

Aerial & fish stock survey of the River Crana catchment, Co. Donegal

September 2018

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Inland Fisheries Ireland Research & Development preliminary report

Contents

1	Scope of report.....	3
2	Introduction.....	4
3	Methods	6
3.1	Fieldwork.....	6
3.2	Image processing.....	6
3.3	Instructions for viewing imagery.....	7
3.4	Assessment of imagery and presentation of results	7
3.5	Electric fishing	8
4	Results.....	2
4.1	Overview	2
4.2	Crana (main channel)	4
4.2.1	Crana (upper): Twin Sisters Bridge to Glashagh confluence (CR1–CR 106)	4
4.2.2	Crana (mid): Glashagh to Owenboy confluences (CR107–CR242).....	5
4.2.3	Crana (lower): Owenboy confluence to sea point (CR243–CR452)	8
4.3	Evishbreedy	10
4.4	Glashagh.....	11
4.5	Camowen	13
4.6	Meenatomish	14
4.7	Owenboy.....	16
4.8	Fish stock assessment	18
5	Conclusions and recommendations	22
6	References.....	25
7	Acknowledgements	26
8	Appendices	27
8.1	Appendix 1: R code to generate interactive map of images	28
8.2	Appendix 2: List of validated geo-referenced image files	30

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1 Scope of report

This report presents the results of an aerial survey of the River Crana catchment, Co. Donegal undertaken in July 2018 using a drone. A preliminary assessment of fish stock status based on an extensive electrofishing survey undertaken in August 2018 is also reported. The surveys were requested by Inland Fisheries Ireland (IFI) Ballyshannon to provide a rapid assessment of the current physical state of the river system, and a stock assessment in order to better inform potential fisheries management actions in response to the severe flooding event which occurred in the catchment in August 2017.

2 Introduction

In late August 2017 a severe flooding event, with a 100-year recurrence interval (Irish Times, August 2017), occurred in the River Crana catchment resulting in substantial bank erosion, movement of marginal and bed material, and displacement of materials within the watershed. This event greatly impacted on local communities, property and farmland within the catchment area and may have also impacted on fish habitat and resident and migratory salmonid populations. IFI considered it prudent to assess the level of impact on fish habitat and fish following this extreme flooding event. Therefore, an aerial drone survey was commissioned to provide:

- a rapid assessment of the current physical state of the river system including documenting the instream and marginal topography in the Crana main channel, and its significant tributaries (Rivers Camowen, Evishbreedy Glashagh, Meenatomish and Owenboy);
- documentary images on the configuration of the channel habitat types (e.g. habitat defined as riffle, run, glide or pool);
- a determination of the extent of bank and channel stability in the system;
- an overview of river substrate character (e.g. bedrock, boulder, cobble or gravels) and their distribution within the channels surveyed to allow for assessment of the extent of change; and
- a permanent georeferenced photographic record of the river tributaries and main channel status at July 2018, approximately one year after the flood event.



Figure 1 Outflow of the River Crana at Buncrana.

It is intended that the aerial survey imagery will be compared to an extensive collection of ground photographs of electrofishing sites in the catchment dating from the 1990s. These survey data also supported a fish stock assessment (quantitative and catchment-wide electro-fishing, CWEF) in the Crana system which was conducted in August 2018.

3 Methods

3.1 Fieldwork

An aerial photographic survey of the River Crana main channel and its significant tributaries was undertaken from the 17–24 July 2018 using a Dji Phantom 4 Professional drone and associated camera (model FC3010). In total, c. 30 km of channel was photographed (Table 1 and Figure 2 River Crana catchment (bounded in purple colour) indicating the river stretches (highlighted in red colour) photographed as part of the aerial survey. Figure 2), with overlapping photographs sequentially taken in batches along the river channel in a downstream or upstream direction. Individual survey flights were constrained by visual line of sight (VLOS) and battery constraints. No temporary restricted airspaces (TRAs) were in effect in the operating area and explicit permissions were not required from the Irish Aviation Authority for this work. Imagery was typically shot at an altitude range above-ground of 20–50 m.

