

# **Survey of Lochs in the Spey and Dee Catchments for Non-Native Fish Species**

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## SUMMARY

A questionnaire survey of fishery proprietors was conducted to provide information on angling practices on key lochs within the Spey and Dee catchments. This was followed by netting, electro-fishing and angling surveys to discover whether or not non-native species were present within the lochs.

A gillnetting survey of four lochs (Beag, Alvie, Insh and Morlich) in the Spey catchment was conducted during July 2004. Lochs Alvie and Insh were surveyed using both benthic and pelagic nets whereas benthic nets only were set in Lochs Morlich and Beag. Non-native fish species (rudd, *Scardinius erythrophthalmus* and roach, *Rutilus rutilus*) were discovered in Loch Beag only. Loch Beag was subsequently electrofished and rod fished, but these two methods failed to catch any non-native fish.

The questionnaire survey provided stocking and angling information for Lochs Beag, Alvie, Insh, Morlich, Pityoulish and Mhicleoid. The survey showed that Lochs Beag and Mhicleoid had definitely been stocked with non-native fish in recent times. However, this practice has been discontinued and all of the lochs are now fished solely for native species. All of the fishery owners interviewed forbid the use of live bait.

Three privately owned ponds (Kylindra, Dowans and Ordiga) were also surveyed. All three contained exotic fish species (roach, rudd, golden orfe *Leuciscus idus*, goldfish *Carassius auratus*, golden tench *Tinca tinca*, koi and ghost carp *Cyprinus carpio*) which could possibly find their way into Spey catchment burns and tributaries. Non-native species from Kylindra Pond were washed into the Kylindra Burn during a recent pollution incident and a Roach was also caught by an angler on the mainstem Spey near the mouth of the River Nethy. Management implications for native species and existing fisheries within the River Spey are discussed.

## **OBJECTIVES**

The objectives for the non-native fish species survey were to:

- Produce baseline non-native fish species presence/absence data for key lochs within the Spey and Dee catchments.
- Gather fishery management and angling practice information for key lochs within the Spey and Dee catchments by means of a questionnaire survey aimed at proprietors and/or fishery managers.

This information will be used to develop a code of practice for sensible and sustainable pike fishing within the Cairngorms. The project also seeks to raise awareness of pike angling and management through the production of guidance leaflets and fishing events.

## 1. GENERAL INTRODUCTION

### 1.1 Project Background

Accidental and sometimes deliberate introductions of non-native fish have caused significant damage to native habitats and species across Scotland. Perhaps the best known example is the introduction of various non-native coarse fish into Loch Lomond. Although some of the ten non-native species of coarse fish introduced to the Loch Lomond system by visiting pike (*Esox lucius*) anglers have not become established (Adams 1994), the Loch Lomond fish fauna is now dominated by non-native coarse fish species and this has had a profound effect upon the entire aquatic ecosystem (Adams and Maitland 2001). For example, Loch Lomond is one of only two sites in the UK for the rare and declining powan (*Coregonus lavaretus*), and the introduction of coarse fish, in particular ruff (*Gymnocephalus cernua*), has been responsible for its rapid demise.

In the Cairngorms there is growing awareness that the introduction of non-native fish to freshwater ecosystems can have detrimental impacts on the local species and the industries that depend upon them. There are three main ecological problems associated with the introduction of non-native fish species: (1) Competition for food/resources with native fish populations; (2) Direct predation of adults, young and the eggs of native fish population; and (3) Introduction of diseases, viruses and parasites.

In light of the potential impacts posed by introduced non-native fish, a number of partners in the Cairngorms area have become increasingly concerned at the use of live-bait in the River Spey and River Dee catchments and the threat posed to the important salmonid fishery and to the qualifying interests of the candidate Special Area of Conservation (cSAC). It is conceivable that non-native coarse fish introductions could result in direct or indirect competition, predation and disease, virus or parasite transfer to native salmonids and hence threaten the ecology and economy of both the River Spey and River Dee cSACs.

Pike fishing is developing in the Cairngorms area and the number of pike anglers visiting the area is expected to grow. For example, in Strathspey there are several water bodies now regularly used by pike anglers, such as Loch Morlich, Loch Alvie and Loch Insh, and local pike angling clubs, groups or representatives have formed. In recent years

several pike anglers have been observed using non-native coarse fish as live bait in these areas, e.g. three non-native fish species, roach (*Rutilus rutilus*), perch (*Perca fluviatilis*) and rainbow trout (*Oncorhynchus mykiss*) were observed being used as live-bait on Loch Morlich during one day in 1999. Trout fishermen in the upper Spey are also known to use live minnows (*Phoxinus phoxinus*), brought in from other rivers.

