requirement to evaluate the progress of stocking initiatives through juvenile fish surveys.

Stocking	Status	Partners	Timing
Stocking Workshops	Underway	AFT, DSFBs, RIAs	2009
Distribute information	Underway	AFT, DSFBs, RIAs	2009 - 15

7c. Provide guidance for hatchery operation
The development of catchment and species specific stocking plans that are informed by survey data and tailored to the requirements of local fish populations are required to maximise benefits of hatcheries for restoration and fishery performance.

Stocking	Status	Partners	Timing
Hatchery visits	To be developed	AFT, DSFBs, RIAs	2009 -15
Stocking plans	To be developed	AFT, DSFBs, RIAs	2009 -15
Administration	Underway	DSFBs, RIAs	2009 -15

7d. Collect data to assess progress
There is also a requirement to evaluate the progress of stocking initiatives through juvenile fish surveys.

Stocking evaluation	Status	Partners	Timing
Fyne, Aray, Kinglas	Underway	AFT, ADSFB, LFRIA	2009 -15
Awe	Underway	AFT, LAIA	2009 -15
Etive, Kinglass	To be developed	AFT, ADSFB, ADRIA	2009 -15
Ruel	Underway	AFT, ADSFB, RRIA	2009 -15
Iorsa, Machrie, Rosa	To be developed	AFT, ADSFB, ARIA	2009 -15
Forsa, Ba	To be developed	AFT, MDSFB, RO	2009 -15

8. Tackle fish health issues affecting recovery

There has been significant improvement in the management of fish farming in relation to the health of both wild and farmed fish. Improvements in farming strategy and husbandry has reduced escapes and begun to control on-farm sea lice production. These management issues are on-going with a number of obstacles yet to be overcome, but are essential to restoration of wild salmon and sea trout stocks.

8a. Develop Area Management Agreement process
The servicing, evaluation and development of the Area Management Agreement (AMA) process requires considerable input from fishery interests. Representation of wild fish issues to the farming sector is undertaken at Area Management Group (AMG) meetings and administered by a Regional Development Officer (RDO).

AMAs	Status	Partners	Timing
Linnhe & Lorn	Underway	AFT, ADSFB, ADRIA, CRIA, MHS, SSF, LCS, KFF	2009 -15
Lower Firth of Lorn	Underway	AFT, ADSFB, ARIA, ROs, LG, KFF	
Firth of Clyde	Underway	AFT, A & EDSFB, RRIA, LFRIA, LCS, LG	
Arran	Underway	AFT, ADSFB, ARIA, LCS	
West Mull	Underway	AFT, MDSFB, ROs, LCS, SSF	
Sound of Jura	To be developed	AFT, ADSFB, RIAs, LCS	

8b. Assess sea lice management on marine farms
An important part of fishery restoration is the control of sea lice on fish farms. It is important to collect and relate farm sea lice data to fishery interests to maintain the process

Sea lice management	Status	Partners	Timing
AMAs	Underway	TWG, RDO, SSF, LCS, MHS, LG, KFF	2009 -15

8c. Implement escapee farm stock recapture plans
Containment of farm stock is an important aspect of farm management for both farmers and wild fish interests. Where breaches of containment do occur it is important to respond and where possible recapture escaped fish before they are able to spawn.

Farm containment	Status	Partners	Timing
Risk assessments	Underway	TWG, RDO, SSF, LCS, MHS, LG, KFF, DF	2009 -15
Develop stock recapture plans	Underway	AFT, DSFBs, TWG, RDO, SSF, LCS, MHS, LG, KFF, DF	2009 -15
Where necessary, implement plans	Underway	AFT, DSFBs, TWG, RDO, SSF, LCS, MHS, LG, KFF, DF	2009 -15

8d. Consult with TWG partners to improve mitigation
Wider strategic planning and management of the health of farm and wild fish require input from wild fishery representatives. Contribution to forums and management meetings is therefore important to consider many aspects such as farm relocation, production strategy and other mitigation measures.

Fish health planning	Status	Partners	Timing
Consultation	Underway	AFT, DSFBs, TWG, RDO, SSF, LCS, MHS, LG, KFF, DF	2009 -15

9. Create and maintain awareness of fishery issues
Communication of fishery issues to stakeholders and the wider public is important to raise awareness of their role in the management of fisheries.

9a. Develop public relations strategy
Utilising a wide range of media and communication tools is required to reach a wide audience. Development of a strategy to make the best use of available resources is required to ensure that robust up-to-date information is delivered to target groups.

Public Relations	Status	Partners	Timing
Develop PR Strategy	Underway	AFT, DSFBs, ROs	2009 -15

9b. Disseminate information via website, newsletters and reports
Developing skills and obtaining sufficient tools to create and maintain a flow of information is needed to maintain and improve awareness and secure funding for future work.

Information delivery	Status	Partners	Timing
Establish Website	Underway	AFT, DSFBs	2009 -15
Produce newsletters	Underway	AFT, DSFBs	2009 -15
Generate reports for wider consumption	Underway	AFT	2009 -15
Establish multi-media presentation & display	Underway	AFT	2009 -15

9c. Undertake school-based educational programme
A school-based Rivers in the Classroom (RITC) programme was delivered by AFT to a number of primary schools across the region in 2007-8. Responses from schools indicate a larger project is required to satisfy local demand for environmental-based educational projects.

Classroom Projects	Status	Partners	Timing
Classroom Projects	To be developed	AFT, DSFBs, ABC, SNH	2009 -15

9d. Contribute to local biodiversity awareness programmes
Other stakeholders working to raise awareness of biodiversity issues may require input from fishery interests to link cross-sector approaches to conservation.