Table 1 Channel length surveyed in the Crana main channel and its significant tributaries

River segment	River segment code	Image files (.JPG)	Channel length (m)
Camowen	CM	CM1–CM48	1,351
Crana (upper)	CR	CR1–CR106	4,493
Crana (mid)	CR	CR107–CR242	4,883
Crana (lower)	CR	CR243–CR452	6,244
Evishbreedy	EB	EB1–EB45	2,454
Glashagh	GL	GL1–GL32	2,416
Meenatomish	MT	MT1–MT37	1,480
Owenboy	OB	OB1–OB187	6,339
Total		798	29,660

Notes: The Crana main channel was divided into the following three river segments: Crana (upper) - "Twin Sisters" Bridge downstream to the Glashagh confluence; Crana (mid) - Glashagh confluence downstream to the Owenboy confluence; and Crana (lower) - Owenboy confluence downstream to tidal limit.

The channel downstream of the Evishbreedy impoundment to its confluence with the Camowen was considered to be the Evishbreedy although this is locally deemed to be part of the main River Crana channel and is named as part of the Owennasop River by Ordnance Survey Ireland (OSI).

3.2 Image processing

Image files (.JPG) taken from the drone were periodically downloaded to a laptop on-site after each flight. Any duplicate, erroneous or low quality shots were deleted. The micro SD card was then wiped for the next flight so the subsequent set of images

taken would have file names re-commencing at DJI1.JPG.¹ All validated image files were initially collated by river segment and renamed in sequential ascending numerical order from upstream to downstream (Table 1) using the rename function in Microsoft Office Picture Manager. The complete set of 798 image files were then placed in a single Master folder. All images are copyrighted © Inland Fisheries Ireland.

In R studio (version 1.0.136; R Core Team 2017), the package “exifr” (Dunnington and Harvey 2017) was used to simultaneously extract the filename, GPS Latitude and GPS Longitude data from the metadata of each image stored in the Master folder. The package “leaflet” (Cheng et al. 2018) was then employed to produce an interactive offline webmap plotting each point on the river where an image was taken along with an html link to view the associated images when each point is clicked. The R code to extract and collate the image metadata and produce the map is provided in Appendix 1.

3.3 Instructions for viewing imagery

A USB key containing the interactive map and all associated 798 image files in the Master folder is provided with this report. The Master folder should be copied to the local C:\ drive of a computer to use the interactive map offline (i.e. C:\Master). The map can be accessed by opening the html file “A1 Crana drone survey map”. The full list of validated images taken during the survey and associated metadata is provided in Appendix 2 and the file Crana image list.csv file stored in the Master folder.

3.4 Assessment of imagery and presentation of results

The results of the aerial survey assessment are presented by river segment according to the scheme in Table 1. River features highlighted in the results section can be further examined with reference to the interactive map. Within each river segment images were examined to identify and describe the following:

- geo-hydromorphological character (bank structure, flow profile, channel substrate composition, substrate displacement);
- floodwater impacts (e.g. bank erosion, structural damage to built environment, riparian zone changes);
- land use adjacent to the channel;

¹ It is advisable to copy images to a laptop after every flight in case the drone is subsequently lost in flight. However, within each river segment surveyed, it would be better to retain the images on the micro SD card so that the ascending naming sequence of the files is preserved for the quicker collation of images.

- level of instream vegetation cover;
- excess siltation issues;
- flood remedial measures undertaken by landowners; and
- potential fisheries management actions that may be required to restore damaged habitat, maintain fish productivity and/or better protect fish stocks.

Right and left-hand banks (RHB or LHB of channel) refer to respective banks when facing in a downstream direction.

3.5 Electric fishing

Electrofishing techniques were used to sample fish populations in selected reaches, both tributary and main channel sites, throughout the catchment, using electrofishing backpacks. Two methodologies were utilised as follows:

- **Standard 5 minute CWEF approach (salmonid fry index) – CWEF₅**

Catchment-wide electrofishing (CWEF₅) is a semi-quantitative technique primarily used to assess salmon fry (0+) distribution & abundance in a system. The survey goal is to sample sites throughout a catchment, in all channels \geq Stream Order 2, which are accessible to adult salmon in order to map salmon fry distribution and abundance.

- **Extended 10 minute CWEF methodology - CWEF₁₀**

This method extends the typical CWEF₅ approach above and entails 10 minute timed sampling in representative sites usually comprising a riffle, pool, glide sequence. This type of mixed habitat tends to support 0+ fry and ≥ 1 salmonid parr and other fish species. Sampling was conducted concurrently with CWEF₅. Method is detailed in Matson *et al.* 2017. The values obtained can be raised and converted to report as quantitative data (no. fish/m²).

