River Nairn Juvenile Fish Survey 2012

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FNL Fisheries Trust Report 01-2013

Prepared for
Nairn District Salmon Fishery Board

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1. Introduction

1.1 The Nairn Catchment

The River Nairn originates near Carn Ghriogair in the Monadhliath at approx 800m above sea level. It flows largely for approx 54km (36miles) north east to meet the Moray Firth at Nairn, the largest settlement along the river. The main tributaries are the River Brin, River Farnack, Craggie Burn and Cawdor Burn although there are several other smaller burns. Loch Duntelchaig is the only major loch draining into the Nairn although some smaller still waters are also present. Loch Duntelchaig is also used for public water supply.

The geology of the Nairn catchment is dominated by schists and gneisses in the upper river while some Old Red Sandstone is present in the lower reaches along with glacial and alluvial deposits. Moorland and substantial commercial conifer plantations are present in the headwaters while arable farming is more prevalent in the lower reaches.

The river flow is monitored by SEPA at their Firhill gauging station in Nairn and the mean daily flow is 5.53m^3s^{-1}. Water quality is also monitored by SEPA and in general water quality is good throughout the catchment. The River Nairn has a catchment size of 313km^2 and an average annual rainfall of 940mm.

The catchment is entirely within the Local Authority administration of Highland Council. The area can be classed as a low population density area with Nairn (pop 8,600) being the only sizeable town within the catchment.

1.2 Fish Species in the Nairn Catchment

Native species include Atlantic salmon (Salmo salar); Brown/sea trout (Salmo trutta); Eel (Anguilla Anguilla; Brook lamprey (Lampetra planeri) Flounder *(Platichthys flesus)*. Non-

native species (Historical Introductions) include Northern pike (*Esox lucius*) and Perch (Perca fluviatilis) and more recent introductions include Rainbow trout (*Oncorhynchus mykiss*) and Brook Trout (*Salvelinus fontinalis*). An adult Sea lamprey (*Petromyzon marinus*) has been observed in the river in recent years and River Lamprey (*Lampetra fluviatilis*) may also be present although recent surveys did not confirm this (Era 2004). Pike and perch are present in Loch Dumtelchaig and are probably introduced some time ago. So the Nairn is similar to many Highland rivers supporting only a limited range of fish species and the preservation of this limited fish fauna should be a key management target rather than attempting to broaden the species list through introductions of non-natives.

Salmon and sea trout management is by the Nairn District Salmon Fishery Board and the river supports a good salmon fishery with rod catches showing an increase in recent years. Sea trout are also captured although recent years have shown a decline in catch. Brown trout are also fished for but little data on catches exist.

1.3 Fish Population Information

Some electro-fishing data is available for the Nairn a site near the bridge at Faillie (NH 71199 38002) was surveyed by SEPA staff in September 2008 (Table 1). Their results indicated that salmon and trout were present along with eels and lamprey. Three age classes of salmon 0+, 1+ and 2+ were found. The densities of salmon and trout indicated a healthy population.

Table 1: Juvenile salmon and trout densities from River Nairn electro-fishing site, September 2008 (data supplied by A. Duguid, SEPA).

	Salmon 0+	Salmon Parr	Trout 0+	Trout Parr
Density ($100m^{-2}$)	123.85	13.95	2.79	1.26
Standard Error	3.41	0.27	0.12	0.18

Scottish Fisheries Co-ordination Centre electro-fishing training sessions were held on the River Farnack, near Inverarnie Bridge during the late 1990s and although fish population density data was not determined, salmon, trout and eels were all recorded as present.

Trout and salmon are likely to dominate in the fish fauna of the Nairn but eels, lamprey have also been reported with more detailed data on the lamprey population provided by Era

(2004) from a national survey of lamprey populations. Their findings indicated that lampreys were present and that these were mostly Brook Lamprey. However, some were not identified to species level so River and/or Sea lamprey could also be present. Further information is desirable.

To address the shortfall in juvenile fish data a survey of the Nairn and its tributaries was completed in 2010 (Laughton, 2011) and this indicated that salmon and trout were well distributed throughout the catchment and often present in good numbers. The mainstem in particular produced good CPUE for juvenile salmon but a number of tributaries were also important. Other species present were Brook lamprey, eel and three-spined stickleback. This survey was repeated in 2012 and this report provides details on the findings and outlines an approach for longer term monitoring.

2. Methods

A timed electro-fishing approach was implemented during the 2010 survey for the River Nairn (SFCC, 2007) and this quick approach allows more locations to be examined giving good distribution data. Relative abundance can also be gained. Each survey site was fished for 10mins then the numbers of capture fish were divided by the time fished and catch per unit effort (CPUE) was calculated. This approach was repeated in 2012.

The captured fish were anaesthetized, identified, measured (fork length, mm), and a small scale sample retained for age determination. The fish were then allowed to recover in fresh water and returned to the site. To shorten survey time further additional data for each survey location was limited to the following; Instream Habitat was scored from the following list None/Poor/Moderate/Good/Excellent; Conductivity/River Temperature and Time were recorded; Access for Fish: all obstructions were recorded; Bankside Vegetation and Land use data; Water level and clarity data. Each site was given a unique code and photographed to allow re-orientation to the site in future surveys.

