

# Neart na Gaoithe Offshore Wind Farm Salmon and Sea Trout Fisheries Technical Report

Undertaken by  
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## 1.0 Introduction

The following document describes the current salmon and sea trout fisheries technical report for the Neart na Gaoithe Offshore Wind Farm.

Salmon and sea trout are species of importance from a socioeconomic perspective on a local, regional and national level in Scotland. As a result of the nature of their fisheries, a separate approach, significantly different to that taken for the assessment of marine commercial fishing activities, is required.

## 2.0 Methodology

### 2.1 Guidance

The following guidance documents have been used for the undertaking of this technical report:

- Strategic Environmental Assessment (SEA) of Draft Plan for Offshore Wind Energy in Scottish Territorial Waters: Volume 1: Environmental Report; Marine Scotland 2010
- Offshore Wind Farms, Guidance Note for Environmental Impact Assessment in Respect of FEPA and CPA Requirements - Version 2; Cefas, MCUE, DTI, June 2004.
- Marine Scotland Scoping Opinion
- UK Offshore Energy – Strategic Environmental Assessment; DECC, January 2009
- Recommendations for Fisheries Liaison; FLOW, May 2008

### 2.2 Sources of Data and Information

There is no standard methodology for the establishment of salmon and sea trout fisheries technical reports in relation to offshore wind farm developments. A range of different data and information sources have therefore been used to inform this assessment. These are as follows:

- Marine Scotland Science (MSS)
- Association of Salmon Fishery Boards (ASFB)
- Salmon Net Fishing Association of Scotland (SNFAS)
- Relevant District Salmon Fishery Boards (DSFBs)
- Atlantic Salmon Trust
- Scientific papers and other relevant publications

### 2.3 Data gaps, Limitations and Sensitivities

#### 2.3.1 Marine Scotland Catch Statistics

MSS catch statistics divide salmon catches into “salmon” and “grilse”. In this context, the term salmon refers to multi-sea-winter salmon (MSW) whilst grilse refers to one-sea-winter salmon (1SW).

The catch data used for the purposes of this assessment are as reported. It is recognised that there may be a degree of error within the catch dataset due to misclassification of fish between the grilse and salmon categories. In addition, further errors as a result of misreporting of catches may also exist. The data used are as provided by Marine Scotland Science on 18/11/2010.

***The catch data used in this report are Crown copyright, used with the permission of Marine Scotland Science. Marine Scotland is not responsible for interpretation of these data by third parties.***

Each fishery in Scotland is required to provide the number and total weight of salmon and grilse and sea trout caught and retained in each month of the fishing season. Rod and line fisheries are also required to provide the monthly numbers and total weight of those salmon, grilse and sea trout which were caught and released back into the river, this practice is known as “catch and release”. As a result, MSS catch data for the rod and line fishery is broken down into two categories, “rod and line” and “catch and release”. The total catch by the rod-and-line fishery is in effect the sum of the catches recorded in both categories. Data from both categories have been combined to give an indication of the total rod-and-line catch. Similarly, the catch by net-and-coble and fixed engines (bag and stake nets) has been combined in some instances to provide an indication of the total catch by the net fishery.

### **2.3.2 Salmon Fishery Regions and Districts**

Each salmon fishery district applies its own voluntary or statutory conservation code, closure times, policies and regulations and has in place different management and conservation schemes (e.g. hatcheries, fish counters, water quality control and monitoring schemes). In addition, different districts include varying numbers of rivers and tributaries within their jurisdictions and have different catchment areas.

The areas and names of some districts have changed over time. In the regional study area, for example, catch statistics are collected for the South Esk, North Esk and Bervie districts separately. However, these districts were superseded by the Esk Salmon Fishery District and abolished in 1988 (S.I, 1988/ 994). For the purposes of this assessment the former, smaller districts, will be used as they provide a better spatial resolution for analysis of catch data.

The boundaries of the salmon fishery regions and districts could not be provided by MSS as GIS data layers as a result of third party copyright ownership of these data. The district and region boundaries shown in the charts provided in this report were produced by geo-referencing a raster image. These should therefore be taken as approximate and for illustrative purposes only.

### **2.3.3 Data Gaps**

The distribution patterns, behaviour and migration routes of salmon and sea trout in the marine environment, particularly in waters off the east coast of Scotland are not fully understood. As a result, accurate estimates of the numbers, time period and origin of the salmon and sea trout potentially migrating through or otherwise using the Neart na Gaoithe Offshore Wind Farm site or its vicinity cannot be made.

## **2.4 Consultation**

Consultation meetings were undertaken with representatives of relevant District Salmon Fishery Boards (DSFBs) and with representatives of the net fishery. These were as follows:

- Tweed District Salmon Fishery Board (17/02/2011)
- Forth District Salmon Fishery Board (17/03/2011)
- Tay District Salmon Fishery Board (16/02/2011)
- Esk District Salmon Fishery Board (27/10/2010)
- Usan Salmon Fisheries Ltd (Montrose) (17/02/2011)

In addition to the above meetings, questionnaires were circulated to all the District Salmon Fishery Boards in Scotland (DSFBs), through the Association of Salmon Fishery Boards (ASFB), and to netsmen, through the Salmon Net Fishing Association of Scotland (SNFAS). This process was aimed at gathering information at a national level and to note the main concerns of the Boards and the

netmen with regards to wind farm developments in Scotland. At the time of writing, a sample of 17 Boards, netmen and other organisations has completed and returned the questionnaires (see Appendix 01).

### 3.0 Study Area

The area of study has been defined at a local, regional and national level (Figure 3.1). The local study area focuses on the Forth, the salmon fishery district within which the proposed export cable landfall options fall. The broader regional area takes account of all the fishery districts located in the vicinity of the Neart na Gaoithe Offshore Wind Farm, including the Esk (South Esk, North Esk and Bervie), Tweed, Forth and Tay. In addition, given the migratory behaviour of salmon and sea trout and the importance of the fishery across Scotland, data and information at the national level have also been briefly described.

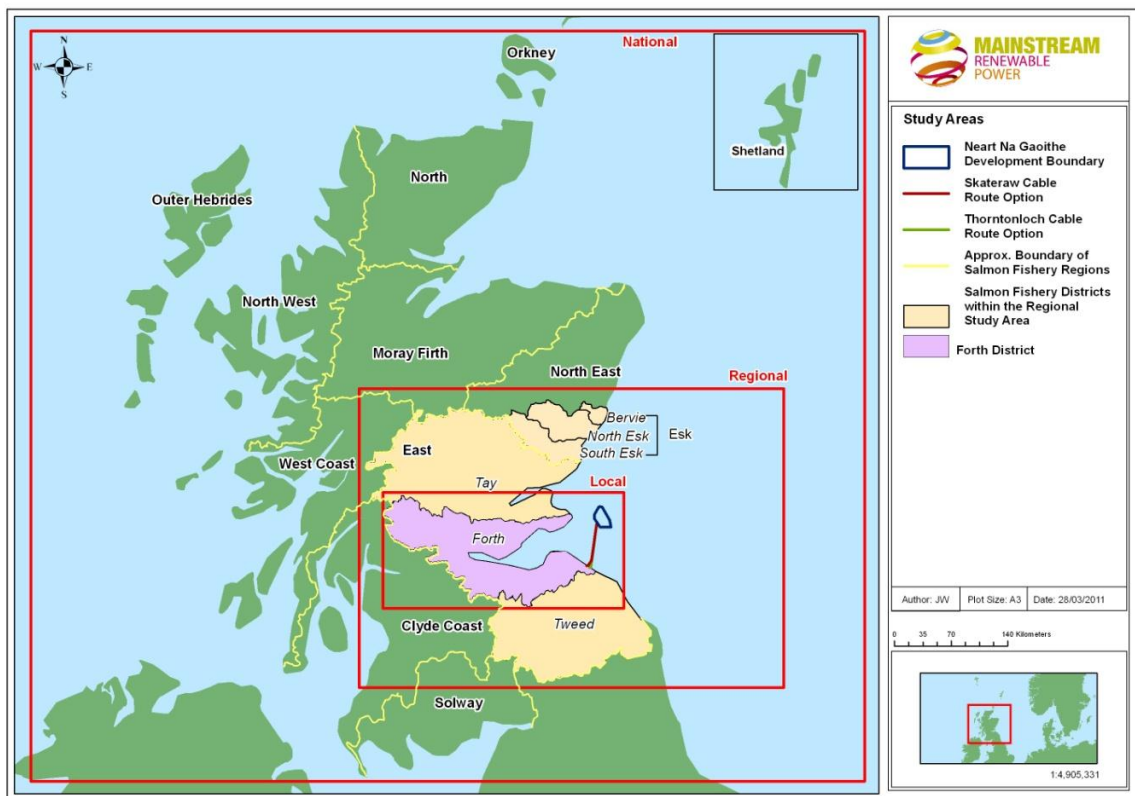


Figure 3.1 Study Areas

### 4.0 Background Information

Atlantic salmon (*Salmo salar*) and sea trout (*Salmo trutta*) are both anadromous migratory species which utilise the freshwater and marine habitats during their life cycle. Salmon and sea trout fisheries exploit the migratory behaviour of these species intercepting fish both in rivers and coastal waters.

For the purposes of better understanding salmon and sea trout fisheries, a short description of the behaviour and ecology of the species, is provided below.

## 4.1 Atlantic salmon

Atlantic salmon spawn in their natal rivers in late autumn. After a number of years in the river (most commonly two or three in Scotland) salmon undergo a transformation both externally and internally, which allows them to adapt to salt water. They are then known as smolts. Smolts move down rivers from April to June to start their marine migration. Once they enter the sea they are known as post-smolts, until the spring of the following year. After one or more years feeding at sea, salmon return to their home rivers to spawn. Fish that have spent one winter feeding at sea are called grilse (one-sea-winter salmon) whilst salmon which have spent more than one winter at sea are known as multi-sea-winter salmon (MSW).

Salmon of different sea-ages tend to return at different times of year and often spawn in different parts of the rivers (Potter and Ó Maoiléidigh, 2006). In most countries salmon runs tend to only take place at specific times, normally during late summer and autumn. In Scotland, however, salmon enter the rivers throughout the year, resulting in the existence of a range of salmon runs. This is of importance to the salmon fisheries as it provides fishing opportunities over extended periods of time (MSS, 2010b).

The majority of grilse (1SW salmon) enter the rivers from early summer until shortly before spawning in autumn and early winter. Many of the MSW salmon also enter rivers over that same period of time. River entry for the Scottish MSW salmon class as a whole, however, occurs over a greater period of time, extending back to the autumn months of the year before spawning (Youngson *et al.*, 2002).

The quality of salmon, from a fisheries point of view, varies depending on the run, with large spring-running MSW salmon being particularly highly prized (Potter and Ó Maoiléidigh, 2006). In the past, spring salmon runs made a major contribution to the Scottish fisheries, especially to those of the east coast and its rivers. Concern on the state of this component of the stock has, however, risen in recent years, as it has declined more significantly than other stock components (Potter and Ó Maoiléidigh, 2006; MSS, 2003; Youngson *et al.*, 2002; Smith *et al.*, 1998). In order to protect the spring salmon populations, measures such as total catch and release policies and delays in the start of the net fishery season have been introduced in many salmon fishery districts across Scotland.

The conclusions of the *Review of the migratory routes and behaviour of salmon, sea trout and European eel in Scottish coastal waters*, recently published by Marine Scotland (Malcolm *et al.*, 2010), suggests that for salmon originating in the east and north east coast rivers, the general direction of coastal movement is northerly and coastal migration may start as far south as the north east coast of England (Figure 4.1). This is in line with the model of adult salmon migration proposed by Shearer (1992) where it was suggested that from Aberdeenshire southwards, fish travel in a northerly direction having migrated south past their home rivers through the North Sea and approach the coast around Northumberland (Malcolm *et al.*, 2010). Assuming this is the case, there is potential for not only salmon originating in rivers within the regional study area, but also in rivers further north (Dee, Don, Ythan, etc), to transit through or in close proximity to the Neart na Gaoithe Offshore Wind Farm site and export cable route.

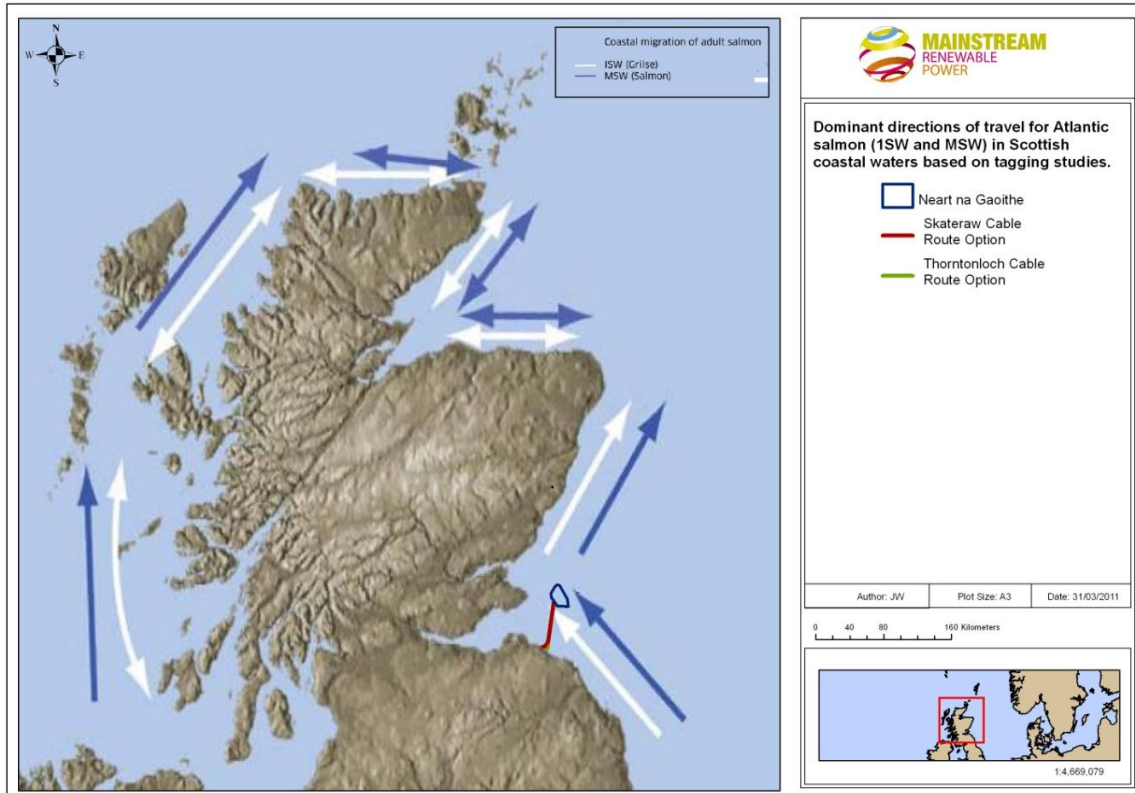


Figure 4.1 Dominant directions of Travel for Atlantic Salmon in Scottish Coastal Waters (Source: Malcolm *et al.*, 2010)

## 4.2 Sea Trout

The life cycle of the sea trout is similar to that of Atlantic salmon. Spawning generally occurs between mid October and January. Most sea trout populations in the UK become smolts after two or three years in the river. Smolts leave the river around the same time as salmon, between April and early June.

Most sea trout return to the rivers after twelve or more months at sea. These can be seen in the rivers between May and October (SNH, 2010). Some immature fish, however, return to the rivers after only a few months at sea, often in July and September (SNH, 2010). These are small fish, regionally known as ‘finnock’, ‘herling’ or ‘whitling’ and are found feeding in most Scottish estuaries as they move in and out with the tide (MSS, 2010a). Many gather in larger rivers and lochs, not necessarily in their natal systems, and over-winter in fresh water before returning to the sea in spring.

Unlike salmon, sea trout generally do not venture to offshore feeding grounds, remaining in coastal waters for the most part of their marine life. Long distance offshore migrations have however also been described for this species, suggesting that offshore migrations are also a feature of the life cycle of sea trout (Malcolm *et al.*, 2010).

In the Tweed, sea trout tagging studies have been undertaken since the 1850s. The results of these suggest, based on fish tagged as finnock (locally known as Blacktail) in the lower river and in the estuary in the winter, that sea trout smolts from rivers to the north come south in winter to feed in the Tweed and in the northern rivers (The Tweed Foundation, 2008).