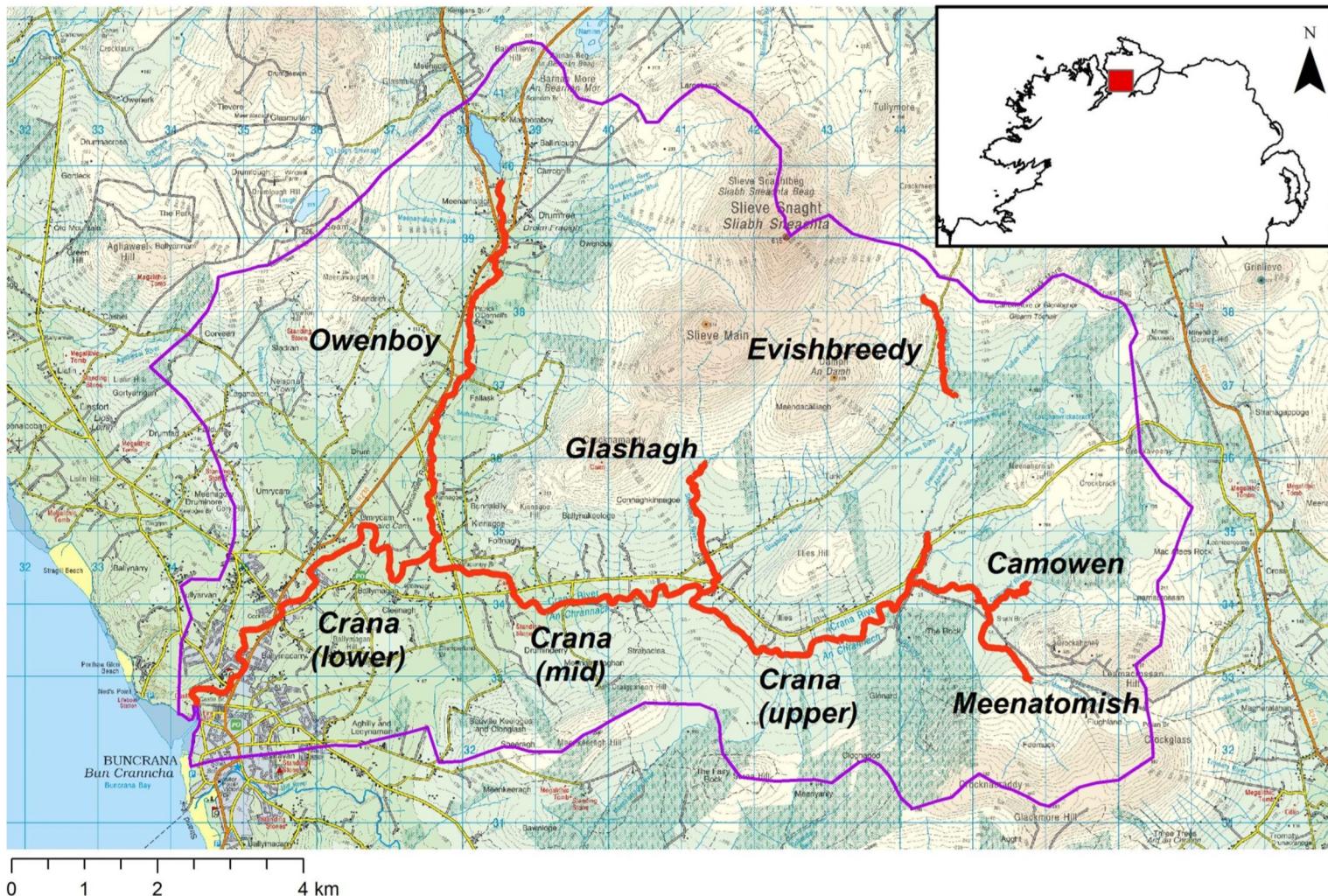


Figure 2 River Crana catchment (bounded in purple colour) indicating the river stretches (highlighted in red colour) photographed as part of the aerial survey.