3. Results

3.1 Site Locations

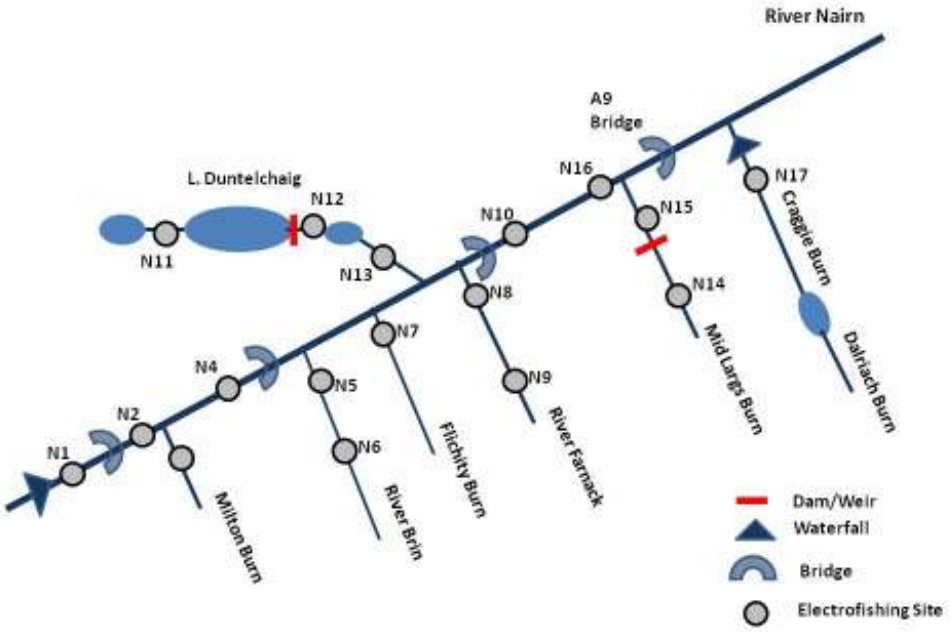

Figure 1a: Schematic map indicating the locations of electrofishing sites in the upper River Nairn and tributaries during 2010 and 2012.

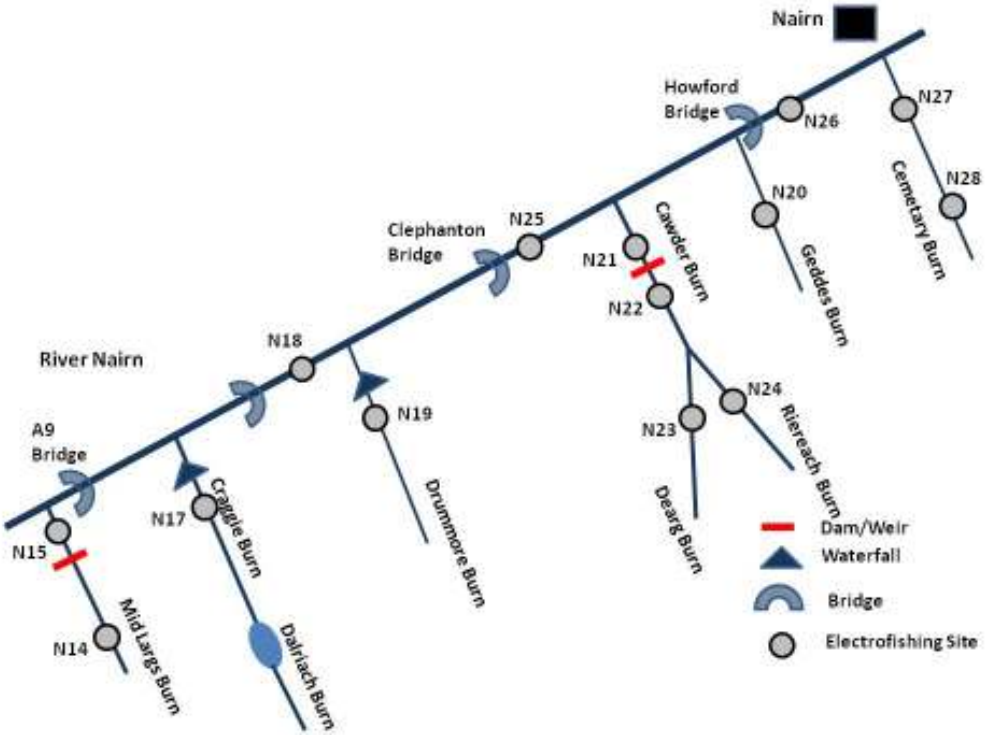

Figure 1b: Schematic map indicating the locations of electrofishing sites in the lower River Nairn and tributaries during 2010 and 2012.

Table 2a: Site locations for electrofishing sites completed on the mainstem Nairn during 2010 and 2012.

Site	Easting	Northing	Alt (m)	River	Situation	Date
N26	287550	854000	20	Nairn	50m down from Howford bridge.	08/10/10 11/10/12
N25	284750	850150	40	Nairn	50m up from Clephanton bridge.	08/10/10 No Survey
N18	274333	843035	100	Nairn	Down from Nairnside bridge	07/10/10 30/10/12
N16	270700	837600	160	Nairn	1km up from Faillie bridge.	07/10/10 04/10/12
N10	268615	835200	170	Nairn	50m down from bridge B861	03/10/10 04/10/12
N4	264919	827921	210	Nairn	100M up from Elrig bridge	28/09/10 02/10/12
N2	262657	825802	250	Nairn	Ruined cottage 500m down from bridge Aberarder	28/09/10 02/10/12
N1	262995	824115	300	Nairn	1km up from B851 bridge	28/09/10 02/10/12

Table 2b: Site locations for electrofishing sites completed on the Nairn tributaries during 2010 and 2012.