The distribution of recaptures of spent adult sea trout (kelts) tagged in the Tweed, suggests that this element of the sea trout population either remains in the Tweed or migrates south to the east coast of England and the southern North Sea. This southern-migrating Tweed sea trout would spend most of their time as post-smolts far from the Tweed and would therefore not be present to be tagged as finnock in the winter (The Tweed Foundation, 2008).

Further north, tagging studies carried out by Shearer (1990) at Montrose (Esk district) have found that the majority of recaptures were in the river North Esk and adjacent South Esk and rates of recapture declined with distance north and south outside these areas. Smolt recaptures were however obtained as far north as the Spey and as far south as the Northumberland coast and finnock recaptures as far north as the Spey and as far south as the Tweed. In addition, adult fish were caught as far away as Lewis, Denmark and the Swedish coast (Malcolm *et al.*, 2010).

Comparison with the results of the tagging of sea trout smolts in the North Esk supports the idea that Tweed sea trout and of rivers to the south have different migration patterns to those rivers to the north. On this basis, it has been suggested that the Tweed is the southern limit and the Spey the northern limit of migration for sea trout originating north of the Tweed (Tweed Foundation, 2008).

Based on the above, it appears clear that there is potential for sea trout from rivers north of the Tweed to transit the area of the Neart na Gaoithe Offshore Wind Farm, export cable route and their vicinity as part of their migration. A summary of the interpretation of sea trout movements in and around the Tweed as derived from the results of tagging experiment is given in Figure 4.2 below.

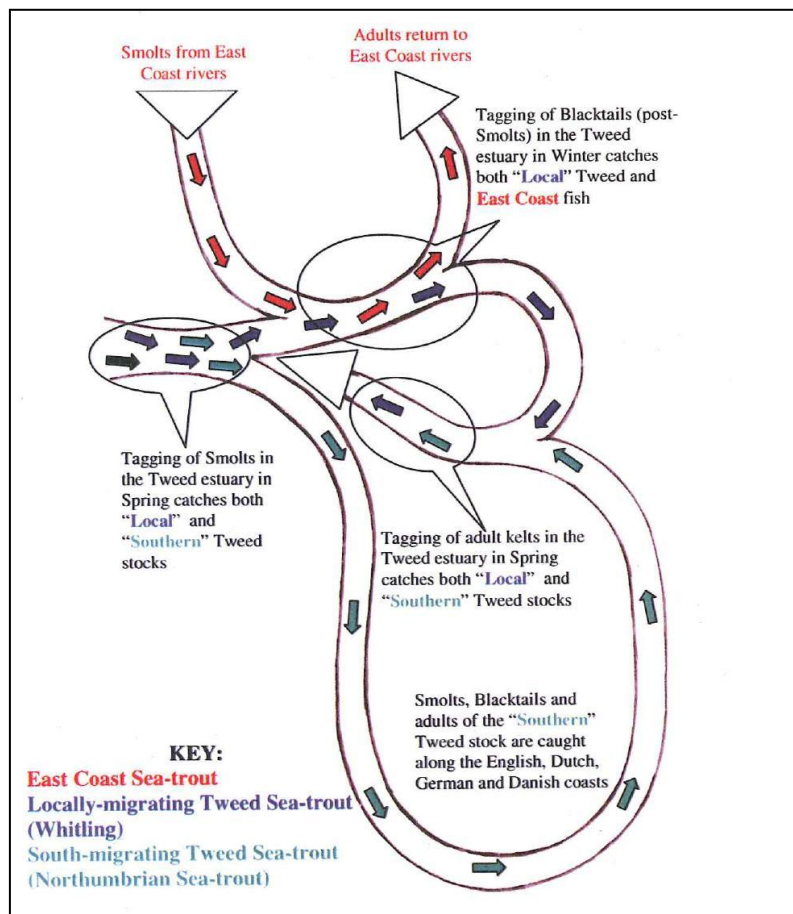


Figure 4.2 Suggested Life-histories and Migrations of Sea Trout in and around the Tweed (The Tweed Foundation, 2008)

### 4.3 Threats to Salmon and Sea Trout

Salmon and sea trout populations are subject to a number of threats in both the freshwater and marine phases. Atlantic salmon stocks are currently considered under threat across their northern hemisphere range and sea trout populations in decline throughout the United Kingdom (Crawley, 2010). In fresh water, degradation of juvenile and spawning habitat, and land use, in particular intensive agriculture, are thought to be having the greatest effect, whilst in the marine phase there is concern over the recent decline in post-smolt marine survival rates (Hendry and Cragg-Hine, 2003; ICES, 2009).

It should be noted that efforts made in the rivers to maintain and conserve salmon and sea trout stocks (e.g. removal of obstacles to migration, fishing codes of practice, river management and water quality schemes, etc), although considerable, are limited in their effectiveness as a result of stock management measures implemented in coastal waters and in the high seas and by changes in the state of the stocks caused by increased sea mortalities and other such factors.

In this context, an aspect of relevance is the persistence of Multi Stock Fisheries (MSFs) in Scotland, which target fish from more than one stock/river (e.g. coastal netting). These fisheries can be damaging because they have potential to intercept any salmon or sea trout in their vicinity, regardless of where those fish are heading or the strength of the population in their natal rivers (Crawley, 2010).

### 4.4 Conservation Status

Atlantic salmon (*Salmo salar*) is listed in Annexes II and V of the EU Habitats Directive as a species of European importance.

Through the implementation of the Habitats Directive and as a result of the European importance of Scotland's salmon populations, 11 Scottish rivers have been designated as Special Areas of Conservation (SACs), for which salmon is a primary reason for selection of the sites. Of these SACs, three (the South Esk, Tay and Tweed) are located in the regional study area. In addition, in the river Teith, a tributary of the Forth which is also a SAC, salmon is a qualifying reason for selection of the site.

An indication of the current state of the principal salmon sub-stock components (spring, autumn and summer) in the salmon SACs within the regional study area is given in Figure 4.3 to Figure 4.6 below based on rod-and-line catch data (Crawley, 2010). The trend in spring salmon is of a decline in the four SACs, especially in the South Esk and the Tweed, whilst for autumn and summer salmon the trend appears to be one of increased catches.

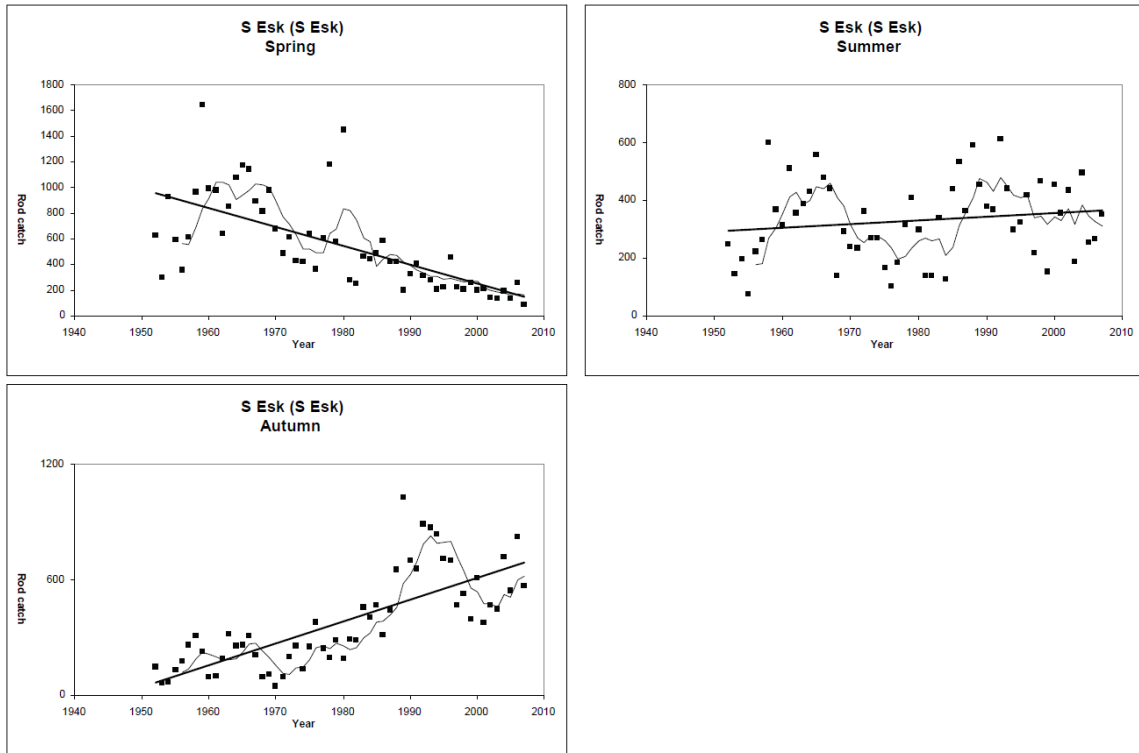


Figure 4.3 Salmon Rod Catches in the South Esk SAC (Crawley, 2010)

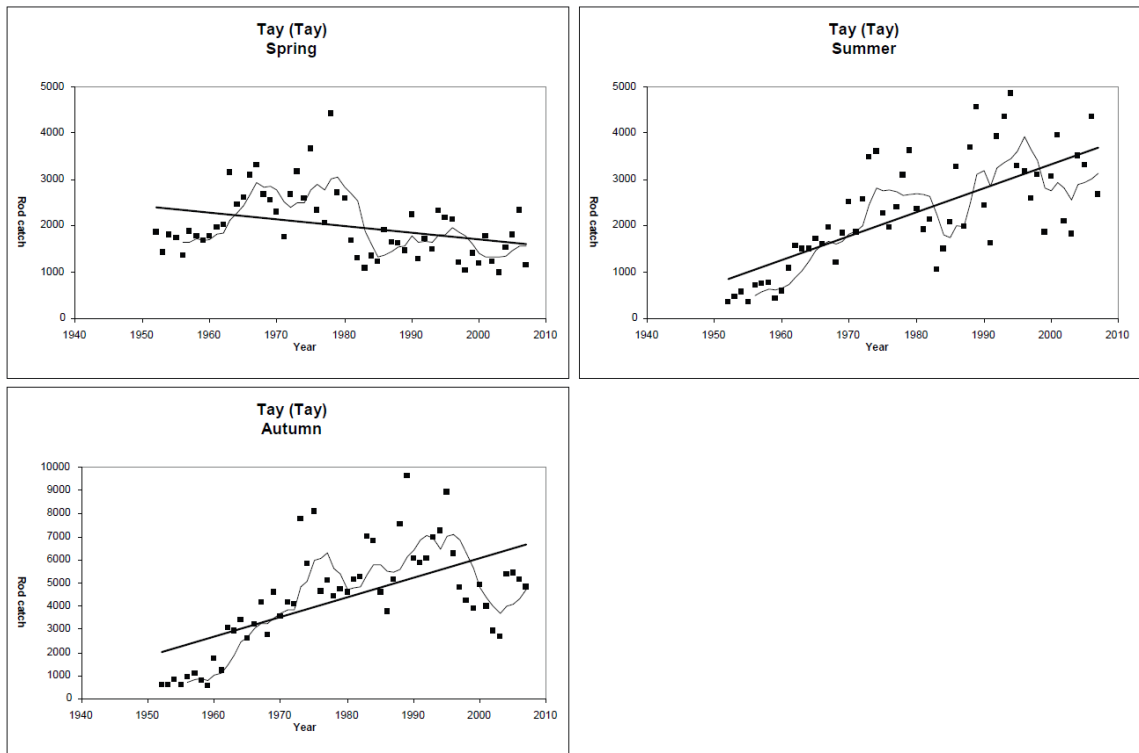


Figure 4.4 Salmon Rod Catches in the Tay SAC (Crawley, 2010)

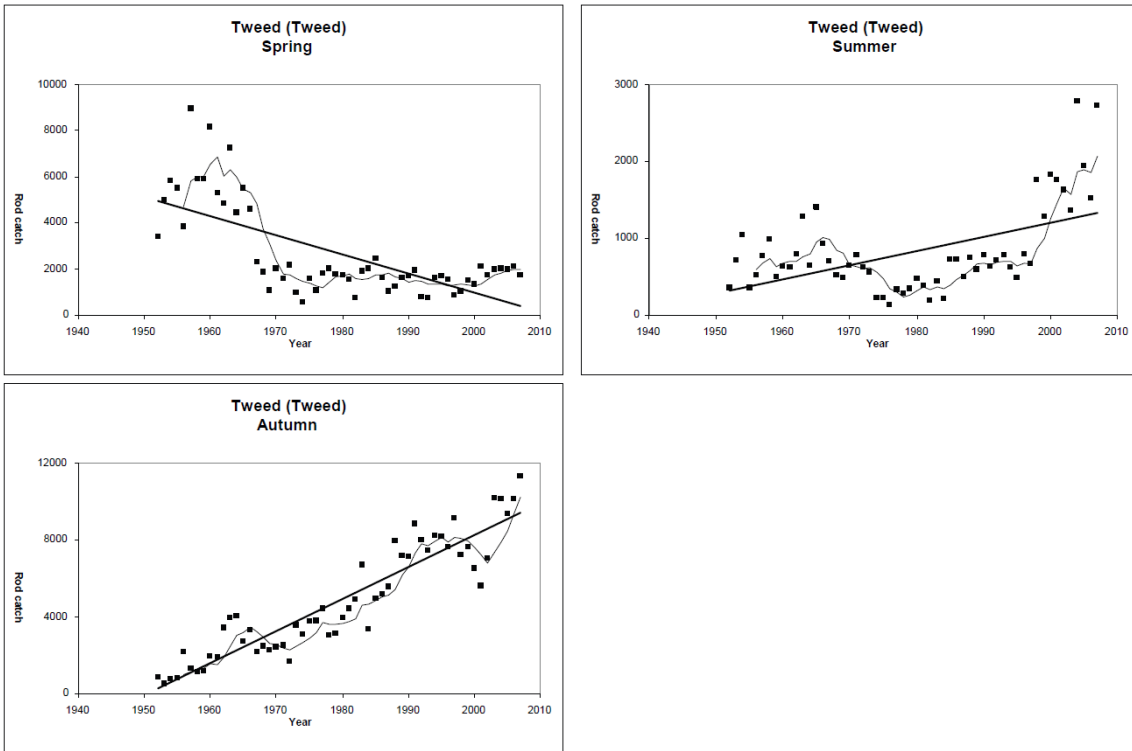


Figure 4.5 Salmon Rod Catches in the Tweed SAC (Crawley, 2010)

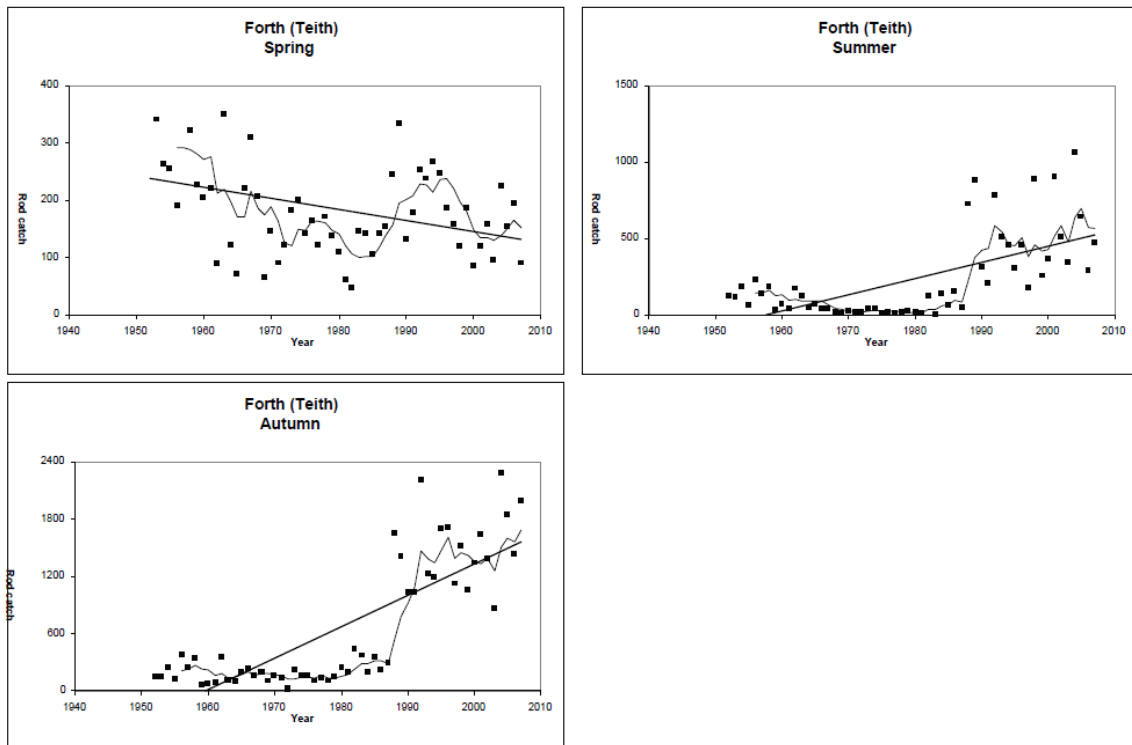


Figure 4.6 Salmon Rod Catches in the River Teith (Forth District) SAC (Crawley, 2010)

In addition to the protection given under the EC Habitats Directive, Atlantic salmon is listed as a UK Biodiversity Action Plan (BAP) priority species and is protected at the international level by the North Atlantic Salmon Conservation Organization (NASCO), an inter-governmental organisation devoted to the conservation, restoration, enhancement and rational management of wild salmon in the North Atlantic (Curd, 2010).