There are concerns that the continuing practice of live baiting may lead to non-native coarse fish species becoming established in the catchment. Some published information exists on the coarse fish populations in the Cairngorms (e.g. Gimingham 2002), but with increasing interest in Pike fishing in the Cairngorms National Park area and lower down the Spey and Dee catchments, there is a need to directly monitor live bait “hot spots”, assess current information and provide guidance for the appropriate management of local fisheries.

A recent economic study of angling in the Spey catchment estimated that salmon and sea trout angling brings in £11 million to the Strathspey economy (Glasgow Caledonian University, 2004). The River Dee fishery is estimated to be worth a similar amount (A. Hudson, *pers. comm.*). Any loss or damage to it through disease, virus or parasite transfer from unwanted introductions would be extremely serious for the economies of the River Spey and River Dee communities. Evidence from elsewhere indicates that prevention is cheaper and more effective than removal and is the best course of action to take when given a choice.

The Cairngorms Local Biodiversity Action Plan and the River Spey and Dee Catchment Management Plans highlight the non-native species live-bait issue and strongly recommend that local preventative measures are put in place immediately.

*“Local partners should promote understanding of the problems caused by non-native species, whilst avoiding the demonisation of these species or generating unnecessary hysteria. Allied to this, is vigilance to prevent further unwitting or deliberate introductions and to act when a problem becomes evident by assessing the feasibility of remedial action and undertaking appropriate measures. Prevention is cheaper, easier and more effective than removal or control.”*

## **1.2 Non-native fish species survey**

The non-native fish species survey was designed to ascertain the current status and distribution of non-native fish in the River Spey and River Dee catchments. A three pronged approach was used to gain the clearest possible picture of non-native fish distribution.

Interviews were held with proprietors and fishery managers to gather information pertaining to stock management of, and angling practice on key lochs within the catchment. A gillnet survey of key lochs in the Spey and Dee catchments was conducted in order to gather baseline fish species data. Electrofishing and rod fishing surveys were conducted where appropriate or necessary.

It should be noted that the pike is technically a non-native species in Highland rivers such as the Spey. However, because pike have been present in the Spey and Dee catchments since the late eighteenth century (Maitland, 1994; Greer and Hammar, 2004), and is therefore well established, the species has not been identified as a non-native species for the purposes of this survey.

The minnow is also technically a non-native species. Small shoals of minnow are to be found in the R. Spey, its tributaries and lochs. The remit for the present project did not include minnow, so, like the pike, it has not been identified as a non-native species. However, their presence has been noted in the survey results.

## **2. PART 1 - GILL NETTING SURVEY**

The following is a summary of the gillnetting survey. The full survey report (Greer and Hammar, 2004) is included as Appendix 1.

### **2.1 SUMMARY OF GILLNETTING SURVEY METHOD**

The gill netting survey formed the core of the non-native study. The intention was to survey lochs in both the Spey and Dee catchments. Unfortunately, due to time constraints, and negative publicity, ostensibly from the coarse fishing lobby, pertaining to gillnetting practice, the survey was restricted to Lochs Morlich, Insh, Beag and Alvie, which are located within the Spey catchment (see Fig. 1).

Two internationally recognised gillnetting experts, Ron Greer (Resource Use Institute, Scotland) and Johan Hammar (Institute of Freshwater Research, Sweden), were contracted to conduct the gillnetting survey. The above named lochs were surveyed during the period June 29<sup>th</sup> – July 8<sup>th</sup>, 2004 using Swedish standard multiple mesh gill net methodology.

Figure 1. Map showing Spey catchment with gillnetting survey lochs  
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Eight benthic nets were set in all four lochs and, in addition, two pelagic nets were linked together and set in lochs Alvie and Insh. The benthic nets were weighted to sit on the loch bed at various depths and the pelagic nets were designed to trap fish in the pelagic zone of deeper waters. The nets were constructed from a random pattern mesh, designed to maximise the number of species caught.

The gillnets were set in the early evening and taken in the following morning. Catches were taken away to Ron Greer's laboratory at Blair Atholl for species identification. Otolith, scale and/or operculum samples were taken for future age analysis and fin tissue samples from all charr, trout and salmon were preserved for later DNA analysis. The

stomach contents of pike were identified and remaining parts of specimens caught were frozen.