Site	Easting	Northing	Alt (m)	River	Situation	Date
N3	264030	826338	240	Milton burn	Milton farm	28/09/10 02/10/12
N5	266400	828750	215	Brin	100m up from bridge	28/09/10 02/10/12
N6	266240	826580	270	Brin	100m up from Achvraid	28/09/10 02/10/12
N7	267050	829450	210	Filchity burn	200m up from road bridge	03/10/10 04/10/12
N8	268655	833755	170	Farnack	10m down from Inverarnie Bridge	03/10/10 04/10/12
N9	269750	830350	390	Farnack	Above bridge on Aarbole road	03/10/10 04/10/12
N12	265000	831975	210	Burn from Duntelchaig	Below Loch Duntelchaig	06/10/10 04/10/12
N11	259850	829800	220	Burn above Duntelchaig	Between Duntelchaig and Loch Ceo Glais	06/10/10 04/10/12
N13	265950	832950	205	Burn from Loch a' Chlachain	Dunlichty graveyard	06/10/10 04/10/12
N14	271300	837250	150	Mid Lairgs burn	100m up from Quarry road bridge	06/10/10 30/10/12
N15	270800	837600	160	Mid Lairgs burn	500m down from Fort Augustus road bridge B851	06/10/10 30/10/12
N17	273540	839280	190	Craggie burn	Beside the arches	07/10/10 No survey
N19	276400	843900	155	Drummore burn	Down from bridge at track to Drummore of Clava	07/10/10 No survey
N21	284750	850100	55	Cawdor burn	Down from footbridge below fish ladder Cawdor burn	08/10/10 31/10/12
N22	284750	849700	70	Cawdor burn	30m above fish pass Cawdor burn.	08/10/10 31/10/12
N23	283000	847350	140	Dearg burn	Wester Barevan bridge	08/10/10 No survey
N24	285500	847450	150	Riereach burn	50m up fm Glenoullie bridge	08/10/10 No survey

Site	Easting	Northing	Alt (m)	River	Situation	Date
N20	288750	853050	30	Geddes burn	Upstream from bridge at Raitloan	07/10/10 31/10/12
N27	289300	855800	10	Cemetery burn	Balmakeith port bridge, Granny Barbour road	08/10/10 11/10/12
N28	291400	856250	15	Cemetery burn	Up from Mill bridge.	08/10/10 11/10/12

Figures 1a and 1b provide a schematic map of the relative positions of the electrofishing sites completed on the mainstem Nairn and its tributaries during 2010 and 2012 while Tables 2a and 2b provide OS grid references, altitude and date of electrofishing for each site. From Figures 1a and 1b it is evident that a good coverage of the Nairn catchment was achieved with a good spread of sites on the mainstem and all significant tributaries examined.

In 2010, 8 sites were examined on the mainstem Nairn and a further 18 examined on the tributaries, in 2013, 7 sites were re-visited on the mainstem and 16 on the tributaries. Note the four sites not re-visited on the tributaries were all above obstructions.

3.2 Fish Distribution

Table 3a: Fish distribution for the River Nairn mainstem and tributary electrofishing sites 2010.

Nairn	No of Sites	Salmon Fry	Salmon Parr	Trout Fry	Trout Parr	Eel	Lamprey	Stickleback
Mainstem	8	8	8	5	3	2	2	1
Tributaries	20	10	10	17	16	2	1	2
Total	28	18	18	20	18	4	3	3

Table 3b: Fish distribution for the River Nairn mainstem and tributary electrofishing sites 2013.

Nairn	No of Sites	Salmon Fry	Salmon Parr	Trout Fry	Trout Parr	Eel	Lamprey	Stickleback
Mainstem	7	7	7	6	7	0	3	1
Tributaries	16	10	11	14	14	2	2	2
Total	23	17	18	20	21	2	5	3

The distribution of salmon, trout and other fish is illustrated in Tables 3a and 3b. The general distribution of salmon and trout was similar in the 2012 survey to that found in 2010. In 2012 salmon fry and parr were present at 17 (74%) and 18 (78%) of the sites examined. Distribution of salmon was better in the mainstem than in the tributaries with 100% of the mainstem sites containing salmon fry or parr compared with 63% of the tributary sites.

Trout distribution showed an improved pattern in 2012. Table 3a indicates that in 2010 only 63% of the sites produced trout fry and 38% of sites produced older trout on the mainstem, while in 2012 this improved to 86% and 100% respectively. On the tributaries 85% of locations producing trout fry and 80% provided older age classes of trout in 2010. In 2012 there was again a slight improvement in distribution with 88% of the sites producing trout 0+ and older age classes.

Three other species were captured during 2012, including eels at 2 sites, lampreys at 5 sites and 3-spined-sticklebacks at 3 sites. This was similar to 2010 although eels were absent at the mainstem sites in 2012. The lampreys captured were all identified as Brook lampreys.

3.3 Obstructions to Fish Passage

No new obstructions to fish passage were determined in the 2012 survey and four of the six sites above waterfalls and existing obstructions were not revisited. See Laughton (2011) for further details on existing obstructions.

3.4 Habitat

Prior to electrofishing commencing the instream cover for salmonids aged one year or older was recorded for each survey site using SFCC (2007) criteria as follows;

None - No cover: Stream bed composed entirely of fine uniform particles (silt, sand, gravel, pebbles) or continuous hard surfaces (bedrock, concrete). No cover from aquatic vegetation.

Poor - Little cover: Stream bed composed predominantly of fine to medium particles (gravel, pebbles and cobbles), little or no cover from aquatic vegetation.

Moderate - Moderate cover: Stream composed of a mix of particle sizes (gravel to boulders) and/or with some areas of Good cover substrate (pebbles, cobbles and boulders), which may or may not have some aquatic vegetation cover.

Good - Good cover: Stream composed mainly of medium to large size substrate (pebbles, cobbles and boulders) and/or with some aquatic vegetation cover.