Sea trout (*Salmo trutta*) is not subject to the same level of protection as salmon in Europe, although it is listed as a UK BAP priority species and, in Scotland, is currently protected under the same legislation as Atlantic salmon. This is a result of the definition of the term salmon in the Scottish legislation including both species. Under the Salmon (Scotland) Act 1986 the term salmon means: *all migratory fish of the species Salmo salar and Salmo trutta and commonly known as salmon and sea trout respectively or any part of any such fish*".

Further to the above, the marine part of the life cycle of both Atlantic salmon and sea trout is included in the draft list of Priority Marine Features recently compiled by the SNH (SNH, 2011). This takes account of habitats and species considered of greatest marine nature conservation importance in Scottish territorial waters.

## 5.0 Salmon and Sea Trout Fisheries Technical Report

### 5.1 Introduction

The definition of salmon under the Salmon Act 1986 includes both Atlantic salmon (*Salmo salar*) and sea trout (*Salmo trutta*). Both species form an important part of Scotland's natural heritage and support and maintain the existence of commercial and recreational fisheries which are of importance to the Scottish economy.

A study undertaken by the Scottish Executive (Radford *et al.*, 2004) estimated that game and coarse anglers spent a total of £131m in Scotland of which 65% (£73m) corresponded to salmon and sea trout fishing. In the Tweed, one of the most important salmon fishery districts in Scotland and in the regional study area, an economic survey carried out in 2007 (RTC, 2007) estimated that the economic impact, the output generated in the Scottish Borders and that could be attributed to fishing on the Tweed system was just under £18 million and that this supported around 457 full time jobs.

### 5.2 Salmon Fishing Rights, Administration and Regulations

#### 5.2.1 Fishing Rights

The right to fish for salmon in Scotland, whether in inland waters or at sea, is a heritable right<sup>1</sup>. The taking of salmon without the right or written permission to do so is prohibited under the Salmon and Freshwater Fisheries (Protection) (Scotland) Act 1951.

The rights originally belonged to the Crown, however the Crown has made grants of salmon fishing to others and ownership is now widely distributed among private individuals, companies, local authorities and others. The rights can be bought, sold or leased independently of land except in Orkney and the Shetlands (Williamson, 1991).

The Crown still owns areas along the coast and in rivers. Since the late 1980s, however, the Crown Estate has supported a policy of conservation. There are therefore, no longer any coastal netting stations let by the Crown and none are actively fished (The Crown Estate, 2010); the existing working netting stations were therefore granted or sold the heritable title by the Crown Estate before the late 1980s (Crawley, 2010). Salmon fishing rights in coastal waters originally extended up to the 12 nm exclusive territorial limit. Restrictions introduced to regulate fishing activities have however resulted in salmon fishing in Scotland being limited to a short distance from the shore, further discussed in Section 5.3.

#### 5.2.2 Fisheries Administration

Salmon fisheries in Scotland, both inland and at sea, are managed by their owner or leaseholder under a framework of regulations laid down by central government.

For the purposes of salmon fishery management Scotland is divided into 54 statutory Salmon Fishery Districts each with a catchment area including a river or group of rivers (ASFB, 2010b). Today, almost without exception, every district has formed a District Salmon Fisheries Board (DSFB) made up of the owners or leaseholders of the fishing rights. These boards manage the rivers and coastal netting zones, being able to appoint bailiffs with the power to enforce regulations and restrictions, as well as establishing other practices for improving and maintaining fish stocks, and monitoring and controlling river conditions. Each salmon fishery in each district has a value, which is calculated by

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<sup>1</sup> The right to fish for salmon is one of the *regalia minora* (proprietary rights of the Crown which can be alienated) and a legal separate tenement which the Crown may grant or lease to a party other than the owner of the (water-covered) land over which the right is held. The right is a type of incorporeal heritable property and as such an interest in land which can be registered in the Land Register.

the district assessor. Individual boards are self-financing and generally raise money by taxing rights' owners within their district. This often works on a sliding scale, according to the number of fish caught. In 1999 the government made a revision to the constitution of the boards to allow for wider representation, by bodies such as the Scottish Environment Protection Agency, Scottish Natural Heritage or others such as local angling clubs and associations (ASFB, 2010b).

Boards hold powers relating to the introduction of new regulations on the fishery, the purchase of property to acquire rod or net fisheries, the imposition of fishery assessments on the fishery proprietors, etc (SPICE, 2000). Whilst the Boards themselves have no ability to make legal restrictions on fishing, applications are made to Scottish Ministers by the Boards for changes and new regulations to be introduced.

Salmon fishery districts, as formalised by the Salmon Fisheries (Scotland) Acts 1862-1868, are shown in Figure 5.1. As explained in Section 2.3.2 above, some districts have been joined together and superseded by larger districts, resulting in the current 54 districts.

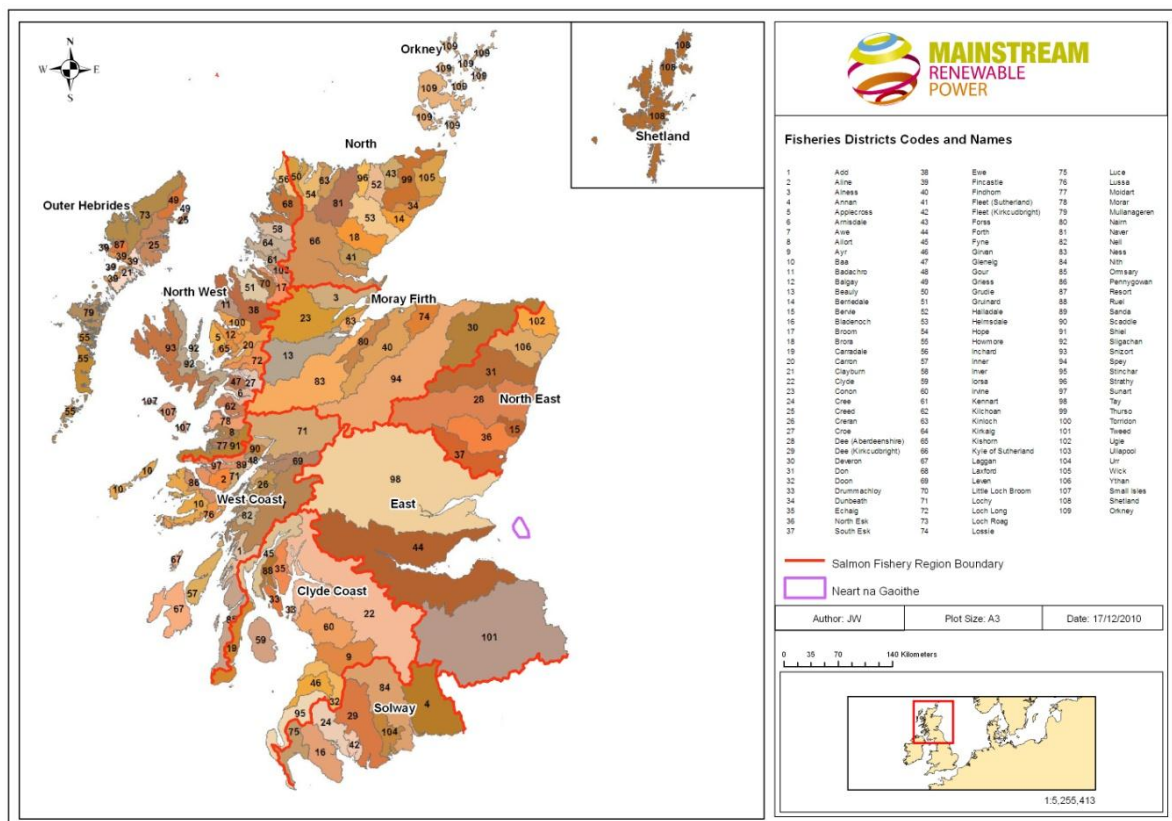


Figure 5.1 Salmon Fishery Regions and Districts in Scotland

In addition to the Boards, Marine Scotland (within the Scottish Executive Environment Directorate)) oversees the fishery as a whole, promoting legislation and making regulations under the various Salmon and Fisheries Acts passed by the devolved government. The Inspector of Salmon and Freshwater Fisheries monitors the effects of legislation and the operation of the fisheries. Marine Scotland Compliance (formerly the Scottish Fisheries Protection Agency) enforces regulations at sea and helps the District Boards with local, coastal enforcement (Williamson, 1991); Marine Scotland Science's Freshwater Fisheries Laboratory provides scientific advice on salmon and their fisheries.

### **5.2.3 Fisheries Regulations**

#### **5.2.3.1 General**

The annual close time for fishing salmon in Scotland (except in the Tweed district) is a continuous period of not less than 168 days. It applies to all methods of fishing, except to the extent that provision is made for periods during the annual close time during which it is permitted to fish for and take salmon by rod-and-line (Crawley, 2010). Actual dates may vary but are mostly from late August to mid February, depending upon individual District Board policy. Rod-and-line may continue for a few weeks either side of this. Weekly close times are also nationally enforced, being 24 hours (Sunday) in the case of angling and 60 hours for all other methods.

In the Tweed, the annual close time is a continuous period of not less than 153 days from mid September until mid-February in the following year. The periods during the annual close time when fishing by rod-and-line is permitted extend until 31<sup>st</sup> of November and from 1<sup>st</sup> of February (Crawley, 2010).

It should be noted that these close periods may, in some cases, be extended through voluntary agreement or decreased after request to Marine Scotland by DSFBs (Crawley, 2010).

It is prohibited to take juvenile salmon (not including trout). There is a minimum mesh size of 90mm for nets, to enable smolts to escape. In addition, since the introduction of the Conservation of Salmon (Prohibition of Sale) (Scotland) in 2002, it is prohibited to sell, offer or expose for sale any salmon that has been taken by rod-and-line.

There is no direct limitation on fishing effort within open fishing periods, although there are restrictions in place which act as indirect controls:

- Restrictions imposed on the various fishing methods (discussed in Section 5.3);
- The exclusive right of the salmon fishermen through ownership or tenancy to decide fishing effort in their fishery and;
- Regulations established and enforced by individual District Boards.

Salmon fisheries are saleable and netsmen or companies may acquire fishing rights over relatively large areas. Other interested parties may also purchase rights. For example, the Atlantic Salmon Conservation Trust has historically bought coastal sites to close them down as a conservation measure in order to halt coastal netting activities. Similarly, rod-and-line interests may buy up river netting rights to close them down, often through the District Boards.

#### **5.2.3.2 Inland waters**

The only lawful fishing methods in inland waters are rod-and-line and net-and-coble. Fixed nets/engines are prohibited.

#### **5.2.3.3 At sea**

It is prohibited to catch fish by enmeshment. Troll or long-lining is also illegal. Effectively the only lawful methods are net-and-coble, fixed engines or rod-and-line.

### **5.3 Fishing Methods**

The principal methods for catching salmon in Scotland are as follows:

- Fixed Engines (Bag and Stake Nets)
- Net-and-coble
- Rod-and-line



### 5.3.1 Fixed Engines (Bag and Stake Nets)

Bag and stake nets are the most common types of gear used to catch salmon in Scottish coastal waters and are commonly referred to as fixed engines. Salmon fishing using this method is not permitted in inland waters (rivers above the estuary limits).

Bag nets are set to fish just below the surface in rocky coasts where they will not ebb dry at low tide. They may be set singly or in a line extending seawards from the shore. The entire net or line of nets is not permitted to extend more than 1,300m from the mean low water mark, excluding mooring warps or anchors. The nets must not be operated between 6pm Friday until 6am Monday. Catches are generally removed from the nets at slack tide (Galbraith and Rice, 2004; SI 1992/1974).

No part of the nets may be set with the purpose of catching fish by entanglement. The minimum mesh net size is 90mm. Nets are designed to target fish swimming close to the surface while following the coastline. The gear is made up of two principal elements, the trap and the leader. The trap is approximately 13.5m wide and 4.5 metres deep at the mouth, tapering to about 3m in width and 2.5m in depth at the head. The leader may not exceed 300m in length. The configuration of a typical bag net is shown in Figure 5.2 below.

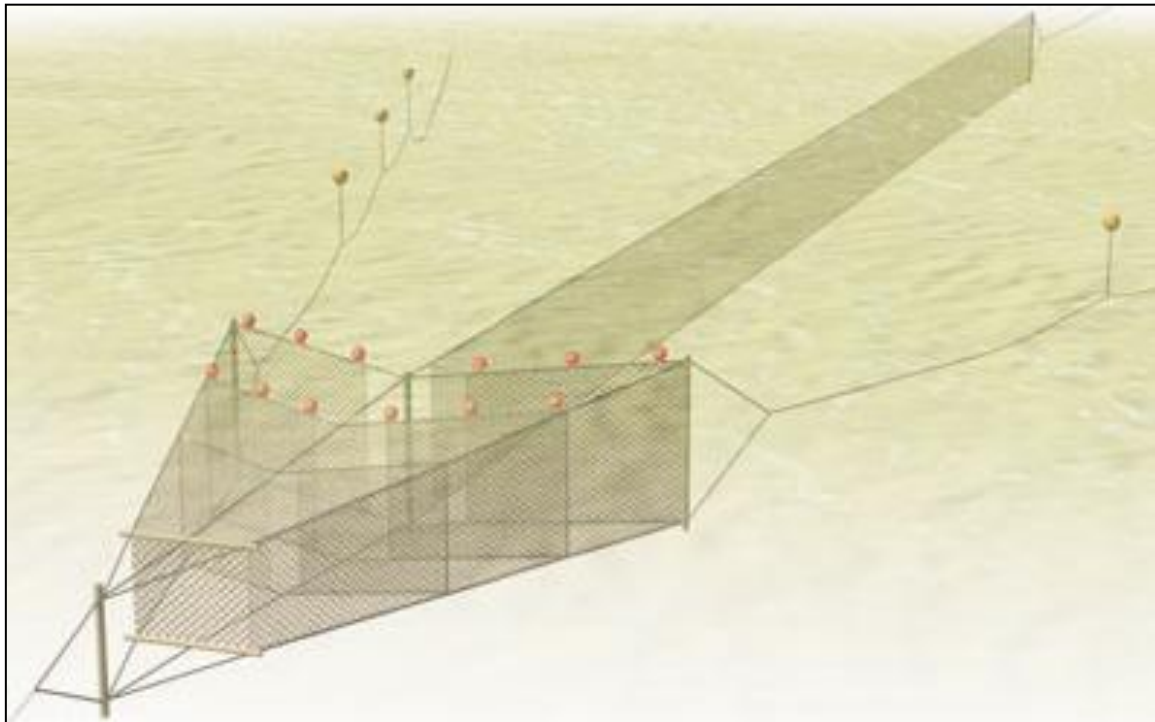


Figure 5.2 Bag Net showing the Trap, the Leader and Moorings

Stake nets are similar in design and operation to the bag nets except that they are set on sandy beaches, supported on stakes driven into the sand, where the receding tide exposes the nets. The maximum allowed leader length and total gear length are similar to those specified for bag nets.