## 2.2 SUMMARY OF GILL NETTING SURVEY RESULTS

Table 1 is taken from the full survey report (Appendix 1) and sets out the species and numbers of fish caught during the gillnetting survey. Other data and analyses are to be found in the full report.

The roach (*Rutilus rutilus*) and rudd (*Scardinius erythrophthalmus*) recorded in Loch Beag showed morphological hybrid characteristics, although the pharyngeal teeth codes were species specific to either roach or rudd.

In Loch Alvie a mixture of resident brown trout (*Salmon trutta*), sea trout smolt and recently stocked hatchery trout were recorded. Although eel (*Anguilla anguilla*) were only caught in Loch Alvie, the presence of eel in Lochs Insh and Morlich were indicated by slime rings left on the gillnets and the remains of charr (*Salvelinus alpinus*) and trout which had been predated upon by eel.

Table 1. Species and numbers of fish caught in gillnetting survey lochs

<b>Loch</b>	Arctic charr	Brown trout	Atlantic salmon	Eel	Pike	Minnow	Roach	Rudd	<b>Total</b>
Alvie	0	14	0	1	5	0	0	0	20
Beag	0	0	0	0	6	1	3	1	11
Insh	56	13	1	0	4	0	0	0	74
Morlich	0	15	0	0	12	0	0	0	27
<b>Total</b>	56	42	1	1	27	1	3	1	132

## 2.3 SUMMARY OF GILL NETTING SURVEY CONCLUSIONS & RECOMMENDATIONS

There is some evidence from this study that there has been recent establishment of non-native species in the lochs sampled with the capture of both roach and rudd in Loch Beag.

The additional report of roach captured by an angler near the mouth of the river Nethy on the mainstem Spey is also worrying (K. Rowley, *pers. comm.*). However, the fish was returned alive to the river and therefore its origin is unknown.

Although only a few individual non-native fish have been discovered, it is possible that sufficient numbers are present to establish a breeding population. The river habitat in the middle Spey and Loch Beag would be well suited for roach to establish.

Greer and Hammar (2004) report the capture of newly released hatchery-reared trout in Loch Alvie, which raises concerns over possible dysgenic effects of introductions of non-native origins of brown trout. Although outwith the scope of the present survey, this activity is a serious concern for the management of native brown trout stocks and therefore needs to be addressed.

Greer and Hammar (2004) recommend that, to better evaluate the current status of native stocks and establish any likely threats from non-native fish stocks, a larger scale inventory sampling programme should be conducted. The inventory sampling method employed, i.e. gill netting, proved useful in obtaining moderate sized, but scientifically valid samples of fish stocks without harm to mammals or birds. It should comprise a main part of a multi-method approach of stock assessment of lochs in the Spey and Dee drainage basins in the future.

### **3. PART 2 - FISHERY SURVEY**

#### **3.1 METHOD**

Telephone interviews and discussions were held with fishery managers and riparian owners of key lochs within the Spey catchment. The objective was to gain a clearer idea of coarse angling practices within the catchment. Lochs Beag, Alvie, Morlich, Insh, Pityoulish and Spey Dam reservoir were identified as high priority water bodies within the Spey catchment, for they already offer fishing to the general public and all are known pike fishing venues.

Loch MhicLeoid is in the Findhorn catchment, but was also included because of its stocking history and proximity to the Spey catchment. It has in the past been stocked with rainbow trout and possibly other non-native species.

Ponds stocked with non-native species could be at risk of losing their stock into burns and tributaries of the Spey during flood episodes. It was therefore decided to include significant ponds within this survey. The three ponds chosen for this pilot survey were Kyntra (Grantown), Dowans (Aberlour) and Ordiga (Spey Bay). It is hoped that a full inventory of high-risk ponds within the Spey catchment will be developed at a later date.

Adrian Hudson, biologist with the Dee Fishery Board, provided information for Lochs Skene, Callater and Kinord. A plan for more detailed survey of the Dee lochs will be developed in the near future.

## **3.2 RESULTS**

Where available data from other sources, e.g. electrofishing and rod fishing surveys, have been added to the results.

### **3.2.1 Spey Catchment Lochs**

#### **Lochs Beag and Alvie**

Loch Beag (286264, 809165) covers an area of 10ha and has a maximum depth of 9m. It flows into Loch Alvie (286691, 809606), which is 57ha in area and has a deepest point of 21m, via two small channels. These channels are shallow, silted and disappear into a heavily reeded and boggy area before entering Loch Alvie. Fish could readily move between the two lochs.