Excellent - Excellent cover: Stream composed predominantly of large size substrate (cobbles and boulders) and/or with extensive aquatic vegetation cover

Summary results for the sites examined along the mainstem and tributaries are presented in Table 4.

Table 4: Summary of instream habitat recorded at mainstem and tributary survey sites, River Nairn 2012.

	Instream Habitat				
	Excellent	Good	Moderate	Poor	None
Mainstem	0	2	4	1	0
Tributaries	1	10	2	1	2

Table 4 indicates that most of the areas surveys along the mainstem and tributaries were in the upper three habitat ratings, Excellent/Good/Moderate; this indicates that there was be sufficient instream habitat for older salmon and trout parr.

The mainstem and tributary sites which had excellent to moderate instream habitat all had salmon parr and trout present. The two locations where the habitat was scored as poor N04 on the mainstem near Elrig bridge, and N27 on the Cemetery Burn (Aultdearn Burn) both contained low numbers of salmon and trout.

Salmon fry and parr were absent from the small burn between Loch Ceo Glas and Loch Duntelchaig (site N11) where the substrate was predominantly sand and silt. However a trout 0+ and 1+ were capture from the woody debris present at the site. In addition salmon were absent from the burn above Loch Duntelchaig (site N12) although good habitat is present the burn is small and narrow and provides more favourable habitat for trout.

The Flichity burn (site N12) was the most interesting site in terms of habitat. Figure 2a shows the site photo for 2010, the substrate was predominantly silt and sand but the bankside vegetation was in good order and provided good cover for juvenile fish particularly trout. However, between 2010 and 2012 surveys the lower part of the burn had been cleared of vegetation and although there had been some re-growth the habitat and cover for trout was greatly reduced (Figures 2b and 2c). The 2012 survey indicated that no juvenile salmon or trout present. The sandy silty habitat is suitable for lampreys and a high catch of brook lampreys was recorded in 2012.

Figure 2a: Site N07 on the lower Flichity Burn showing good vegetation growth along the both banks in 2010.

Figure 2b: Site N07 on the lower Flichity Burn showing reduced vegetation growth along the both banks in 2012.

Figure 2c: Site N07 on the lower Flichity Burn showing silt/sand instream habitat, no habitat for juvenile salmonids but lamprey catches were good in 2012.

3.5 Fish Abundance

Relative fish abundance was determined by dividing the number of fish caught by the time fished (fish.min^{-1}) to provide an index of catch per unit effort (CPUE). The data for the mainstem Nairn sites from 2012 are presented in Table 4 and Figures 3a and 3b.

3.5.1 Mainstem

Table 1: Catch per Unit Effort (CPUE) (fish.min^{-1}) for salmon and trout at the mainstem electrofishing sites on the River Nairn, 2012.

Site	Salmon (fish.min^{-1})			Trout (fish.min^{-1})			
	0+	1+	2+	0+	1+	2+	3+
N26	5.90	0.60	0.10	0.10	0.10	0.00	0.00
N25	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N18	0.80	0.40	0.00	0.10	0.00	0.10	0.00
N16	1.90	0.50	0.00	0.00	0.10	0.00	0.00
N10	1.80	0.10	0.00	0.20	0.00	0.00	0.00
N4	0.10	0.20	0.00	0.60	0.50	0.00	0.00
N2	1.10	0.90	0.00	0.30	0.00	0.10	0.10
N1	0.10	0.30	0.00	0.20	0.20	0.00	0.00
Mean	1.46	0.38	0.01	0.19	0.11	0.03	0.01

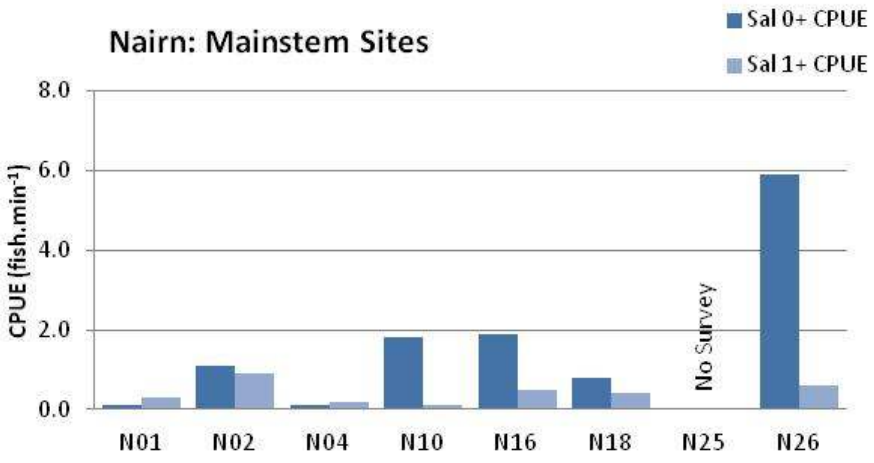

Figure 3a: Catch per Unit Effort (CPUE) (fish.min^{-1}) for salmon at the mainstem electrofishing sites on the River Nairn, 2012.