### 5.3.2 Net-and-Coble

Traditionally nets are operated from cobbles, small flat bottomed, open boats, with a shore party assisting in operations. A member of the shore party holds the upstream hauling rope and the net is paid out from the stern of the vessel, as shown in Figure 5.3. The net must not be stationary or allowed to drift at any time and must be constantly 'swept', surrounding the fish and drawing them

towards the shore. No other objects or obstructions may be used to aid fishing and adjacent netting operations must be at least 50 metres apart (Galbraith and Rice, 2004).

Net-and-cobles are generally operated in estuaries and the lower reaches of rivers, although small numbers are also used in coastal waters (Potter and Ó Maoiléidigh, 2006).



Figure 5.3 Net-and-coble Fishing

### 5.3.3 Rod and Line

At present, recreational rod-and-line fishing is the most common method of fishing for salmon. The Salmon and Freshwater Fisheries (Consolidation) (Protection) (Scotland) Act 2003 defines rod and line as: “a single rod and line (used otherwise than as a set line or by way of pointing, or by striking or dragging for fish) with such bait or lure as is not prohibited”. DSFBs can apply to Scottish Ministers for regulations specifying baits and lures that may not be used for rod-and-line fishing in their district to be made whilst in some cases voluntary restrictions are set by the boards. Usually the restrictions prohibit the use of shrimps, prawns or worms as bait and the use of lures bearing multiple sets of hooks (SPICe, 2000). The use of fish roe, fire or light as bait or lure is also prohibited (Salmon and Freshwater Fisheries (Consolidation) (Protection) (Scotland) 2003).

Salmon and sea trout are generally not caught by rod-and-line at sea, but along river beats. Most DSFBs operate and police a catch and release policy. Due to its popularity, the sport makes a significant contribution to both local and regional economies.

## 5.4 Fisheries Data

The information given in this section is principally based on reported catches of salmon, grilse and sea trout recorded from 1952 to 2009 by region and by salmon fishery district within the regional study area from 2000 to 2009. These were kindly provided by Marine Scotland Science. In addition, information gathered during the consultation process has also been included in this section where appropriate.

The analysis and interpretation of fisheries statistics given below is not intended as an assessment of the abundance or state of the stocks but as an indication of the underlying population trends and the relative importance of the salmon and sea trout fisheries by region, fishery district and method.

#### 5.4.1 National

##### 5.4.1.1 Historical Data

An indication of the current trends in salmon, grilse and sea trout catches in Scotland with respect to historical levels (1952-2009) is given below broken down for the rod-and-line (including catch and release) and the net (net-and-coble and fixed engines) fisheries respectively.

Current salmon catches by rod-and-line are in line with historical levels whilst there has been a slight increase in the total annual catch of grilse, particularly during the second half of the time series. The overall trend in the sea trout catch is one of a decline, with current catches being more than half from those recorded at the start of the series (Figure 5.4).

It should be noted that the fisheries statistics given below do not take account of fishing effort. The popularity of rod-and-line fishing together with the improvement of the catch reporting system, may have, to some extent, contributed to catch values for salmon and grilse remaining in line with historical levels.

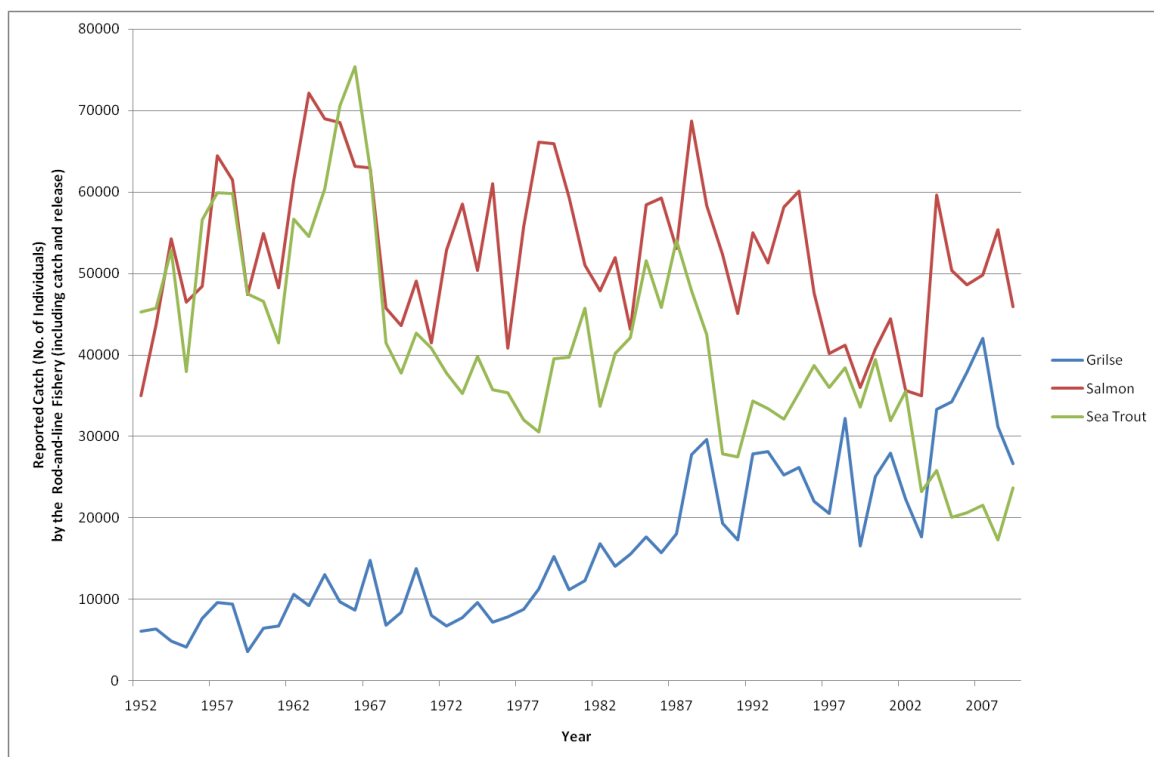


Figure 5.4 Rod-and-line Fishery (including Catch & Release) Reported Catches (1952-2009)

Catches by the net fishery (net-and-coble and fixed engines) have shown a marked decline in the last decades with respect to historical levels (Figure 5.5). This decline is associated with a decrease in fishing effort observed in recent years, principally resulting from the buyout and closure of coastal netting stations, changes in abundance of salmon and the fall in the market price of wild salmon caused by competition from the aquaculture industry (MSS, 2008). This may, to some extent, also be contributing to the current catch values recorded in rivers by the rod-and-line fishery.

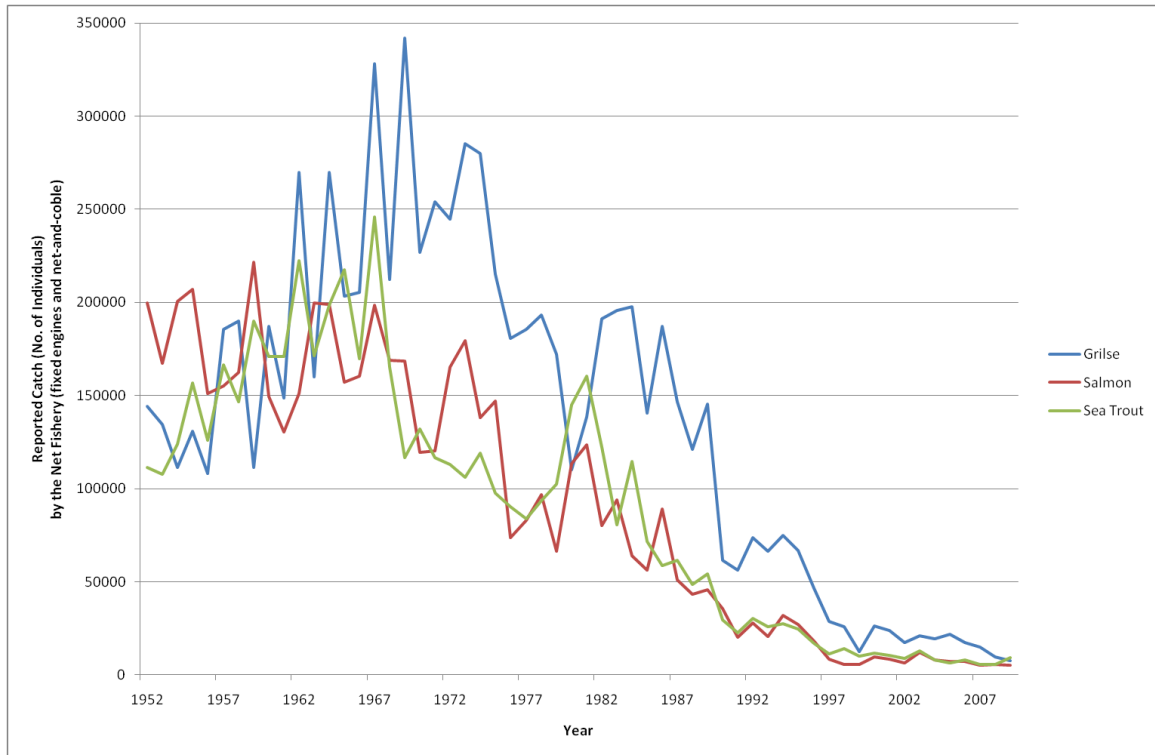


Figure 5.5 Net Fishery (Fixed Engines and Net-and-coble) Reported Catches (1952-2009)

#### 5.4.1.2 Current Trends

An indication of the relative importance of the fishery by region is given in Figure 5.6 and Figure 5.7, based on annual average catches (2000-2009) by species and method, respectively.

Overall, reported catches tend to be higher in the east coast, with the East and North East fishery regions recording the highest catches at the national level, followed by the Moray Firth and the North (Figure 5.6 and Figure 5.7).

In general terms salmon and grilse account for the majority of the catch, with the exception of the Outer Hebrides, where sea trout catches are comparatively higher than those for grilse and salmon combined (Figure 5.6).

Rod-and-line (including catch and release) is the principal method used in most regions. Netting by fixed engines and net-and-coble is of relevance in some regions, principally in the North and North East (fixed engines) and in the East (net-and-coble), where the percentage of the catch by these methods is comparatively high. The netting component of the total catch is of special importance in the North East Region, where the combined catch by fixed engines and net-and-coble accounts for a similar percentage of the total catch (50.3%) than that recorded by the rod-and-line fishery (49.7 %). Other fishery regions where netting is of relative importance are the North and the Solway and to a lesser extent the East. The net fishery is further discussed in Section 5.4.2.1 below.

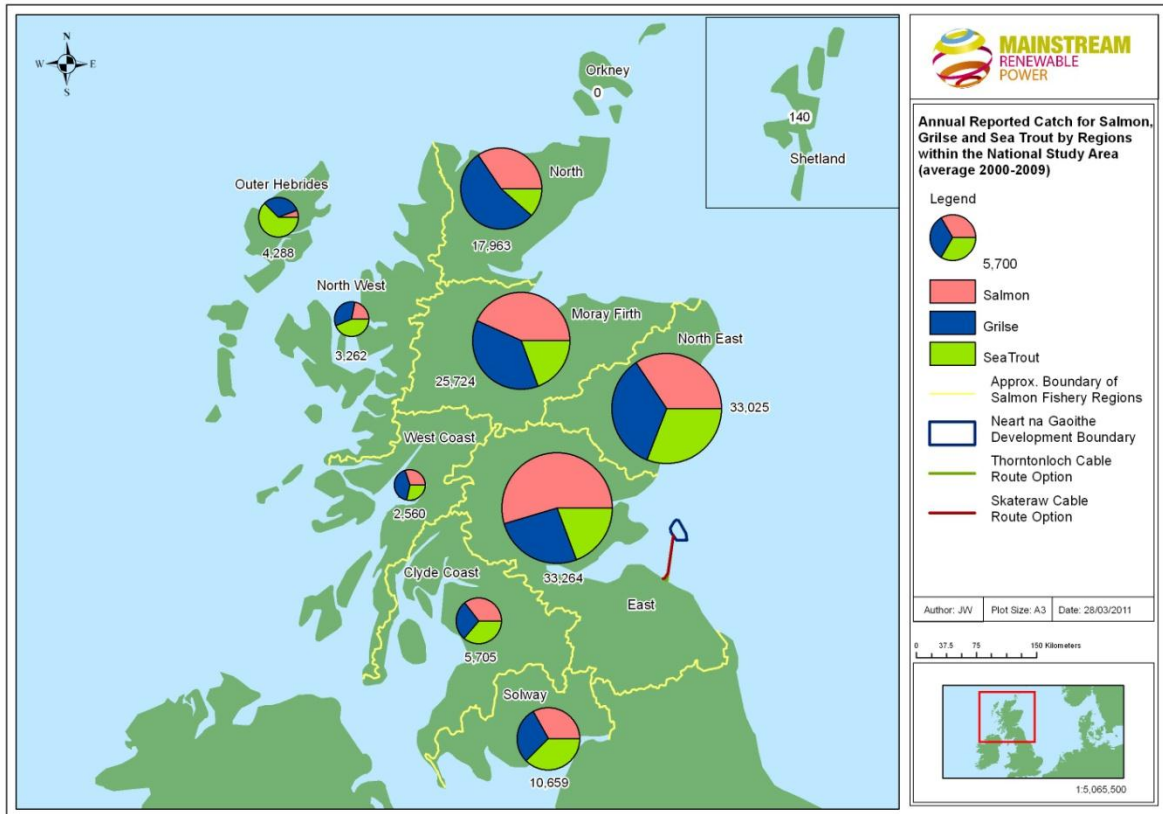


Figure 5.6 Annual Reported Catch (No. of Individuals) by Species and Region (average 2000-2009)

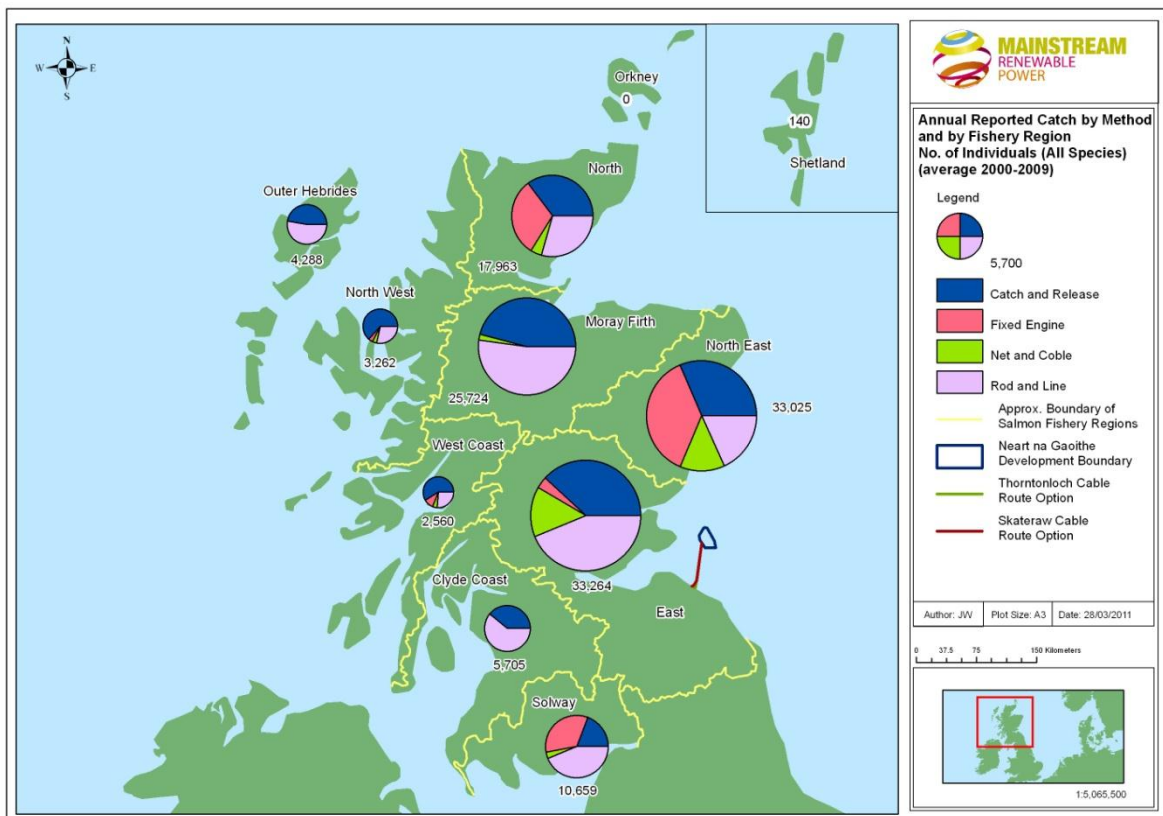


Figure 5.7 Annual Reported Catch (No. of Individuals) by Method and Region (average 2000-2009)

### 5.4.2 Regional

This section provides an overview of the salmon and sea trout fishery in the districts within the regional study area, including the Esk (North Esk, South Esk and Bervie), Tay, Forth and Tweed. Whilst the information provided below is principally based on MSS catch data for the period 2000-2009, data gathered through consultation with fisheries stakeholders has also been used.