The outflow of Loch Alvie is also a narrow channel that flows through a marshy area known as the Bogach. The channel has been dredged in the past and fish have been known to migrate from the Spey to Loch Alvie via the Bogach, which drains into the R. Spey (see Fig. 2). Although the channels are silted and well vegetated with reed beds fish would still be able to move between the Spey and Loch Alvie. Both Alvie and Kinrara Estates have riparian ownership of these two lochs and the fishing is, therefore, shared.

Figure 2. Map showing location of Loch Alvie  
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Loch Alvie has been stocked with brown trout from the Alvie hatchery in the past and around five years ago it was stocked, by the late Mr. Peter Braun, with roach, perch, carp, tench, rudd, bream (*Abramis brama*), bleak (*Alburnus alburnus*) and asp (*Aspius aspius*).

Roach and rudd were caught during the 2004 gillnetting survey of Loch Beag, but no non-native species were caught in Loch Alvie (see Table 2 and Section 2.2 above).

Table 2. Gillnetting survey results for Lochs Alvie and Beag

<b>Loch</b>	Arctic charr	Brown trout	Atlantic salmon	Eel	Pike	Minnow	Roach	Rudd	<b>Total</b>
Alvie	0	14	0	1	5	0	0	0	20
Beag	0	0	0	0	6	1	3	1	11
<b>Total</b>	0	14	0	1	11	1	3	1	31

A timed electrofishing survey of the larger connecting channel between Lochs Beag and Alvie (Site A) and two sites on the fringes of Loch Beag (Sites B and C) was conducted by the Spey Fishery Board research team on 15<sup>th</sup> July 2004 as part of the non-native survey (see Fig. 3). The three sites were each fished for ten minutes. This survey produced three eels and one *Lampetra sp.*, but no non-native fish (see Table 3).

Figure 3. Loch Beag electrofishing sites

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From July to September 2004 a group of experienced coarse fishermen conducted a pre-baiting programme on Loch Beag prior to a coordinated coarse fishing campaign. A Nash type carp feed was sprinkled over the deepest section of the loch every other day for one month. This procedure was designed to attract any coarse fish to one feeding area of the loch prior to fishing. The loch was then fished by two anglers from a boat for thirteen nights. Despite their concentrated fishing efforts no non-native fish, or indeed any other fish species, were caught.

Table 3. Electrofishing results for Lochs Alvie and Beag

Electrofishing site	Location	Fishing duration	Survey date	No. and species of fish caught plus lengths
A	Connecting channel	10	15/07/04	1* Lampetra sp. (160 mm) 1 * eel (200mm)
B	Fringe of Loch Beag by outlet	10	15/07/04	1 * Eel (200mm)
C	Fringe of Loch Beag by jetty	10	15/07/04	1 * Eel (300mm)

Day and season fishing permits are available for Loch Alvie and can be purchased from the Alvie Estate office. Fishing regulations are printed within the Alvie Estate's fishing information leaflet and on the permits. Fishing is for brown trout and pike using fly or spinner only, and all catches must be recorded. It is a small fishery with a maximum of eight to ten boats.

Kinrara Estate operates on a more casual basis. They have one or two boats available for use on a discretionary basis. They do not offer permit fishing to the general public.

Kinrara and Alvie Estate gamekeepers routinely patrol both lochs to ensure anglers comply with these regulations.

### **Loch Morlich**

Loch Morlich (296519, 809355) extends to an area of 122ha and has a maximum depth of 15m. It is fed by three main burns, namely, the Allt Mor, Allt Choire Chondlaich and Caochan na Criche. It flows out along the Allt Luineag, which joins the R. Druidh before flowing into the R. Spey (see Fig. 4). There are no obstructions to fish migration and the Allt Mor is a valuable spring salmon spawning area.

No non-native species were caught in Loch Morlich during the 2004 gillnetting survey (see gillnetting report summary above).

Loch Morlich is largely owned by Forest Enterprise (FE), with just a small portion on the west side being owned by Rothiemurchus Estate. Fishing rights are owned entirely by FE. Permits can be purchased from the Fishery Manager at the FE Visitor Centre, Glenmore, and the fishing regulations are printed on each permit.

Figure 4. Map showing location of Loch Morlich  
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Live bait is not allowed and anglers may use fly or spinner from the bankside only. The trout season runs from March to October and pike fishing is available on a year round basis. The loch is policed by the fishery manager and other FE staff.