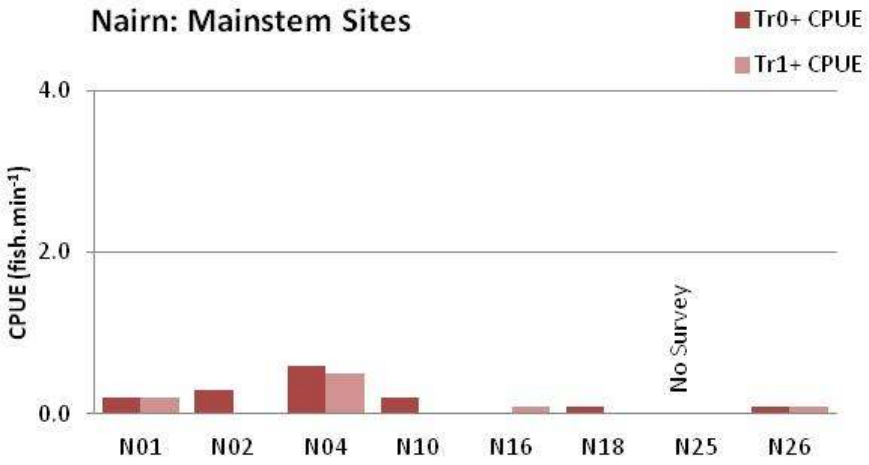

Figure 3b: Catch per Unit Effort (CPUE) (fish.min^{-1}) for trout at the mainstem electrofishing sites on the River Nairn, 2012.

Seven sites were examined on the mainstem Nairn in 2012, sites are presented from top to bottom of the mainstem, and N25 was not examined in 2012. indicating that suitable habitat for spawning and the juvenile life stages for salmon was present throughout the length of the mainstem. Three age classes of salmon were present including 0+, 1+ and 2+. Table 4 and Figure 3a show the CPUE for salmon. Mean CPUE for salmon 0+ was 1.46fish.min^{-1}and for salmon 1+ of 0.38fish.min^{-1}. Table 4 indicates that salmon 2+ were present at one survey locations (N26) and mean CPUE was 0.01fish.min^{-1}.

Table 4 and Figure 3b indicate that catches of juvenile trout in the mainstem were lower than for salmon although trout were also caught at each of the seven survey sites. Trout 0+ mean CPUE was 0.19fish.min^{-1}; trout 1+ was 0.11fish.min^{-1} A single trout 2+ and trout 3+ were caught at site N02.

3.5.2 Tributaries

Juvenile Salmon

Table 2: Catch per Unit Effort (CPUE) (fish.min^{-1}) for salmon and trout in the tributary electrofishing sites on the River Nairn, 2010. Sites (N14, N17, N19, N22, N23, N24) are above impassable waterfalls and man-made obstruction and are indicated by the shaded rows.

Site	Salmon (fish.min^{-1})			Trout (fish.min^{-1})			
	0+	1+	2+	0+	1+	2+	3+
N03	0.20	0.40	0.00	0.80	0.40	0.20	0.10
N05	1.60	0.60	0.00	0.90	0.00	0.00	0.00
N06	0.20	0.70	0.00	0.10	0.30	0.00	0.00
N07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N08	3.90	1.00	0.10	0.20	0.00	0.00	0.00
N09	0.10	0.50	0.00	0.50	0.20	0.00	0.00
N11	0.00	0.00	0.00	0.60	0.20	0.10	0.00
N12	0.00	0.00	0.00	0.10	0.00	0.00	0.00
N13	2.10	2.50	0.00	0.00	0.00	0.00	0.00
N14	0.00	0.00	0.00	2.00	1.10	0.00	0.00
N15	1.30	0.40	0.00	0.50	0.20	0.00	0.00
N17	Not Surveyed						
N19	Not Surveyed						
N20	0.50	1.40	0.00	0.60	1.00	0.20	0.10
N21	0.50	1.80	0.00	0.10	0.30	0.00	0.00
N22	0.00	0.00	0.00	0.50	0.10	0.00	0.00
N23	Not Surveyed						
N24	Not Surveyed						
N27	0.20	0.00	0.00	0.30	0.30	0.00	0.00
N28	0.00	0.40	0.00	0.90	1.00	0.20	0.00

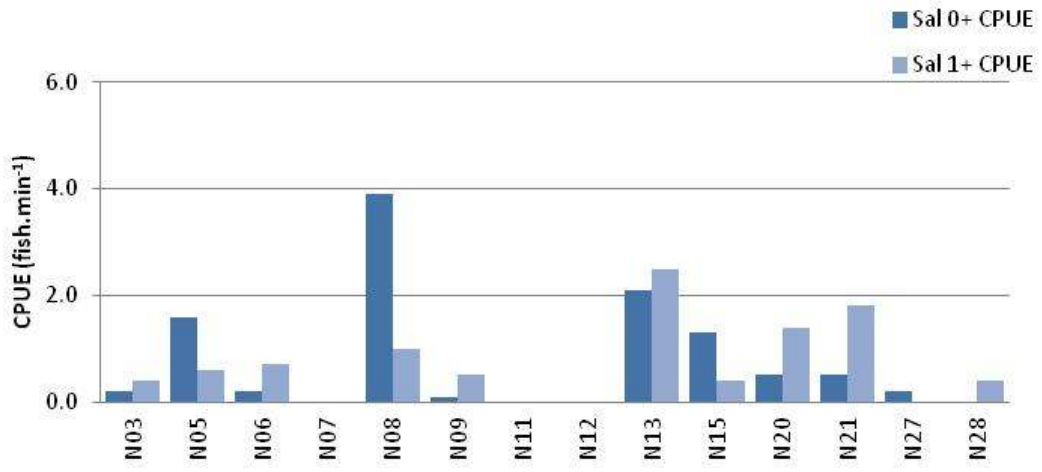

Figure 4: Catch per Unit Effort (CPUE) (fish.min^{-1}) for 0+ and 1+ salmon on the tributary sites accessible to spawning adults within the River Nairn 2012.