The annual reported catch (average 2000-2009) for each salmon fishery district within the regional study area is shown in Figure 5.8 and Figure 5.9, by species and method respectively. Note that for the Esk district catch statistics are broken down by former district (North Esk, South Esk and Bervie).

The Esk (South Esk, North Esk and Bervie combined) and the Tweed are the principal districts in terms of total catch with annual catches (average 2000-2009) of 20,085 and 19,681 fish respectively, followed by the Tay with 10,255 fish caught. Catches in the local area, the Forth district, are comparatively low (3,328) (Figure 5.7 and Figure 5.8).

Salmon is the principal species caught in the Tay, the Forth and Tweed, with grilse and sea trout making similar contributions to the remaining of the total catch in these districts.

Grilse is the principal species caught in the North Esk, with salmon and sea trout accounting for similar percentages of the total catch in the district. In the South Esk, salmon, grilse and sea trout catches account for similar percentages of the total catch.

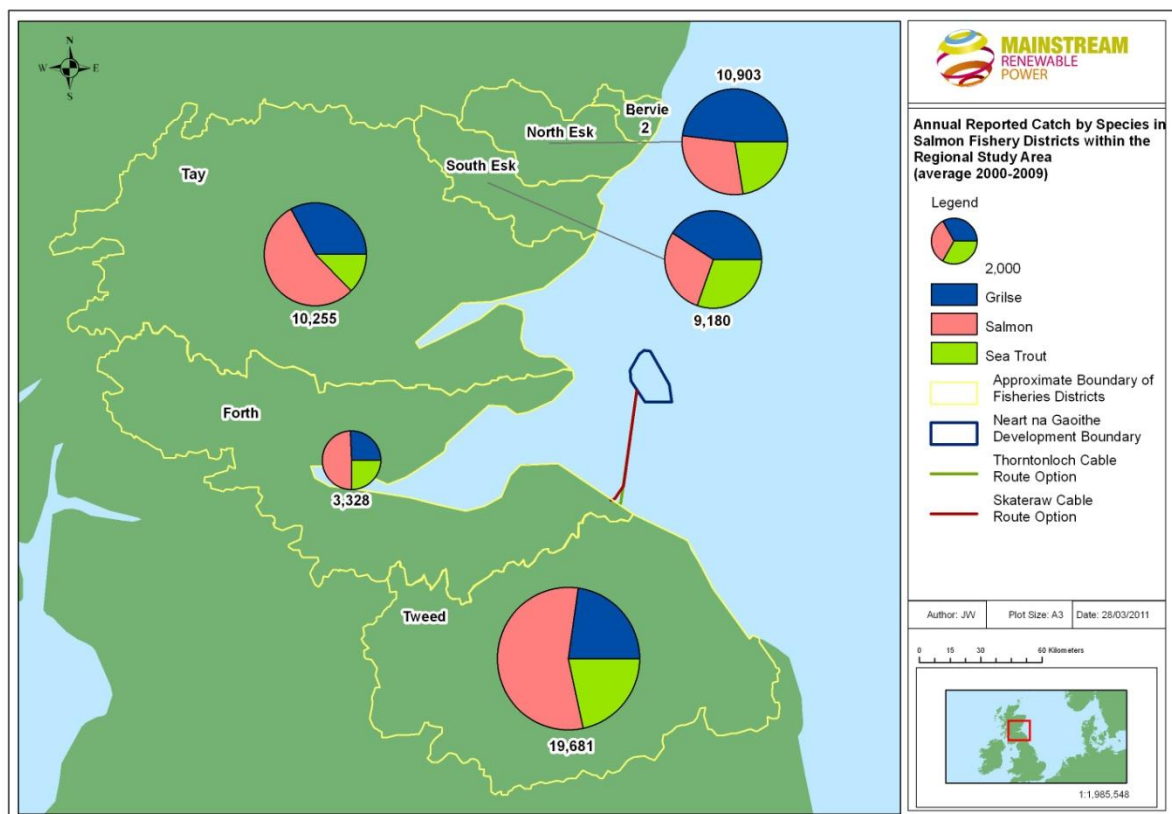
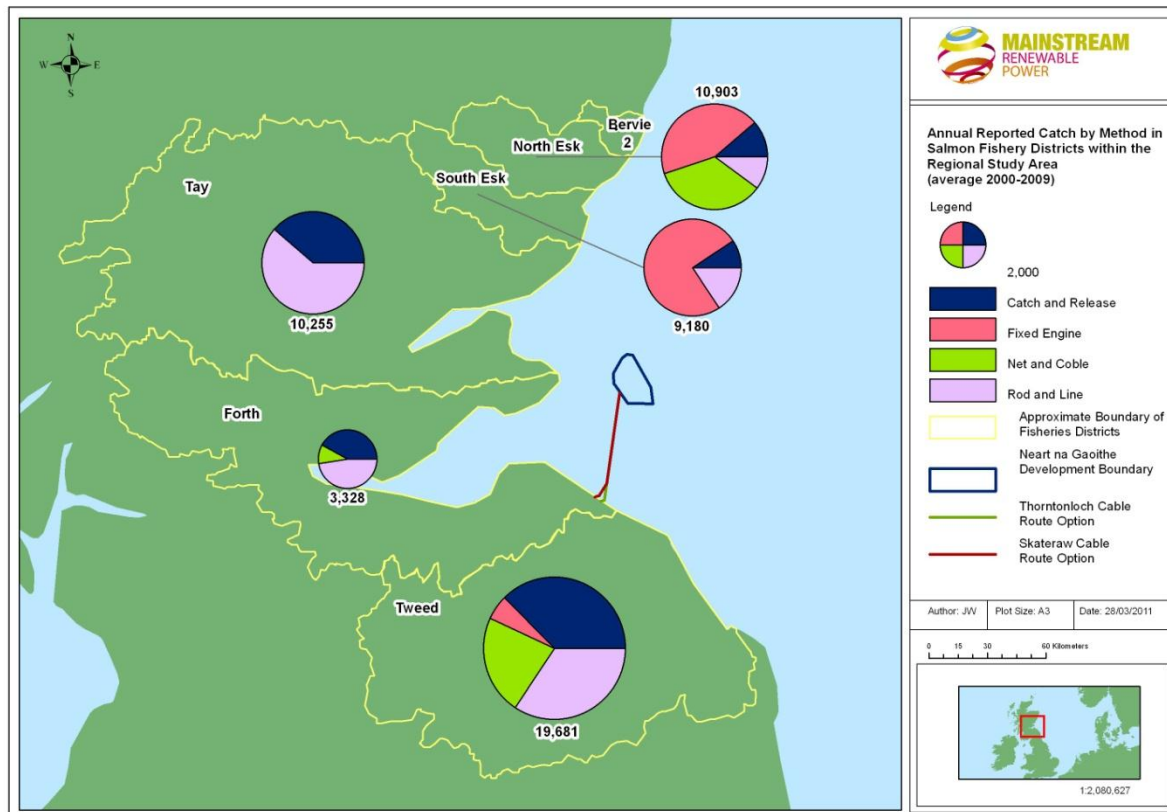


Figure 5.8 Annual Catch (No. of Individuals) by Species in Salmon Fishery Districts within the Regional Study Area (average 2000-2009)

In the Forth, the Tweed, and more significantly the Tay, rod-and-line (including catch and release) fishery accounts for the majority of the catch, whilst in the North Esk and South Esk, a greater percentage of the total catch comes from netting (net-and-coble and fixed engines). The net fishery in the Tweed, particularly by net-and-coble, is also of relative importance. The net fishery is further discussed in Section 5.4.2.1 below.

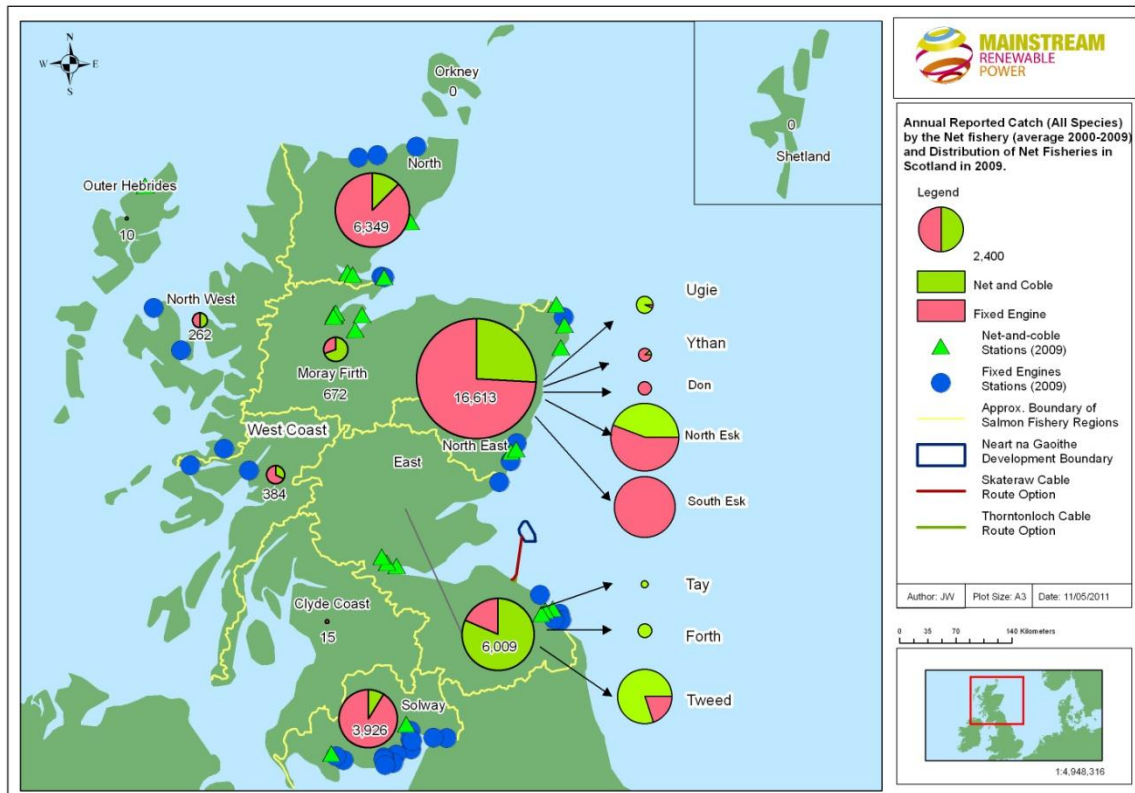


**Figure 5.9 Annual Reported Catch (No. of Individuals) by Method in Salmon Fishery Districts within the Regional Study Area (average 2000-2009)**

#### 5.4.2.1 The Net Fishery in the Region

The annual reported catch of the net fishery (net-and-coble and fixed engines) by salmon fishery region is illustrated in Figure 5.10 below. Catches in the North East and East region have been further broken down by individual district. In addition, the location of active net fisheries in 2009 (MSS, 2011) is also shown in the figure.

It should be noted that as illustrated in Figure 5.5 above, the national trend in netting is one of a decline and it is likely that average values for the 2000-2009 period will, for the most part, overestimate the current levels of exploitation of the net-and-coble and fixed engine fisheries.



**Figure 5.10 Annual (average 2000-2009) Net Fisheries Catch by Region and Distribution Fisheries in Scotland (2009)**

The North East is the principal region in terms of netting activity within a national context. The majority of the catches in this region concentrate in the Esk district (North and South Esk). The South Esk in particular, supports significant fixed engine fisheries. The principal fishery in that area is the Usan Salmon Fishery (Montrose).

The net fishery is also of relative importance in the East Region, especially in the Tweed district where it is predominantly undertaken using net-and-coble. There are five active netting stations in the Tweed, all of which operate at varying degrees on a part time basis (Consultation, 2011b). In addition, there are 5-6 heritable rights along the Tweed’s coastline, the majority of which are leased by the Tweed Trust from the heritable right holders (Consultation, 2011b).

In the Forth district there are over 60 netting stations, however, most of these are dormant and netting activity is limited. Six netting stations are currently active of which only two (at Follen and Alower) are fully operational. No coastal netting by fixed engines is currently taking place. As shown in Figure 5.10, there are currently no active net fisheries in the area relevant to the export cable landfall options (Consultation, 2011c).

In the Tay, netting is limited to a few net-and-cobles which operate upstream of Dundee and to coastal nets in the northern reaches of the district, where the Usan Fishery also has rights (Consultation, 2011d).

### **Usan Salmon Ltd**

Usan Salmon Ltd is one of the last remaining commercial salmon netting stations in Scotland. The fishery has been operational since the 1960’s but didn’t move to Usan until 1983. Usan’s fishing rights extend between Scurdie Ness lighthouse to the north and Auchmithie harbour in the south. They operate eight netting stations in total. Bag nets are predominantly set, although jumper nets (a



type of stake nets) are used in Lunan Bay. A total of 18 fixed engines were employed in 2010. Nets are set up to 1500m from the shore, in lines. Between 10 and 12 fixed engines can be set per line.

The peak season is between 16<sup>th</sup> February and the end of August although in 2011 Usan will not commence fishing until the 1<sup>st</sup> May for conservation purposes. Fish caught in Usan nets have originated from the Rivers Tay up to the Dee and Don.

Usan manufacture their own nets using purpose built onsite facilities. In 2010 Usan Salmon was awarded a grant, in excess of £100,000, under the auspices of the European Fisheries Fund for both the construction of a net and boat manufacturing and repair facility and three new power net washing beds (Consultation, 2011a; Usan Salmon, 2011)

It should be noted that the Esk fishery board is currently seeking new legislation that continues the conservation measure discussed above to prevent Usan catching salmon between the 16<sup>th</sup> February and the 31<sup>st</sup> May for a five year period (Fishing News, 2011).

#### **5.4.2.2 Seasonality and Annual Variation**

An indication of the seasonality and annual variation in the rod-and-line (including catch and release) and the net fisheries (separated into net-and-coble and fixed engines) by species and district is illustrated in Figure 5.11 to Figure 5.16 below, based on average monthly reported catches and annual catches for the period 2000-2009.

It should be noted that the national trend in catches with respect to historic levels, as shown in Section 5.4.1.1 above is one of a decline and that given the relatively shorter period of time considered in this section (2000-2009) the data given are only intended to provide an indication of recent changes in the fishery and current annual catches rather than an indication of trends in the state of the stocks. In addition, it is recognised that the seasonality of the fisheries will to some extent be influenced by the length of the open season in different districts and further seasonal voluntary or statutory restrictions in place for some methods (e.g. delays in the start of net fisheries to protect spring salmon). The lack of recorded or low catches in some months will to some extent be a result of this. Furthermore the assumption that the species are not present in this period should not be made.

#### **Rod-and-line Fishery Seasonality**

Rod-and-line salmon catches peak in September and October in most districts within the regional study area with the Tweed also recording high catches in November. Whilst relatively lower, salmon catches are also of importance from March to July, particularly in the Tay and Tweed, reflecting the diversity of salmon runs in the regional area (Figure 5.11).

Grilse are principally caught from July to October with peak catches recorded from August to October in most districts. In the Tweed, as for salmon, relatively high grilse catches are also recorded in November (Figure 5.11).

In the districts within the regional study area sea trout are principally caught from May to October, with highest catches being recorded in June, July and August (Figure 5.11).

#### **Rod-and-line Fishery Annual Variation**

In the Tweed, rod-and-line salmon catches peaked in 2004 and 2007. From 2007 onwards, there was a decrease in the catch, with 2009 having catches similar to those of 2000, the year recording the lowest catch within the ten year period under consideration. Grilse catches in the Tweed have

shown a similar pattern, with an overall increase from 2000 to 2007 and relatively lower catches in 2008 and 2009.