### **Loch Insh**

Loch Insh (283063, 804473) is located on the main stem of the R. Spey and its waters therefore form a part of the R. Spey itself (see Fig. 5). It covers an area of 114ha and reaches a depth of 30m. This loch maintains an important population of Arctic charr and the Dunachton Burn, which feeds into the loch, provides spawning areas for charr.

No non-native species were caught in Loch Insh during the 2004 gillnetting survey (see gillnetting report summary above).

Figure 5. Map showing location of Loch Insh  
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Fishing on the loch is managed by Clive Freshwater of Loch Insh Watersports, Dunachton Estate and Alvie Estate.

Dunachton Estate lets two boats; one to Loch Insh Watersports and the other to the Ossian Hotel. The estate allows fishing with these boats between March and October.

Loch Insh Watersports operates a permit system for fishing on the loch. Fishing is by fly or spinner only and the use of bait is not permitted. Also, fixed rods and keep nets are not allowed. Fishing is either from a boat or a restricted area of bankside and all catches must be recorded.

Alvie Estate offers fishing from bank and boat and the regulations are the same as those for Loch Alvie.

## **Loch Pityoulish**

The southern third of Loch Pityoulish (292060, 813635) has an area of 30ha and the outflow burn, Feith Sheilich, flows directly into the R. Spey (see Fig. 6). Ownership is split between Rothiemurchus and Pityoulish Estates. However, boats launched from the Rothiemurchus end can be used to fish the entire loch as long as no attempt is made to go ashore along the riparian area owned by Pityoulish.

Figure 6. Map showing location of Loch Pityoulish

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Loch Pityoulish was not included within the 2004 gillnetting survey due to time constraints.

There is only one boat available for hire from Rothiemurchus. This boat will take a maximum of three fishermen. The loch is fished mainly for pike and the boat is not available during the winter months.

Fishing is by permit only and absolutely no live bait is allowed. This regulation is printed on the permit. Dead rainbow trout from the nearby Rothiemurchus fishery are available for use as bait. The loch is not stocked. There is a catch and release policy for pike, but the loch is not watched or bailiffed.

### **Spey Dam**

Spey Dam (256901, 793335) has an area of 90ha and is a reservoir created by the damming of the Spey mainstem approximately 3.5km west of Laggan (see Fig. 7). The dam is passable to spawning salmonids via the fish ladder. Spey Dam was to be included within the 2004 gillnetting survey, but it was decided to exclude this water body after being informed that it had recently been stocked with brown trout by Abernethy Angling Association, who manage the fishing.

Pike have been recorded (Gimingham, 2002), but recently little or no pike fishing has been practised. Thus, the current status of fish populations within the loch remains unknown.

Figure 7. Map showing location of Spey Dam

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### **Loch MhicLeoid**

Loch MhicLeoid (300880, 834687) has an area of 2.3ha and is situated just outwith the Spey catchment close to Lochindorb (see Fig.8). It flows into the Anaboard Burn that joins with the Dorback Burn, which forms a confluence with R. Findhorn.

The loch is owned by the Seafield Estate, but the fishing is managed by Colin McCabe of Angus Stuart Tackle, Grantown.

Figure 8. Map showing location of Loch MhicLeoid  
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Loch MhicLeoid was to be included within the 2004 gillnetting survey, but it was decided to exclude this loch after being informed that it had recently been stocked with brown trout (C. McCabe, *pers. comm.*).

Rainbow trout were introduced by the Seafield Estate before the fishing tenancy was taken on by the late Mr. Peter Braun. There may still be a few rainbow trout surviving in the loch, but there are no recent rainbow trout catch records (C. McCabe, *pers. comm.*). Mr. Braun may have introduced other non-native species into the loch, following the

practice he adopted for Loch Beag, but there is no evidence to suggest that this was the case. Loch MhicLeoid is now stocked annually with brown trout only.

Only fly-fishing is allowed and fishing is restricted to six anglers at any one time. The bag limit is three fish. The loch is fished by the odd angler and is not overly popular as a fishing venue.

Permits can be purchased from Angus Stuart Tackle and the fly fishing only regulation is clearly stipulated. The loch is monitored by Colin McCabe every few days during the fishing season.