Table 5 provides the CPUE data for the survey sites examined throughout the tributaries of the River Nairn. Six sites were established above impassable waterfalls and man-made obstructions during 2010 but only two of these (N14 and N22) were revisited in 2012. However, similar to 2010 for the analysis of juvenile salmon CPUE these two sites are omitted and only the accessible sites are included in Figure 4. From Figure 4 it is evident that at three of the sites salmon were completely absent and the reasons for this have already been discussed (see section 3.3). Salmon were also absent at site N22 which is situated above the weir on the Cawdor Burn. The weir is fitted with a fish pass but salmon have been absent from this site on in both 2010 and 2012 indicating the fish pass is not effective in allowing adult salmon access.

In 2012 mean CPUE for salmon 0+ was 0.66fish.min^{-1} and for salmon 1+ was 0.61fish.min^{-1} (Table 6). Salmon 2+ were present at one site N08 and mean CPUE was 0.01fish.min^{-1} (Table 6). Table 6 also compares the mean CPUE data for each age class of salmon within the mainstem and the accessible tributary sites for 2010 and 2012.

Table 6 indicates that in both 2010 and 2012 the mean CPUE for salmon 0+ was lower in the tributaries than the mainstem. For salmon 1+ the mean CPUE was high in the mainstem in 2012 than the tributaries but this was reversed in 2012. Mean CPUE for older 2+ salmon remained similar in both years for the mainstem and the tributaries. However the more striking pattern is the much lower mean CPUE for the majority of age classes of salmon in 2012 compared with 2010. Only the mean CPUE for salmon 1+ within the tributaries in 2012 was similar to the results in 2010.

Table 3: Mean CPUE (fish.min^{-1}) for salmon 0+, 1+ and 2+ from mainstem electrofishing sites and tributary sites accessible to adult salmon on the River Nairn, 2010 and 2013.

Salmon	Mean CPUE (fish.min^{-1}) 2010		
	Salmon 0+	Salmon 1+	Salmon 2+
Mainstem	3.40	1.00	0.10
Accessible Tributaries	2.30	0.60	0.09
	Mean CPUE (fish.min^{-1}) 2012		
	Salmon 0+	Salmon 1+	Salmon 2+
Mainstem	1.46	0.38	0.01
Accessible Tributaries	0.66	0.61	0.01

Figure 5 provides a more detailed look at the number of sites which showed an increase in CPUE for salmon 0+, 1+ and 2+ during the 2012 survey when compared with the CPUE in 2010. It is clear from Figure 5 that for salmon 0+ and 1+ within the mainstem only 25% of the survey sites showed an increase or was equal to the CPUE determined in 2010. For 2+ salmon, 50% of the maintem sites were equal or greater in CPUE than in 2012.

Salmon 0+ in the tributary sites also showed a decline with only 38% of sites indicating and improvement or similar CPUE to 2010 in the current survey. However, for older salmon there

was a marked improvement with 69% of the sites showing and increase in CPUE for 1+ salmon and 89% for 2+ salmon when compared with 2010.

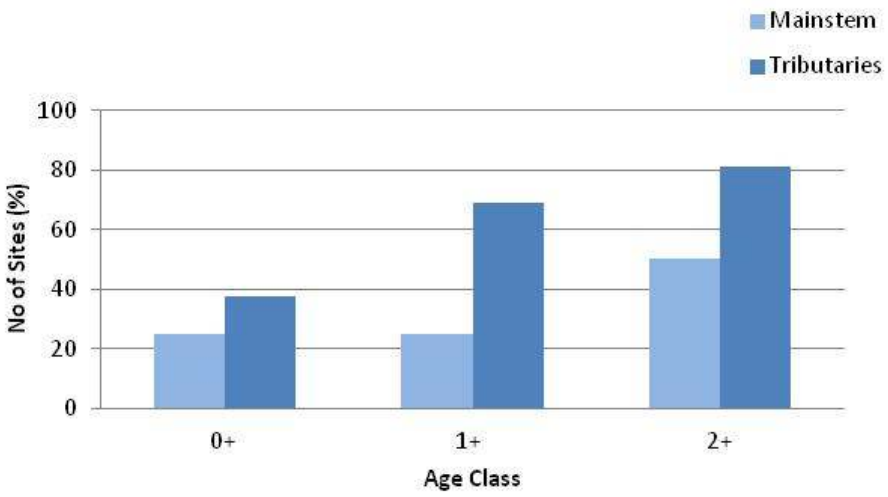

Figure 5: Percentage of survey sites in 2012 that showed an increase or were equal in juvenile salmon CPUE (fish.min^{-1}) when compared with 2010.

Juvenile Trout

Four age classes (0+, 1+, 2+ and 3+) of trout were captured in the tributaries, In general CPUE for each age class was lower than the equivalent salmon age class.

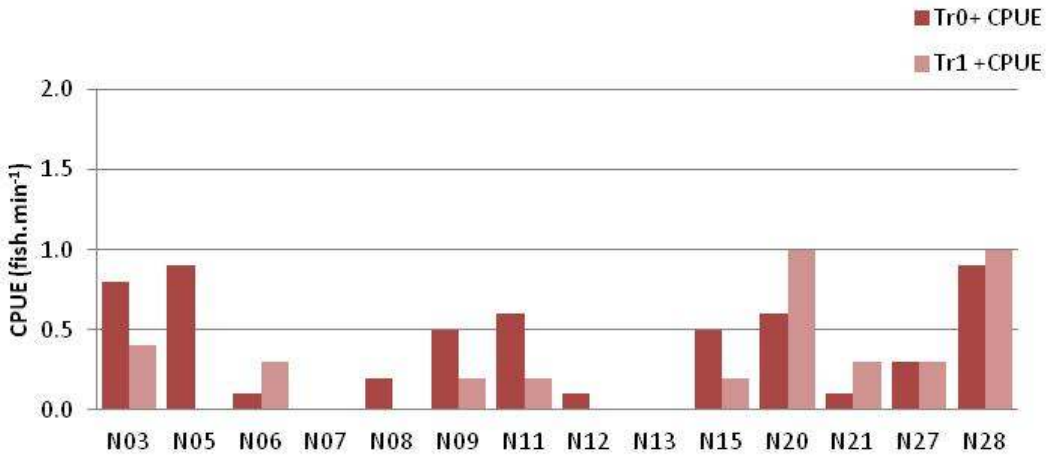

Figure 6: Catch per Unit Effort (CPUE) (fish.min^{-1}) for 0+ and 1+ trout on the tributary sites which are accessible to adult sea trout within the River Nairn 2012.