In the Tay, salmon catches have remained relatively stable with the exception of the lows recorded in 2002 and 2003. Grilse catches, after a low in 2002 and 2003, increased to a peak of 5,603 individuals caught in 2006 decreasing again in recent years. In the Forth, salmon and grilse catches have fluctuated over the years, with salmon catches peaking in 2004 and grilse catches peaking in 2001, 2004 and 2008.

In the North Esk salmon catches have shown ups and downs over the years, whilst for grilse there has been a relative increase in the catch, with 172 grilse caught in 2000 compared to 1,144 in 2009. In the South Esk, salmon and grilse catches have remained relatively stable from 2000 to 2009, with relatively high values recorded between 2004 and 2008.

Sea trout catches have shown a general decline during the first years of the time series, with a low being recorded in most districts in 2003, after which the general trend has been one of an overall increase. An exception to this is the South Esk, where there has been a decline in the sea trout catch with lows in 2005 and 2008.

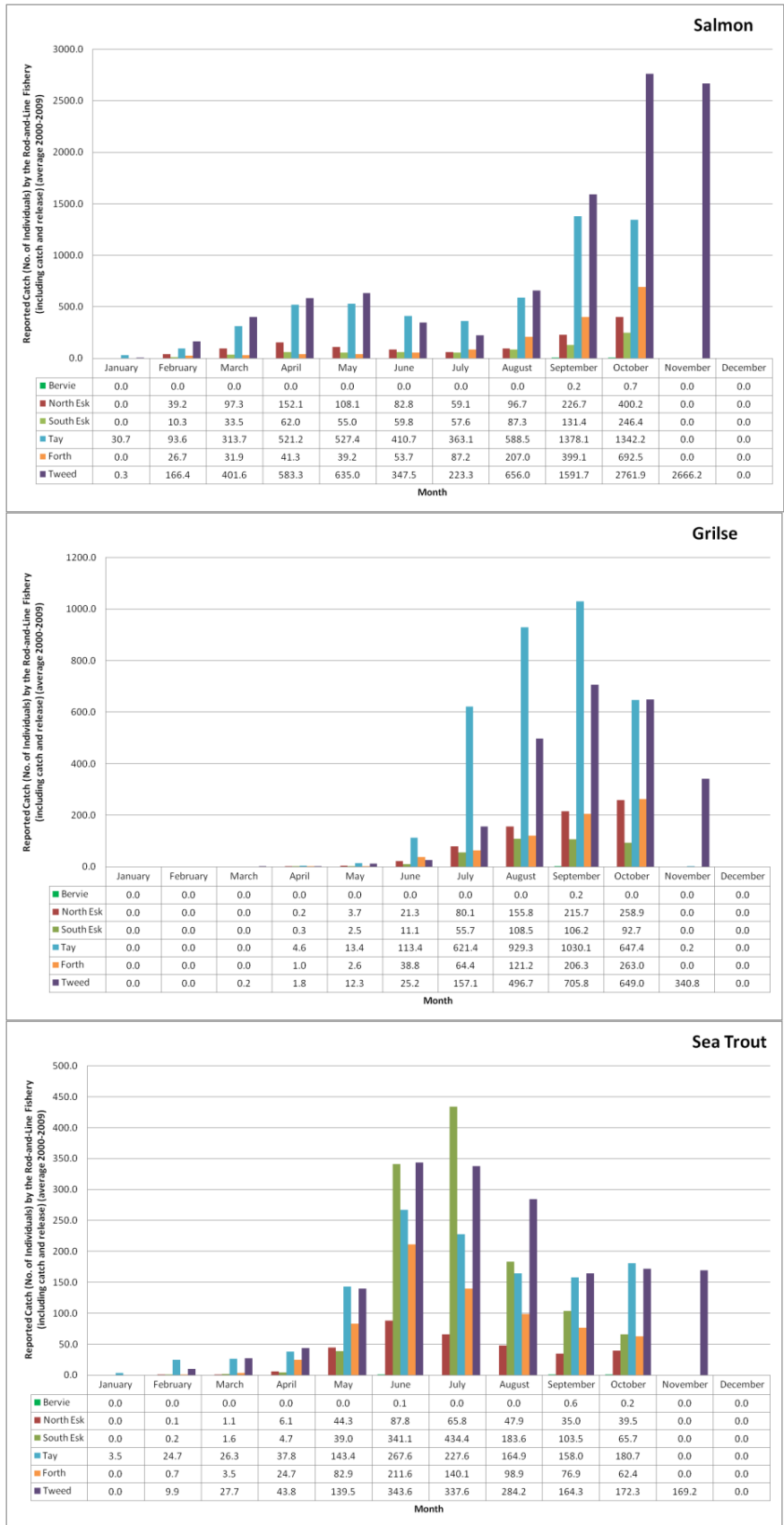
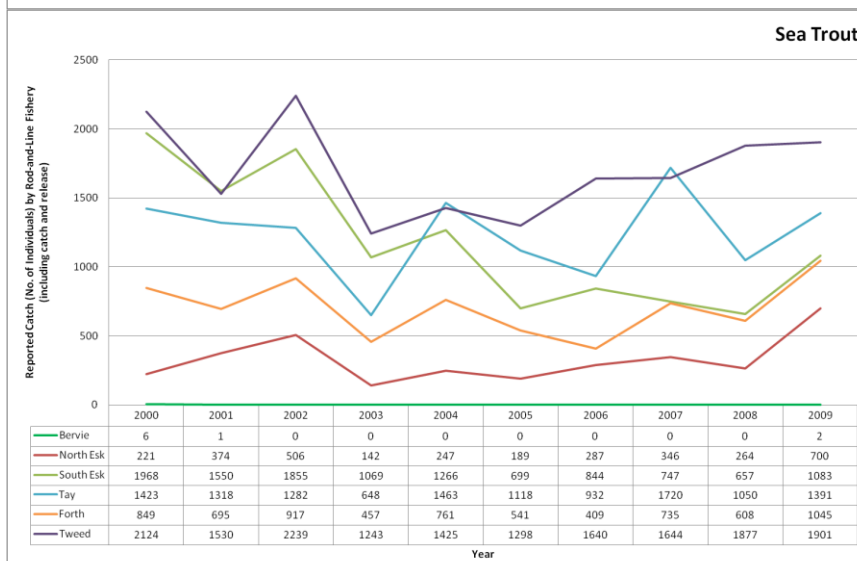
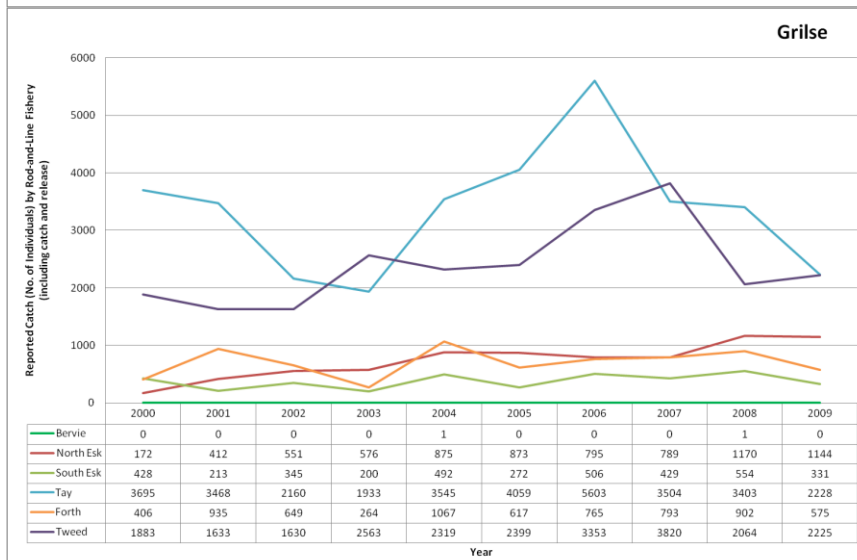
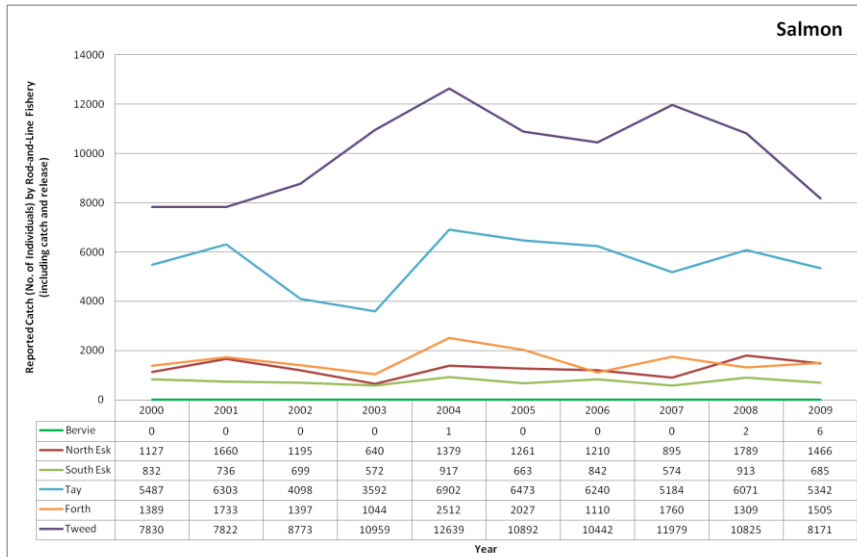


Figure 5.11 Seasonality of the Catch (average 2000-09) by the Rod-and-Line Fishery (including catch and release)



**Figure 5.12 Annual Variation (2000-2009) of Catches by the Rod-and-Line Fishery (including Catch and Release)**

### **Net-and-coble Fishery Seasonality**

Net-and coble principally takes place in the North Esk and the Tweed districts, and to a much lesser extent in the Forth and Tay. In the Tweed, salmon are caught in highest numbers by net-and-coble from June to September. Similarly, for grilse the highest catch values are recorded from July to September. Sea trout is caught in relatively high numbers from June to September.

In the North Esk, salmon catches by net-and-coble are recorded from April to August, peaking in May. Peak grilse catches are reported from June to August with peak sea trout catches reported during May and June.

### **Net-and-coble Fishery Annual Variation**

The salmon catch by net-and-coble in the Tweed has shown a marked decline over the years, dropping in 2009 to half of the catch values reported in 2000. Grilse catches fell from 3,305 individuals in 2000 to 518 individuals in 2008, after peaking in 2007. Unlike for salmon and grilse, the overall trend in sea trout catches has been one of an increase, with 2009 recording the highest catches for the 2000-2009 period.

In the North Esk, salmon catches by net-and-coble have fluctuated during 2000 -2007, with a peak in 2003 and a low in 2007, after which the trend appears to be one of an increase, with 2009 recording the highest values for the period 2000-2009. The grilse catch has also been variable over the years, with peaks in 2000 and 2005, followed by lows in 2004 and 2007. Sea trout catches in this district showed a marked decrease from a peak in 2001 through 2005. The trend has been one of an increase since then, especially in the last year (2009) which records the highest annual catch for the 2000-2009 period.

In the Forth the general trend for salmon, grilse and sea trout net-and-coble catches has been one of a decline, especially from 2007 onwards. Similarly, in the Tay the catch by net-and-coble has been low throughout the period, with no catches being reported since 2007, 2005 and 2004 for sea trout, grilse and salmon respectively.

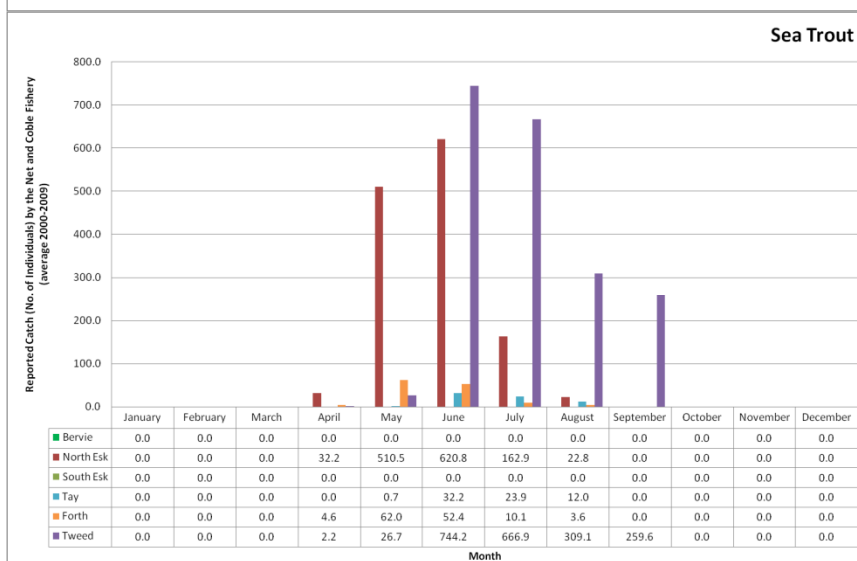
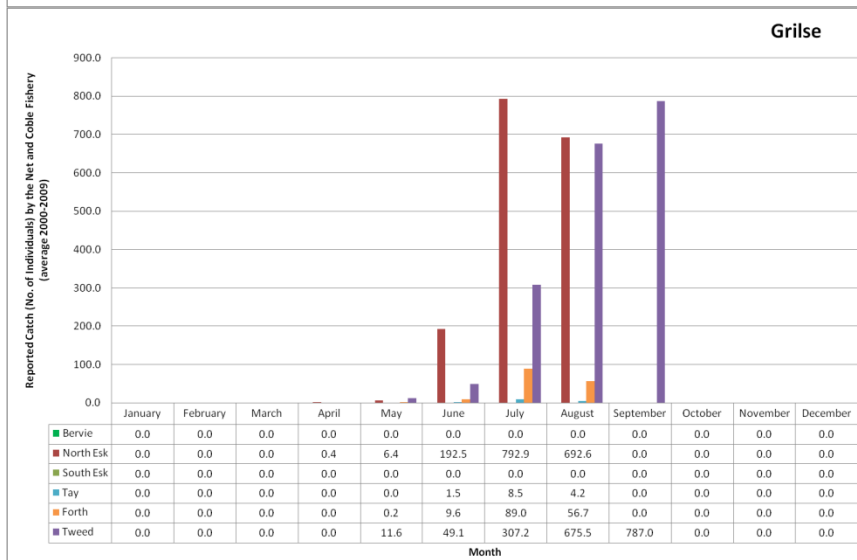
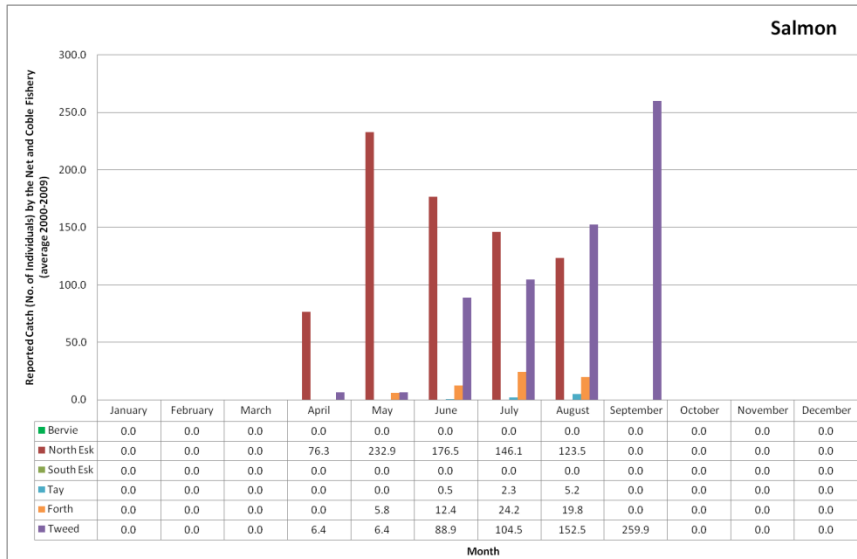


Figure 5.13 Seasonality of the Catch (average 2000-2009) by the Net-and coble Fishery