### **3.2.2 Spey Catchment Ponds**

#### **Kylintra Pond**

Kylintra pond (302880, 827925) is situated in private grounds which were in the estate of the late Mr. Peter Braun. The pond is ornamental and fed by and the outflow runs into the Kylintra Burn, which itself flows directly into the River Spey, close to Spey Bridge, Grantown. Mr. Braun reported in June of 2004 that he had, in the past, stocked the pond with common carp, crucian carp and roach.

The small dam and sluice gate at the pond outflow would normally prevent fish from escaping into the burn. However, on 15th May, 2004 dredging works in this pond caused the sluice gate to be dislodged. The burn was inspected during the incident by Spey Fishery Board bailiffs and two dead roach were retrieved (see Fig. 9) along with fourteen trout and two *Lampetra sp.*

Figure 9. Roach retrieved from Kynlra Burn, 15<sup>th</sup> May, 2004

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Table 4. Kynlra Pond electrofishing results

Species	Length (mm)	Scale samples taken
Trout ( <i>Salmo trutta</i> )	108	Yes
Trout ( <i>Salmo trutta</i> )	65	Yes
Trout ( <i>Salmo trutta</i> )	73	Yes
Trout ( <i>Salmo trutta</i> )	85	Yes
Trout ( <i>Salmo trutta</i> )	110	Yes
Trout ( <i>Salmo trutta</i> )	103	Yes
Trout ( <i>Salmo trutta</i> )	111	Yes
Trout ( <i>Salmo trutta</i> )	95	Yes
Trout ( <i>Salmo trutta</i> )	96	Yes
Trout ( <i>Salmo trutta</i> )	123	Yes
Trout ( <i>Salmo trutta</i> )	170	Yes
Trout ( <i>Salmo trutta</i> )	159	Yes
Trout ( <i>Salmo trutta</i> )	196	Yes
Trout ( <i>Salmo trutta</i> )	170 (Smolt)	Yes
Roach ( <i>Rutilus rutilus</i> )	260	No
Roach ( <i>Rutilus rutilus</i> )	245	No
<i>Lampetra sp.</i>	105	No

An electrofishing survey of the pond by Spey Fishery Board staff in June of 2004 managed to catch brown trout and *Lampetra* sp., but no non-native species were discovered (see Table 4). It is possible that the roach caught by an angler in the Nethy Pool originated from the Kylintra Pond.

### **Dowans Pond**

Dowans Pond (326170, 842460) is ornamental and is sited in the grounds of The Dowans Hotel, Aberlour. It is fed by mains water and the outflow runs into the Burn of Aberlour, which, in turn, feeds directly into the River Spey. It was established in 1980 and stocked with Golden Orfe in 1983. The pond is fed by mains water and the outflow is to the Aberlour Burn via a valve. The pond extends to an area of approx. 600m<sup>2</sup> and is 1m deep. The owners are planning to drain the pond prior to filling in and re-landscaping (no progress on this had been made by September 2004)..

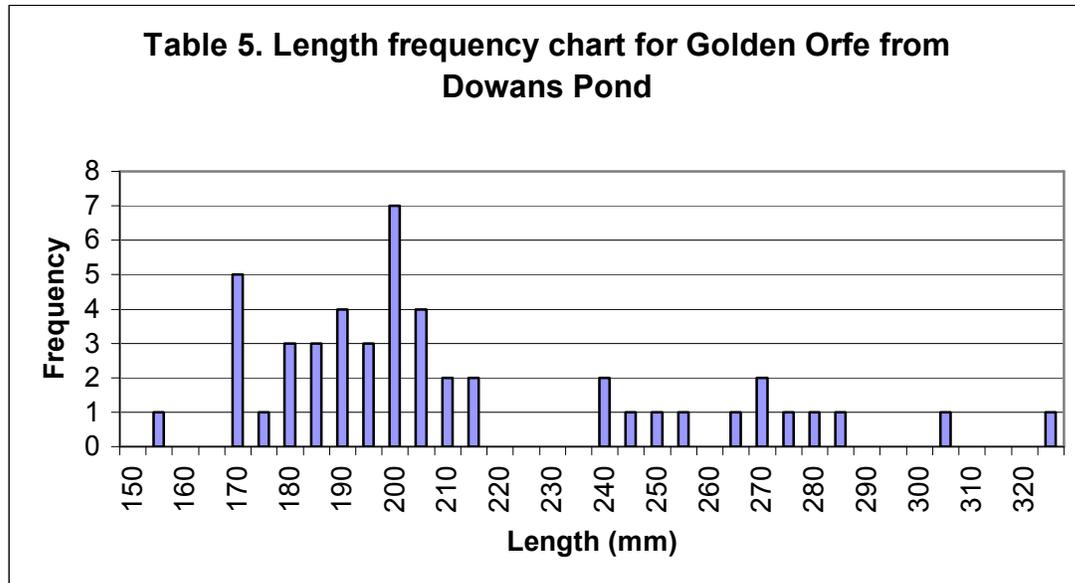
Figure 10. Fish species netted in Dowans Pond  
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**Golden orfe**