Table 5 and Figure 6 provide the CPUE data for the survey sites examined throughout the tributaries of the River Nairn. Six sites were established above impassable waterfalls and man-made obstructions during 2010 but only two of these (N14 and N22) were revisited in

2012. However, similar to 2010 for the analysis of juvenile salmon CPUE these two sites are omitted and only the accessible sites are included in Figure 4. From Figure 13 it is evident that at two of the sites (N07, N13) trout 0+ and 1+ were absent. Indeed trout were completely absent at N07 0n the Flichity Burn due to poor habitat (see section 3.3). Trout were also absent from N13 which was a surprise since they had been present in low numbers during 2010. Trout 0+ were present at the remaining sites and mean CPUE was 0.51fish.min^{-1}, mean trout 1+ was 0.32fish.min^{-1}, and for 2+ trout mean CPUE was 0.04fish.min^{-1}. Two 3+ trout were captured at N03 on the Milton Burn and N20 on the Geddes Burn.

Trout were present at both the sites above the barriers; site N14 on the Mid Largs burn is upstream from a concrete bridge apron (see Laughton 2011, for a photo and further details) which may curtail access to adult salmon and trout. However, Table 5 indicated good CPUE for 0+ trout and 1+ trout above the barrier, 2.00fish.min^{-1} and 1.10fish.min^{-1}, respectively. Similarly at trout 0+ and 1+ were present at site N22, upstream from the weir on Cawdor Burn although CPUE was lower at 0.50fish.min^{-1} and 0.10fish.min^{-1} respectively.

Table 7 provides a summary of the mean CPUE for each age class of trout within the mainstem and tributaries of the Nairn during 2010 and 2012. It is evident that the mean CPUE for 0+, 1+ and 2+ age classes of trout within the accessible tributaries is higher than in the mainstem in both 2010 and 2012. The mean CPUE for the 0+ and 1+ trout were greater within the mainstem and the tributaries in 2012 than in the previous survey. CPUE for trout 2+ were also greater in the mainstem in 20102 but had declined slightly in the tributaries. CPUE for older 3+ trout remained the same in both years.

Table 7: Mean CPUE (fish.min^{-1}) for trout 0+, 1+, 2+ and 3+ from mainstem electrofishing sites and tributary sites on the River Nairn, 2010 and 2012.

Trout	Mean CPUE (fish.min^{-1}) 2010			
	Trout 0+	Trout 1+	Trout 2+	Trout 3+
Mainstem	0.15	0.04	0.00	0.01
Accessible Tributaries	0.52	0.07	0.10	0.01
	Mean CPUE (fish.min^{-1}) 2012			
	Trout 0+	Trout 1+	Trout 2+	Trout 3+
Mainstem	0.19	0.11	0.03	0.01
Accessible Tributaries	0.51	0.32	0.04	0.01

Figure 7 provides a more detailed look at the number of sites which showed an increase in CPUE for trout 0+, 1+ and 2+ during the 2012 survey when compared with the CPUE in 2010. It is clear from Figure 7 that for trout 0+, 1+ and 2+ within the mainstem there was a marked improvement in the CPUE in 2012 when compared with 2010. Within the mainstem 63% of the survey sites had shown similar or improved CPUE for 0+ trout while for 1+ trout the figure was 75% and for 2+ trout 100% of sites had improved CPUE.

In the tributary sites, trout 0+ CPUE was equal or improved at 19% of the sites surveyed in 2013 when compared to 2010, while for 1+ and 2+ trout, 75% and 63% of sites were equal or better than in 2010.

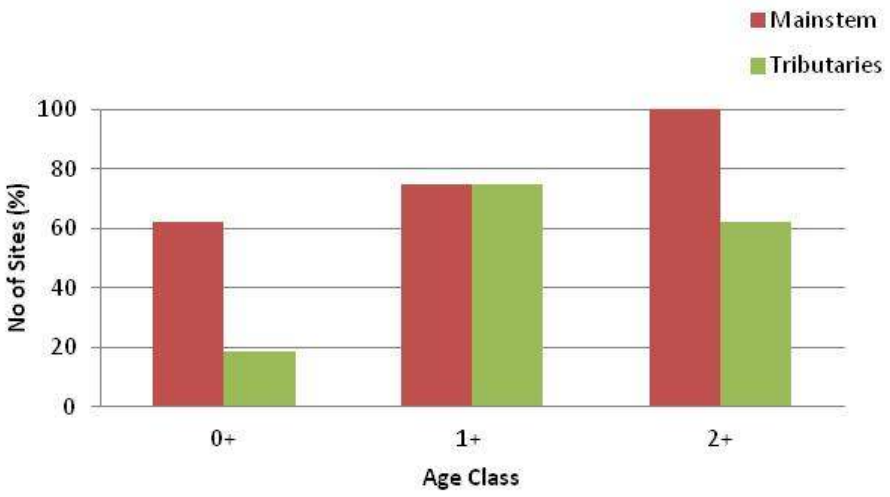

Figure 7: Percentage of survey sites in 2012 that showed an increase or were equal in juvenile trout CPUE (fish.min^{-1}) when compared with 2010.