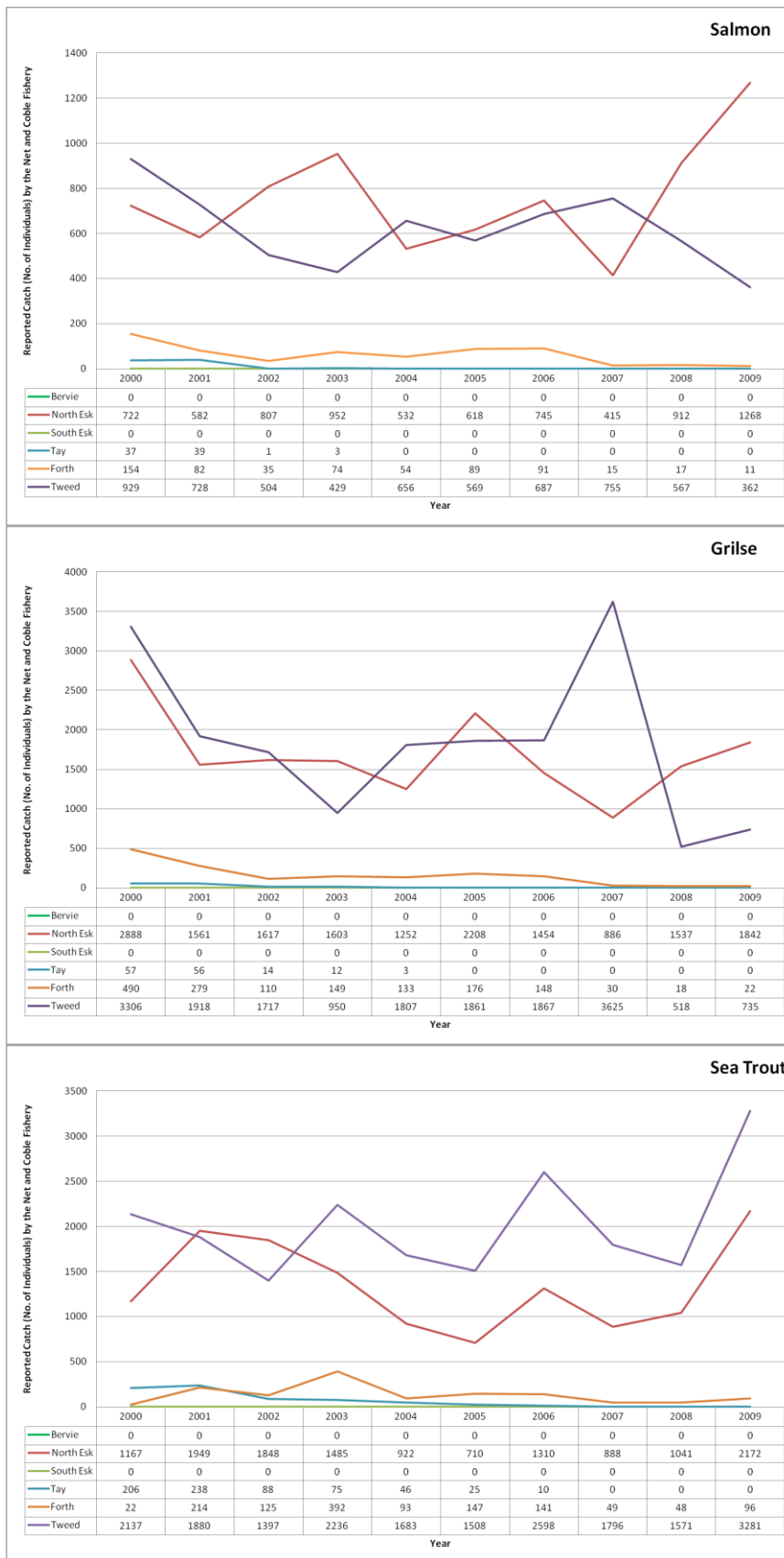


Figure 5.14 Annual Variation in Catches by the Net-and-coble Fishery by Species and District

### **Fixed Engines Seasonality**

Overall peak catches by this method are recorded from May to August for salmon, July and August for grilse and May and June for sea trout (Figure 5.15).

As previously mentioned, the majority of the catch by this method within the regional study area comes from the Esk district (North and South Esk), and to a lesser extent the Tweed.

### **Fixed Engines Annual Variation**

In the North Esk there has been a decline in catches by fixed engines over the years, principally as a result of the buyout of the North Esk's coastal netting stations by the Esk District Salmon Fishery Board (Consultation, 2010). Despite the closure of the commercial coastal fishery in the North Esk, fixed engines are still commercially operational in the South Esk.

In the South Esk the salmon catch by fixed engines has fluctuated over the ten year period under consideration, whilst for grilse the overall trend has been one of a decline, especially from 2007. Sea trout catches in the South Esk, have also varied during the ten year period under consideration, with 2003 recording the highest catch (3,143 individuals) within the ten year period.

In the Tweed the annual catch by fixed engines for salmon and grilse has been variable, with no clear trends being shown, whilst for sea trout, the total catch has shown an increase since 2005.



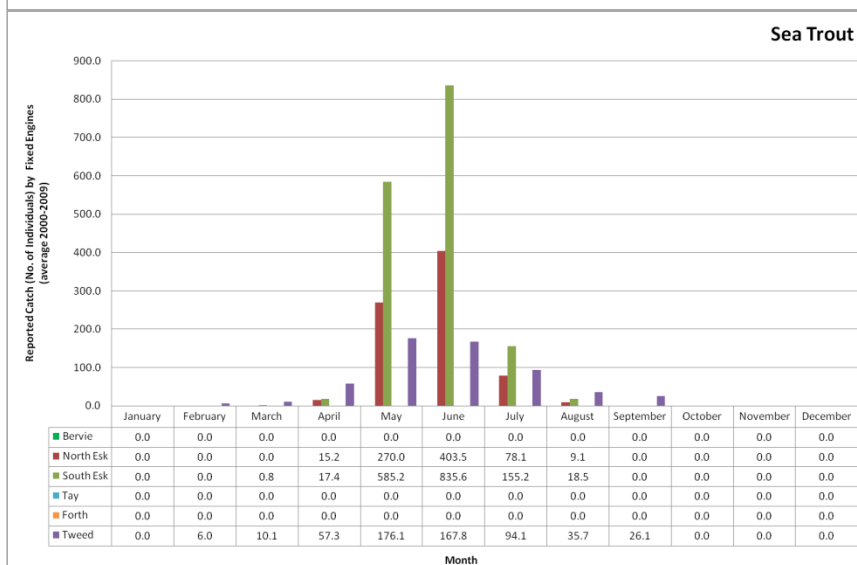
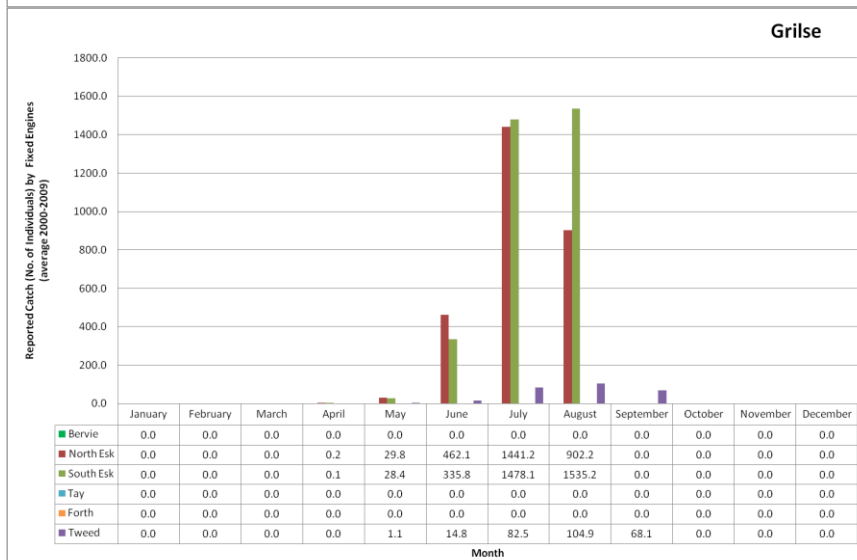
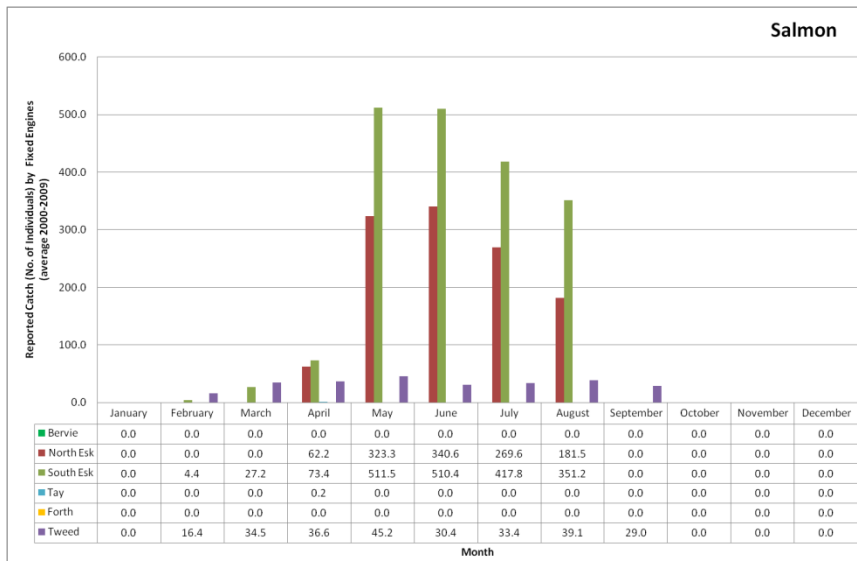


Figure 5.15 Seasonality of the Catch (average 2000-2009) by Fixed Engines

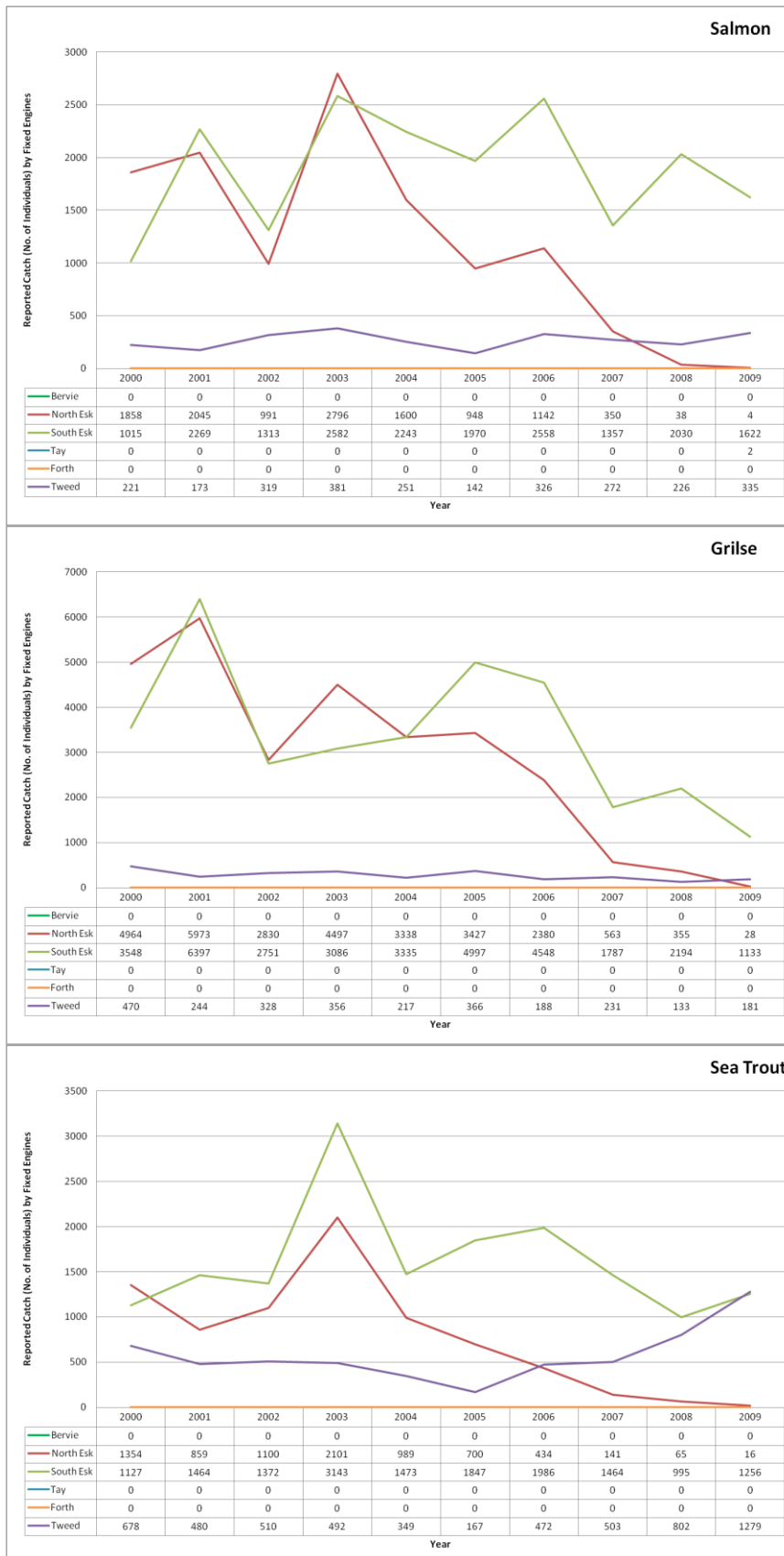


Figure 5.16 Annual Variation in Catches by Fixed Engines by Species and District

## 5.5 Local (The Forth District)

### 5.5.1 The Forth District Salmon Fishery Board

The Forth District Salmon Fishery Board (DSFB) is responsible for the protection, enhancement and conservation of salmon and sea trout stocks and their fisheries within the Forth district. The district includes more than 3,600 km<sup>2</sup> of water, including the River Forth and its tributaries, the estuary and the coast (Figure 5.17).

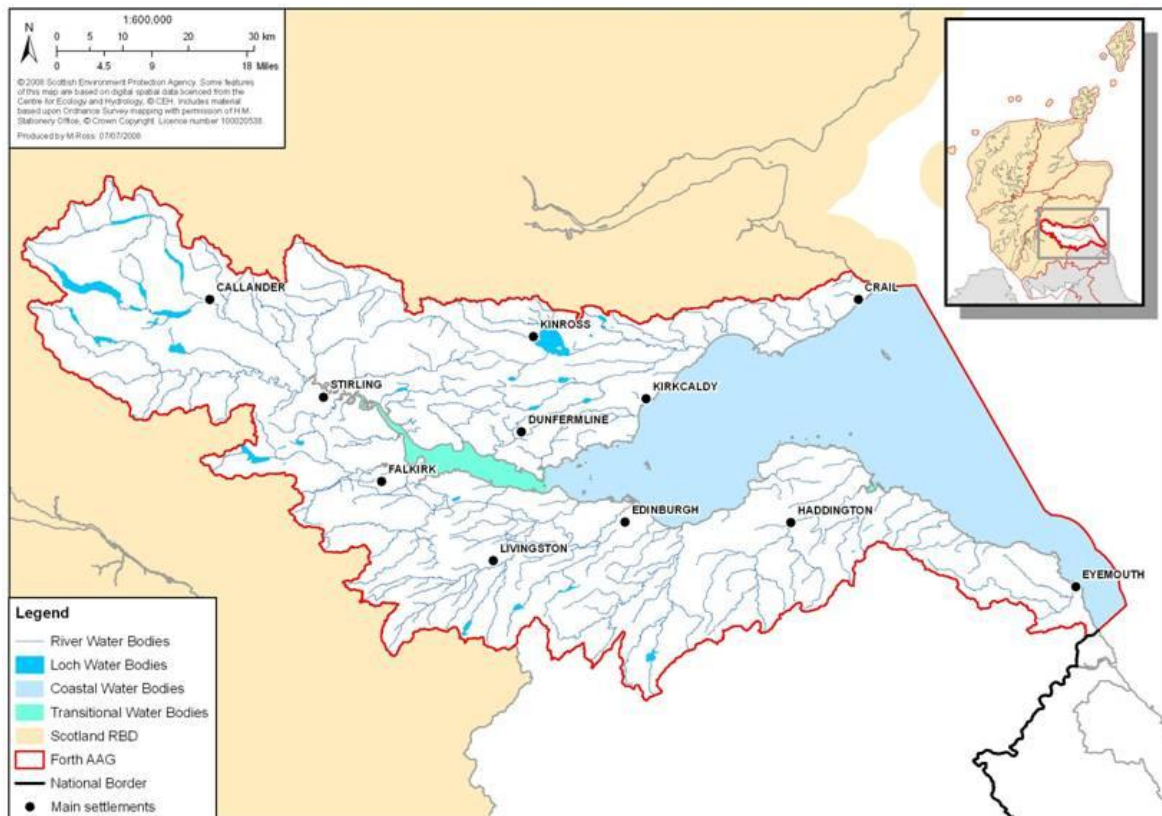


Figure 5.17 Forth Salmon Fishery Board Area of Responsibility (Source: FDSFB, 2011)

The Forth DSFB works closely alongside the River Forth Fisheries Trust, which has recently introduced a Fisheries Management Plan for the district (Forth Fishery Management Plan, 2009). The Board is currently in the process of establishing Area Management Groups for each of the principal rivers within the district, which will produce sub-management plans for each river. Those plans are aimed at identifying projects for habitat improvement, barrier removal and stock restoration.