**Goldfish**

**Golden tench**

In June 2004 the Spey Fishery Board was invited by the owners to net the pond and to relocate the fish caught. 224 golden orfe, 1 goldfish and 2 golden tench were caught with the nets (see Fig. 10). These were transferred to the late Mr. Peter Braun's stank in Grantown. It is of note that the golden orfe constituted a breeding population and exhibited a range of age classes (see Table 5). The pond will be re-fished prior to draining.



### Ordiga Pond

This is a domestic pond located near to Bogmoor, lower Spey and has been *in situ* for twelve years. It covers an area of approximately 125m<sup>2</sup> and contains goldfish, koi carp and ghost carp. Breeding of these fish within the pond has been recorded.

Water is circulated within the pond using a closed system and there is no inflow or outflow. A number of other domestic ponds of this type also exist in the area and although there is no direct connection to the R. Spey they are situated on a flood plain and fish could find their way into the R. Spey during times of high flood.

### 3.2.3 Dee Catchment Lochs

There is no evidence to suggest that Lochs Skene, Callater, Kinord or Davan (see Fig. 11) hold any non-native species. There are pike in all three, but the lochs are not popular pike fishing venues and the use of live bait is prohibited.

Loch Callater is the only one of the three water bodies that doesn't have controlled fishing. However, it is reasonably inaccessible and so only attracts the odd prospecting fisherman. Adrian Hudson electrofished the margins of the loch in Summer, 2004. This survey failed to discover any non-native species.

Figure 11. Maps showing location of Lochs Callater, Skene and Kinord and Davan

Loch Callater

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Loch Skene

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Lochs Kinord and Davan

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The fishing on Lochs Kinord, Davan and Skene is tightly controlled. Lochs Kinord and Davan are within the Muir of Dinnet National Nature Reserve (NNR) and fishing applications are closely vetted. Skene is the only loch which has boats, but they are not available to the general public. Applications to fish on Loch Skene, which is a SSSI, are made through the estate office.

#### **4. CONCLUSIONS AND RECOMMENDATIONS**

##### **4.1 Survey methodology**

The gillnetting methodology used for this survey followed the standard NORDIC protocol for surveying larger still water bodies (Appleberg, 2000). Angling and electrofishing surveys were also conducted, but were largely unsuccessful. Gillnetting was judged to be the best method for capturing a range of fish species and age classes within the survey sites. The results indicate that this method is efficient and has a minimum impact on native fish stocks.

However, many anglers are now adhering to a catch and release policy and have concerns with respect to the use of gillnets for loch surveys. Indeed, objections to the current survey were voiced in both the national and angling press. It is true that gillnetting is an invasive technique, which is fatal to netted fish, and may have a negative impact on other wildlife species. With this in mind other techniques should be considered for future surveys. Alternative methods might include the use of acoustic tracking

technology, traditional angling techniques and boom-boat electrofishing. It is recommended that a combination of techniques should be used for any future surveys.

#### **4.2 Lochs**

Of the four lochs surveyed all apart from Loch Beag contained a typical range of Highland fish species (brown trout, arctic charr, eel, pike, salmon and minnow). Loch Beag was unusual in that brown trout were not captured. There are no suitable streams for trout spawning feeding into Loch Beag and, in addition, the outflow stream has very limited potential for spawning. These factors, combined with pike predation, may account for the lack of brown trout.

The lochs included within this survey are, on the whole, well managed as fisheries. Importantly, the use of live bait is banned on all lochs and this restriction is made clear to anglers. However, anecdotal evidence suggests that pike fishermen have, in the past, ignored this regulation. It has been reported that pike anglers have used live bait on Lochs Morlich, Beag and Alvie. It is recommended that fishery managers should be given additional support to ensure that pike anglers adhere to the regulations. Ideally a river bailiff would be employed to assist with policing fisheries. However, currently funds are limited and such a position can't be supported.