Educational Projects	Status	Partners	Timing
Community Projects	To be developed	AFT, DSFBs, ABC, SNH	2009 -15
Local events	Underway	AFT, LAIA, SNH	2009 -15

10. Maintain and improve fishery management structure

Much has been done to improve local management of fisheries, but further work is required to establish a legal and management framework that allows fisheries management to modernise and improve.

10a. Consult with government to improve legislation
Local fishery management groups can contribute to the development of effective legislations as part of national umbrella groups such as the Association of Salmon Fishery Boards (ASFB) and Rivers And Fisheries Trusts of Scotland (RAFTS) that may consult directly with legislators and supporting wider management forums.

Fishery Legislation	Status	Partners	Timing
National development	Underway	AFT, DSFBs, ASFB, RAFTS	2009 -15

10b. Establish all species region-wide management body
The fragmentation of species-based management of fisheries is detrimental to the concept of catchment and regionally-based management. Streamlining the currently complex management structure of fisheries will also free-up limited resources to be employed elsewhere.

Regional Management	Status	Partners	Timing
Argyll Fishery Board	To be Developed	AFT, DSFBs, RIAs, LAIA	2009 -15

10c. Establish local management groups and develop skills
Delivery of effective management groups at the catchment scale require well informed local interests to generate and undertake administration, management and improvement initiatives. A range of training for hands-on managers and bailiffs is also required to raise standards of management and protection.

Local Management	Status	Partners	Timing
River & Loch Improvement Associations	Underway	AFT, DSFBs, ROs, RIAs, LAIA	2009 -15
Training	Underway	AFT, DSFBs, ROs, RIAs, LAIA, IFM, SFCC	2009 -15

10d. Establish a web-based fishing access and permit system

The fish populations that are currently able to sustain fisheries require marketing and improved permitting arrangements to ensure that economic benefits to local communities is maximised by encouraging angling related tourism.

Angling tourism	Status	Partners	Timing
Web-based marketing & permit system	To be developed	AFT, DSFBs, ROs, RIAs, LAIA	2009 -15

10e. Identify fishery development potential in trout lochs
Utilising information collected as part of loch and angling surveys it is possible to establish and facilitate a network of lochs for trout fishing.

Trout Loch Fisheries	Status	Partners	Timing
Data gathering and analysis	To be developed	AFT, ROs, RIAs, LAIA	2009 -15
Consultation	To be developed	AFT, ROs, RIAs, LAIA	2009 -15
Web-based marketing & permit system	To be developed	AFT, ROs, RIAs, LAIA	2009 -15

11. Inform & fund activities to meet management aims

Delivery of a wide ranging work programme with limited resources obtained from fisheries requires contribution from multiple sectors that have an interest in fish resources.

11a. Develop project and grant-based work programme
Establishing a project-based programme will require resources to establish potential partners and undertake project development.

Project development	Status	Partners	Timing
Rivers Projects	Underway	All	2009 -15
Lochs Projects	To be developed	All	2009 -15
Biodiversity Projects	Underway	All	2009 -15
Biosecurity Projects	To be developed	All	2009 -15
Economic Projects	To be developed	All	2009 -15

11b. Incorporate a wide range of benefits to attract funding
Undertaking consultation with a wide range of potential stakeholders and agencies are required to establish the range of data and other information that may be able to be collected as part of fisheries management. Maximising benefits of such work will be essential to establishing sufficient funding to support such work in the long term.

Consultation	Status	Partners	Timing
Consultation	To be developed	All	2009 -15

11c. Establish program to evaluate mitigation of developments
Organisation of the delivery of a work programme to evaluate and ensure effective mitigation is undertaken to maintain productivity. Consultation with developers and SEPA to establish AFT's role is required to establish the programme.

Developer Consultation	Status	Partners	Timing
S&SE	To be developed	AFT, DSFBs, S&SE, SEPA	2009 -15
SW & abstractors	To be developed	AFT, DSFBs, S&SE, SEPA	2009 -15
Renewable Developers	To be developed	AFT, DSFBs, S&SE, SEPA	2009 -15

11d. Secure fishery funding for core management activities
With limited resources available within the fishery sector due to poor fishery performance it is essential to engage and consult with fishery interests to determine the potential for longer term funding of core management activities.

Fishery Consultation	Status	Partners	Timing
Consultation	To be developed	AFT, DSFBs, RIAs, ROs	2009 -15

12. Assess the effectiveness & progress of the plan
Delivery, assessment and where required, adaptation of the plan's many activities will required a management group to represent the wide range of interests involved.

12a. Establish management group to assess progress
A wide range of interests need to be considered beyond the initial consultation phase for the strategic plan and assess

AFT Review	Status	Partners	Timing
AFT review	To be developed	AFT	2009 -15

12b. Review data & amend activities accordingly
Annual review of data and assessment of progress in each work programme will be required

Fisheries Review	Status	Partners	Timing
Fisheries review	To be developed	AFT, DSFBs, RIAs, ROs	2009 -15

12c. Consult widely to maximise benefits
Regular consultation and the development of the next phase of the plan will also be required to ensure the strategy is up-to-date and momentum maintained.

Sector Consultation	Status	Partners	Timing
Consultation	To be developed	All	2009 -15

12d. Develop second phase of the plan before 2015
Regular assessment of progress will allow the plan to be updated on an on-going basis, but other developments not foreseen in this phase are likely to occur so a further round of re-drafting and consultation will be required in 2015.

Plan Consultation	Status	Partners	Timing
Re-draft & Consultation	To be developed	All	2015