The Board operates a team of Water Bailiffs whose primary duty is to enforce the Salmon and Freshwater Fisheries Act (Consolidation) (Scotland) 2003. They work in partnership with Wildlife Liaison Officers from a number of Police Forces across the District, targeting areas where illegal fishing is or has taken place. Further to the mandatory practices required under the Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003, the Board, in collaboration with the River Forth Fisheries Trust, recommends fishermen to adhere to the following fishing practices:

#### 5.5.1.1 Salmon

- All salmon caught before 1<sup>st</sup> June should be released
- Barbless hooks should be used before 1<sup>st</sup> June

- All coloured fish should be released throughout the season
- No angler should kill more than 1 salmon/grilse on any given day
- Salmon of 15lbs or over should be returned
- All hen salmon should be returned in September and October
- Netting operations should be delayed until 1<sup>st</sup> June

#### 5.5.1.2 Sea Trout

- No angler should take more than 2 sea trout on any given day. The Forth DSFB and River Forth Fisheries Trust would however prefer if all sea trout were returned.
- All coloured sea trout to be returned

#### 5.5.2 The Fishery in the Forth District

The following sections provided an indication of the principal fishing methods, seasonality and annual variation of the Forth District salmon and sea trout fisheries.

It should be noted that whilst both salmon and sea trout make an important contribution to the fishery in the district, the relative importance of each species may vary depending on the river under consideration. The River Forth for example is principally a salmon river, whilst other rivers within the district (e.g. Tyne, Allen) are predominantly sea trout rivers (FDSFB consultation questionnaire). In addition, the times and relative importance of different runs may also vary between different rivers within the district.

A summary of the salmon and sea trout stock structure in the district, based on information provided in “The Forth Fishery Management Plan 2009” is given in Table 5.1 below.

**Table 5.1 Forth District Salmon and Sea Trout Stock Structure (Source: Forth Fishery Management Plan, 2009)**

River	Salmon	Sea Trout
River Teith	Discrete, spring, summer and autumn runs	From March onwards, peaking in late May
River Old Forth		
River Allan	Small summer run. Principally autumn runs	
Rest of rivers within the District	Only autumn runs	

#### 5.5.2.1 Principal Fishing Methods

Salmon and sea trout fishing in the Forth District is principally undertaken by rod-and-line. The Forth DSFB and the River Forth Fisheries Trust promote a total catch and release policy, which has been taking up at different rates in different areas within the District (Consultation, 2011c). The distribution of the catch by method is shown in Figure 5.18 (2000-2009).

As mentioned in section 5.4.2.1 above netting activity within the district is limited at present, with only two net-and-coble stations being currently fully operational. In addition, fixed engines are not used and no net fisheries in areas relevant to the export cable landfall options are operational at present.

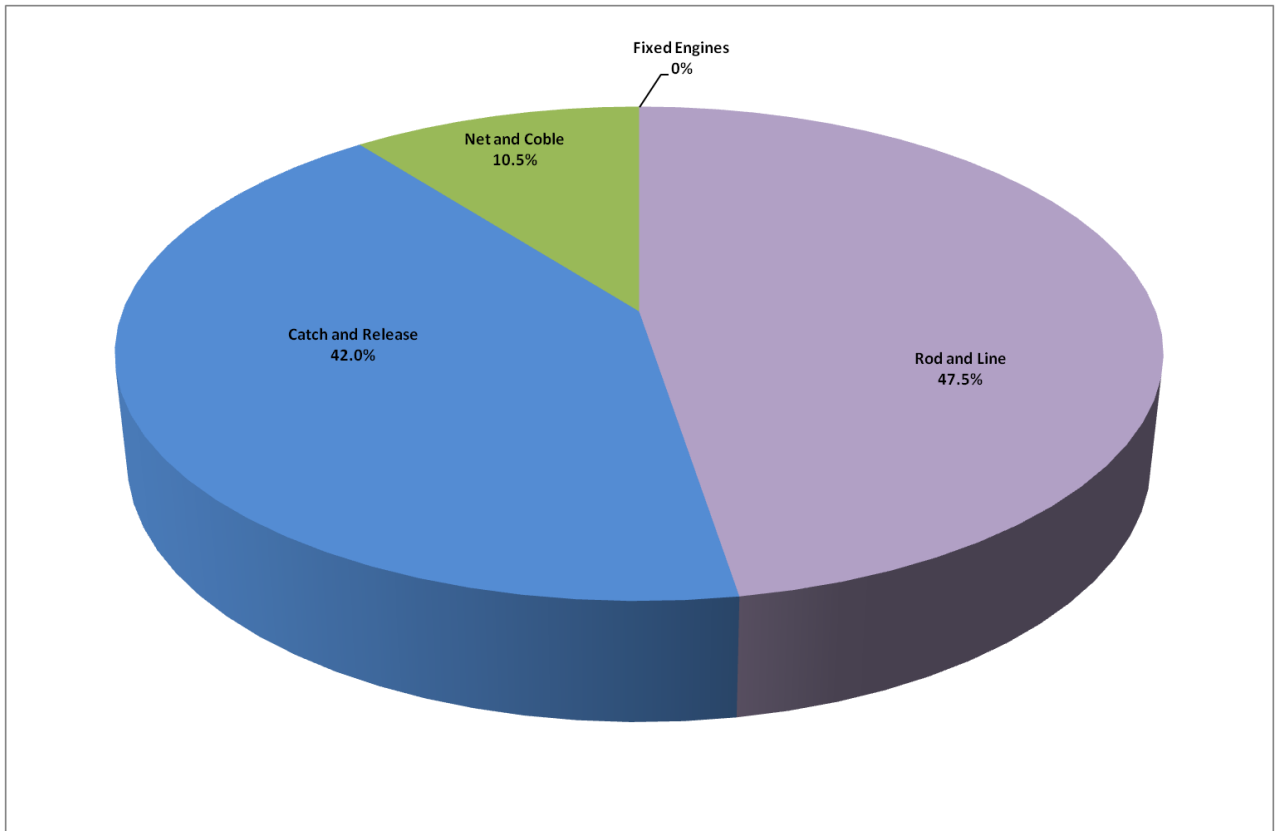


Figure 5.18 Distribution of the Catch by Method in the Forth District (2000-2009)

### 5.5.2.2 Seasonality of the Fishery and Annual Variation

The principal runs in the Forth District take place in June and July for grilse and in August and September for salmon. In addition, there is an improving spring salmon run in the District (Forth DSFB consultation questionnaire).

During the 2000-2009 period the highest grilse and salmon catches have been recorded in autumn (July to October) with peak catches in September and October. Sea trout catches have been highest from May to August, peaking in May and June (Figure 5.19).

The fishery is closed annually between the 1<sup>st</sup> November and the 31<sup>st</sup> January and as a result no catches are recorded during this period.

Salmon and grilse catches have fluctuated during the ten year period under consideration. High catches have been recorded in 2001 and 2007 and a low in 2003 with no clear trends being apparent. In the case of sea trout, after an overall decline from 2000 to 2006, there has been a relative increase in the catch with 2009 recording the highest catch for this species (Figure 5.20).

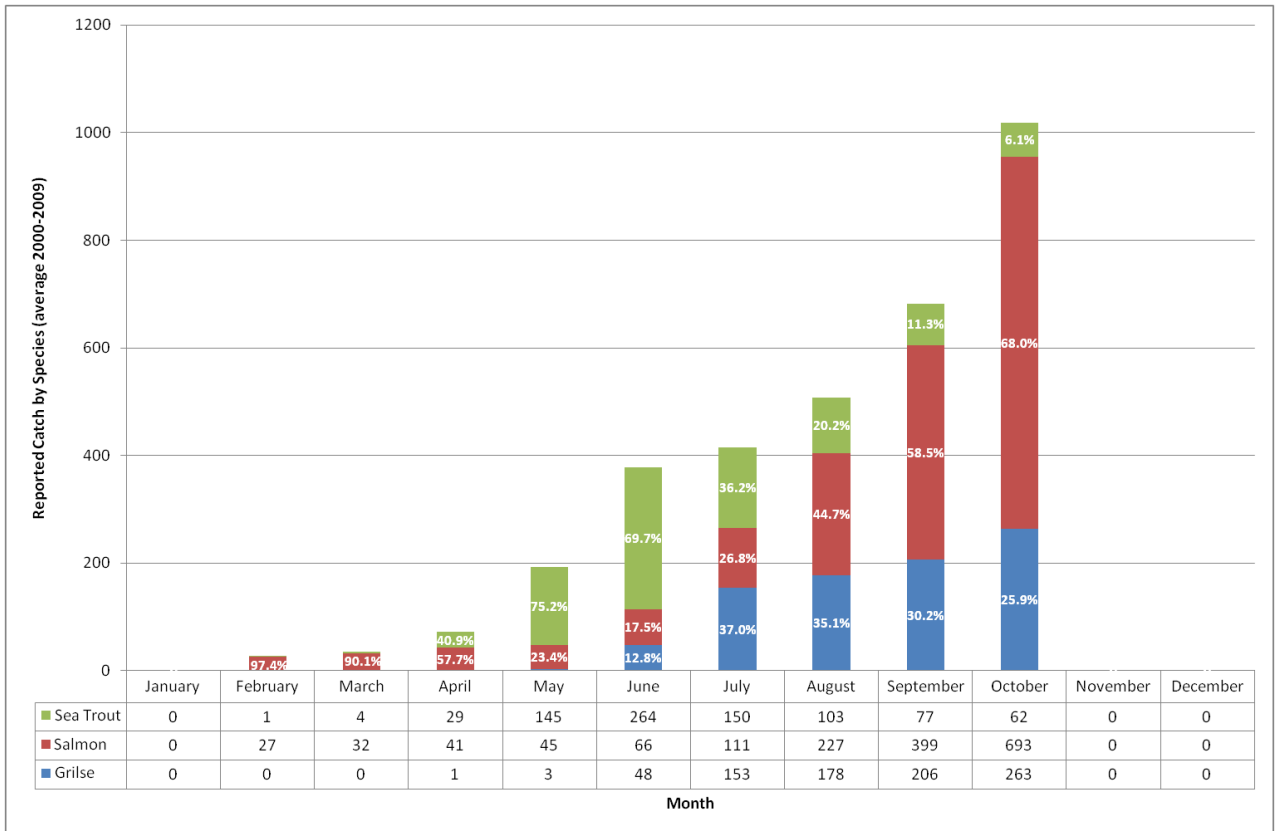


Figure 5.19 Seasonality of the Salmon and Sea Trout Fishery in the Forth District (average 2000-2009)

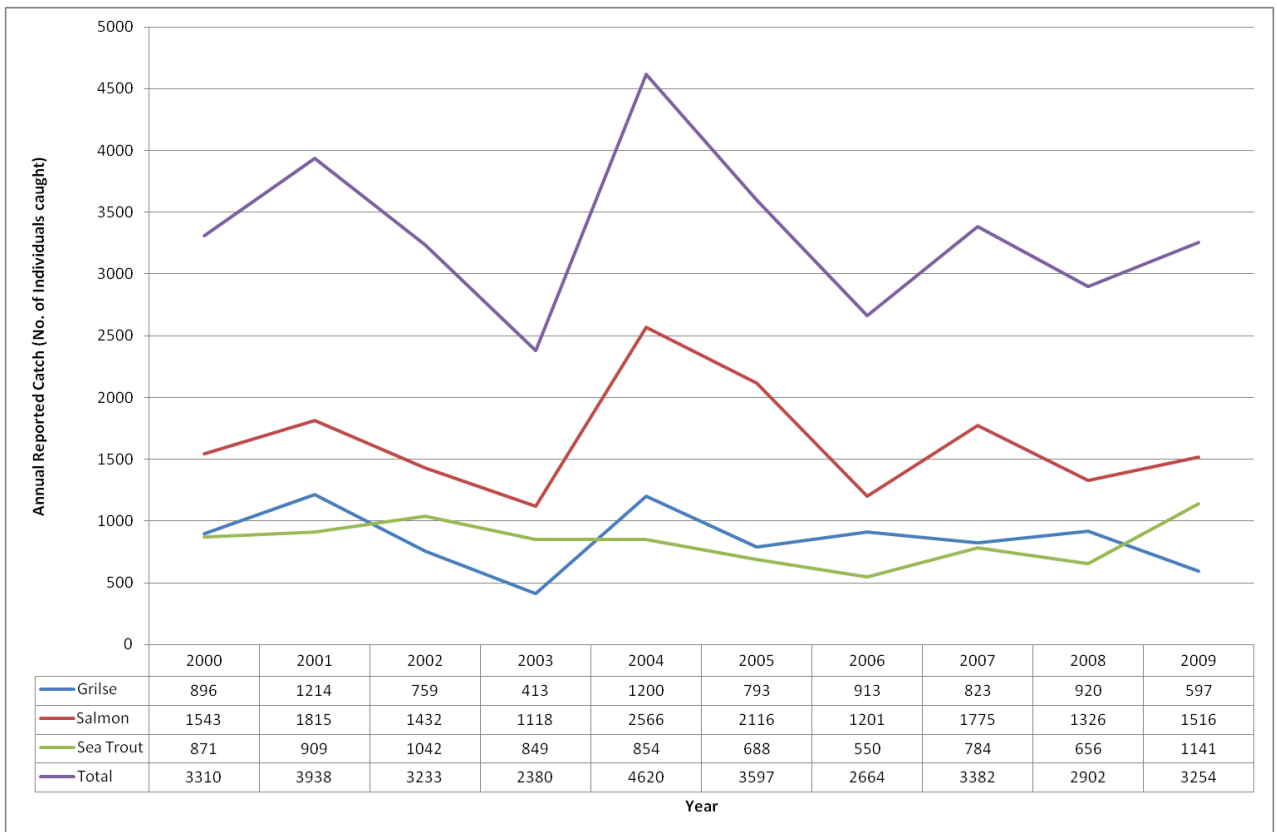


Figure 5.20 Annual Variation in the Reported Catch by Species in the Forth District (2000-2009)

## 5.6 The Future of the Salmon and Sea Trout Fisheries

DSFBs throughout Scotland, generally in conjunction with Trusts and conservation groups, are making significant efforts to ensure the future of the industry and specifically the rod-and-line fishery, implementing programmes to maintain and improve upon the number and quality of salmon and sea trout in their rivers. Catch and release policies are also increasingly closely monitored.

A priority for the majority of Boards is the maintenance and development of rod-and-line fishing. It is expected that this trend will continue in the future, in line with the joint aims of the ASFB and other organisations. Parallel to the maintenance and development of the rod-and-line fisheries, a decrease in coastal netting activity has been the trend in the last decade. This is likely to continue to be the case, with river and conservation interests buying up coastal stations, as well as increasing statutory and voluntary restrictions and policies being implemented, all of which are considered effective stock management measures.

Scotland, together with England, Norway and Northern Ireland has come under increasing international pressure to establish a policy for managing Multi Stock Fisheries (MSFs), such as coastal netting. This is of particular sensitivity in Scotland, as fishing is prosecuted under heritable property rights, rather than as an activity licensed by Government, as in most salmon producing countries (Crawley, 2010). International advice is that there should be a presumption against operating MSF unless they can be shown not to contravene basic conservation policies (ASFB, AST and S&TA, 2009).

It should be noted that there are numerous constraints placed upon the degree to which potential losses and their significance to salmon and sea trout fisheries can be assessed over the operational life of the Neart na Gaoithe Offshore Wind Farm. As it is the case with other commercial fishing activities, unpredictable and unrelated influencing variables such as natural fluctuations in stock levels or changes in legislation could significantly alter elements within the technical report.

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