In August 2004 a dead perch was discovered on the banks of Lochan Uaine, Pass of Ryvoan. It is not known how it arrived there, but it could have been live bait disposed of by a prospecting pike angler (*W. Gillies, pers. comm.*). This highlights the need to make anglers clearly aware of the threat posed by the use of non-native fish as live bait. Representatives from the British pike angling associations have already met with the Cairngorms LBAP Officer, SNH and the Spey and Dee Fishery Boards to discuss ways forward on this issue. An approved code of conduct was recommended and will be drafted shortly.

The survey indicated that pike are present within each of the lochs, and there is potential to further develop pike angling within the Cairngorms. To achieve this good management practices need to be developed, but also the sport needs to be more widely promoted and publicised. It is recommended that a forum be established aimed at fostering a closer relationship between existing salmonid fishery interests and pike fishing interests.

At a previous meeting the idea of a joint salmon and pike fishing event was raised. It is recommended that such an event should be organised.

Lochs Beag and MhicLeoid were the only survey lochs which had definitely been stocked with non-native species in the past. Loch Beag was surveyed using gillnets, electrofishing equipment and anglers, with the result that three small roach and one rudd were caught. These introductions were due to the actions of a single fishery manager, the late Mr Peter Braun, who had hoped to offer a wider range of fishing opportunities within the lochs. Some of the introduced species have survived but it is not clear whether the small numbers of roach and rudd captured represent a viable breeding population. It is recommended that a regular monitoring programme should be established for lochs within the Cairngorms. In particular Loch Beag requires immediate regular surveys to determine if roach and rudd have established breeding populations.

Currently the above lochs are not stocked with non-native species. It is recommended that this should remain the policy for the future.

#### **4.3 Ponds**

Ponds in the catchment pose a slightly different threat. Firstly, in the event of a flood or pollution incident as described above (see Kylvetra Pond) non-native fish could easily be washed into burns and tributaries leading to the R. Spey mainstem. Secondly, in the event that owners decide to fill in ponds the resident fish population might be disposed of in a careless fashion, i.e. live non-native fish could be released directly into the river network.

Many ponds are on private property and currently little control of stocking activities can be imposed by fishery or conservation organisations. However, it is recommended that the process of mapping ponds and identifying fish species should continue. The taking of a pond inventory should be coupled with a public awareness exercise aimed at communicating the potential problems caused by the escape of non-native fish, and indeed of invasive plants such as *Ranunculus fluitans*, into the Spey and its tributaries. Such a project would need to have the consent and good-will of the various owners.

#### **4.4 Signal crayfish**

A signal crayfish (*Pacifastacus leniusculus*) survey was not included within the remit of the non-native fish project. However, signal crayfish pose a major threat to the habitats and native fish species of Scottish rivers. Therefore, a summary of their present status and recommendations for future population monitoring should be briefly outlined here.

Signal crayfish is a non-native species originally introduced to England, Wales and Ireland for aquaculture, which has since established in the wild and is now widespread. In Scotland there have also been introductions, with known breeding populations in the Rivers Dee (Kirkcudbrightshire) and Clyde. Localised colonies have also been found in ponds near the Rivers North Esk and Tay. It has recently been discovered in the River Nairn, the most northerly location so far recorded.

Signal crayfish in the wild are officially classified as pests and once established are almost impossible to eradicate. They predate upon juvenile salmon and trout and their eggs; exclude salmon parr from winter shelter; compete for food; and burrow into banks, causing collapse into and siltation of spawning and juvenile salmonid habitats.

It is recommended that a targeted signal crayfish monitoring and awareness raising programme be established. It is illegal to release signal crayfish into the wild, but they are kept in ponds or aquariums as pets. The pond inventory exercise described above would provide an ideal opportunity for discovering whether or not these fish are being kept in high risk water bodies.

## **5. SUMMARY OF RECOMMENDATIONS**

The following actions are recommended:

- Alternative survey techniques should be considered for future surveys.
- Fishery managers should be given additional support to ensure that pike anglers adhere to fishing regulations.
- An approved code of conduct for pike anglers should be published.
- A forum should be established aimed at fostering a closer relationship between existing salmonid fishery interests and pike fishing interests.
- A joint salmon and pike fishing event should be organised.
- A regular monitoring programme should be established for lochs within the Cairngorms.
- Lochs should not be stocked with non-native species.
- An inventory should be made of ponds within the Cairngorms.
- A non-native species public awareness programme should be developed.
- A targeted signal crayfish monitoring and awareness raising programme should be established.

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## **APPENDIX 1 – GILLNETTING SURVEY REPORT**