4. Discussion

The current survey builds on the data collected in 2010 (Laughton, 2011) and confirms that salmon and trout were present throughout the River Nairn and its tributaries. Three age classes 0+, 1+, and 2+ were captured for each species. 0+ and 1+ were the most abundant age classes for both species with some 3+ trout were also captured at two locations.

Salmon were found in the mainstem from the falls at Alltarder down to Nairn. Salmon were also present in most tributaries with the Brin and Farnack again showing good numbers. In general the CPUE for salmon 0+ was lower in both the mainstem and the tributaries during the current survey than in 2010 which may have indicated a lower spawning input in 2011. There was also a noticeable drop in CPUE for older salmon 1+ and 2+ in the mainstem although the CPUE in the tributary sites was an improvement on the 2010 results.

Numbers of juvenile salmon can vary widely from year to year and depend on a large range of factors. The variation shown here between the 2010 and 2012 survey is likely to be within the expected range for juvenile salmon. The 2012 survey again indicated the importance of both the mainstem and the tributaries for harbouring juvenile salmon. Maintaining good habitat within the mainstem and tributaries to ensure suitable spawning areas are available and a good variety of run/riffle and boulder/cobble substrate to support the juveniles is essential for the future of the stocks.

Trout were also widespread in the Nairn catchment. The current survey indicated greater numbers in the mainstem than in 2010 and although trout 0+ had declined in the tributaries older trout were present in good numbers. With the current poor catches of seas trout it is encouraging to see some small improvements in juvenile trout numbers.

Eels, Brook lamprey and 3-spined-stickleback were also caught at a few locations during the 2012 similar to the 2010 survey. However, it is worth noting the high numbers of lamprey caught in the Flichity Burn. Lower part of the Flichity burn has been subjected to straightening and dredging over the years leaving little to no suitable instream habitat for juvenile salmonids, however, the juvenile lamprey numbers indicate the sand substrate which is now dominant is providing good habitat for their development.

A number of obstructions to fish passage were identified in a previous habitat survey of the Nairn by Mackay (2000) and their effect on fish passage was examined further during the 2010 survey by Laughton (2011).

The current survey revisited the Duntelchaig system and similar to 2010 did not find salmon beyond Loch a' Chlachain. There is a Dam on Loch Duntelchaig fitted with a fish ladder but some further inspection of the facility maybe worthwhile to ensure it is passable for all migratory fish.

A weir plus waterfall on the Cawder Burn also limited the upstream range of salmon and this is a more difficult structure. The weir has been built along the top of the waterfall to provide water for the Brackla distillery. An attempt to build a fish pass in the structure has also been made. No salmon were found above the structure in the 2010 and 2012 surveys and low numbers of trout indicating they would be a resident population with no sea trout input. Clearly improving access through a better fish pass or removal of the weir would open up considerable spawning and juvenile habitat for both salmon and sea trout. Further assessment of the structure is underway.

The concrete bridge apron on the Mid Largs Burn was considered impassable to salmon and sea trout although under certain flow conditions sea trout may ascend at the left bank side. The 2010 survey at site (N14) upstream produced no salmon but very good numbers of trout 0+ and 1+ and the pattern was similar in the 2012 survey so there may be some access above the structure by sea trout. However, the habitat was excellent with good undercut banks and draped vegetation providing ideal cover for young trout. Further assessment of the apron using SEPA barrier methodology is required and then development of remedial options to improve fish access.

Poor habitat also affected fish numbers in one particular tributary, the Cemetery Burn. This burn has been subjected to canalisation and dredging over the years and much of the natural substrate has been lost. It was particularly bad in the lower reaches where it flows through Nairn, however, a few salmon and trout were captured during this survey. These fish appear to be utilising the dense vegetation along the banks for cover. Further upstream some pockets of better fish habitat still remained and similar to 2010 both salmon and trout were found. Clearly salmon and trout still utilise the burn but returning the burn to its original state would be a huge task, but it may be worth exploring further.

The current survey repeated the timed electrofishing approach used in 2010. The technique allowed good coverage of the catchment and also provided some information on relative abundance using catch per unit effort (CPUE). However, although the technique allows good coverage of the river there may be a need to establish more detailed surveys sites using depletion electrofishing techniques (SFCC 2007) to provide a better indication of long

term trends in the salmon and trout stocks. Some thought to establish a number of long term core monitoring sites may be worthwhile.

In general the Nairn and its tributaries appear to have a healthy stock of salmon and trout. There is some room for improvement through encouraging better agricultural practises and removal of some man-made structures to improve fish access.

5. Recommendations

Electrofishing provides a useful insight into the current status of fish populations within a river and through time information on trends in the population and smolt outputs can be calculated. Problem areas where stocks are limited, or damaged due to natural or man-made events can also be identified and some remedial actions can be considered. The current survey indicated that juvenile salmon and trout stocks were well distributed throughout the catchment and abundance was also encouraging. The current survey used a quick timed electrofishing approach to cover the catchment in a limited time. The approach provided a good over view of the rivers stocks but to add value in the future a establishing a set of core of sites to provide population density data would be beneficial. This could be visited regularly and provide estimates of smolt output and trends in population. However, yearly electrofishing surveys are expensive to maintain and a three or five year programme may be more appropriate.

Most of the accessible habitat was utilised by salmon and trout however, there some areas where access could be improved, Cawder Burn, Mid Lairgs Burn and also where land management practices could also be improved.

1. Devise plan for future electrofishing surveys,

2. Review problematic access points and develop remedial actions if possible and appropriate,

3. Identify areas with damaged or degraded habitat and develop remedial plans.

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