4 Results

4.1 Overview

Overall the aerial survey shows the Crana catchment to be in a relatively good state as regards the geo-hydromorphological character required and expected to support healthy salmonid stocks. Channel substrate throughout the system principally comprises a heterogeneous boulder-cobble mix interspersed with gravels, some sand and occasionally sections dominated by exposed bedrock. Excessive siltation which may be detrimental to juvenile salmonid production was not generally observed. Instream macrophyte cover is generally limited with the exception of the Owenboy tributary (Table 2). Riffles, runs and pool sequences are a common feature of all the river segments surveyed with glides an increasingly feature in the lower gradient, lower portion of the catchment. No overt signs of pollution (e.g. excessive algae) were observed during the survey.

Remedial bank works to repair flood-impacted land and aimed to protect land and property against future such flooding events were locally observed and are not extensive as a proportion of the total catchment wetted area. Such measures principally included the installation of locally-extracted earthen or natural stone levees raising bank height and occasionally the use of artificial concrete block armour or rock armour. At the time of the survey, landowners impacted by the flood had already or were in the final phase of completing remediation works on their land including clearing debris, reseeding fields and refencing riparian zones. As such, the masses of material reportedly displaced in the flooding event onto land adjacent to the channel in some sections of the river are not now generally evident. In addition, areas where in-river substrate may have been substantially displaced were not readily identifiable. Some potential impediments to upstream fish passage were identified and further assessment would be useful to ascertain if any alleviation works in this regard are required (i.e. a temporary pipe culverted bridge and associated boulder footbridge at CR170; and damaged weirs in the Swan Park area CR423–CR434).

Table 2 Overview of aerial survey observations by river segments.

Item	Crana (upper)	Crana (mid)	Crana (lower)	Camowen	Evishbreedy	Glashagh	Meenatomish	Owenboy
Physical habitat status to support salmonids	Good	Good	Good	Good	Good	Good	Good	Good
Principal channel substrate character	Predominated by a boulder-cobble mix interspersed with gravels and sand	Predominated by a boulder-cobble mix interspersed with gravels and sand	Boulder-dominated interspersed with cobble; exposed bedrock a regular feature	Boulder-dominated interspersed with cobbles, gravels and sand	Bedrock and boulder-dominated with some gravels	Upper: bedrock and boulders with cobbles, gravel & sand; lower: boulder-coble mix with gravels	Upper: bedrock and boulders with cobbles, gravel & sand; lower: boulder-coble mix with gravels	Cobble interspersed with boulder and gravel
Principal land use	RHB: grazed grassland; LHB: rough pasture and moorland with plantation forestry in upper section	RHB: grazed grassland; LHB: rough pasture and moorland with some grasslands present	Agricultural; low density housing and; semi-natural parkland	Moorland (sheep-grazed) with some farmland present in lower reaches	Moorland (sheep grazed)	Upper: Moorland (sheep grazed); Lower: agricultural	Upper: Moorland (sheep grazed); Lower: agricultural and rough pasture	Agricultural pasture (sheep grazed) with some areas of rough uncultivated land
Instream vegetation cover	Moderate	Moderate	Moderate	Minimal	Minimal	Minimal	Minimal	High
Bank stability issues	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal	Minimal
Excessive siltation	Not evident	Localised	Not evident	Not evident	Not evident	Not evident	Not evident	Not evident

4.2 Crana (main channel)

4.2.1 Crana (upper): Twin Sisters Bridge to Glashagh confluence (CR1–CR 106)

The Crana (upper) appears to be in a good physical state to support salmonid stocks. The channel substrate principally comprises a boulder-cobble mix interspersed with gravels and sands. There are no obvious signs of excessive siltation which may be detrimental to salmonid spawning and nursery areas. Land use adjacent to the river channel largely comprises agricultural grassland with some plantation forestry present in the upper section of this river segment (Table 2). Some localised bank reinforcement works have been undertaken at the Twin Sisters bridge and in the vicinity downstream of this (Table 3; Figure 3, Figure 4 and Figure 5). Installation of fencing along exposed areas of the riparian zone is recommended to encourage its natural development and consequently aid long-term bank stability (Table 3; Figure 3).

Table 3 Crana (upper): notable features identified and recommended measures.

Measures	Observations	Image reference
Measures implemented by landowners in response to the flooding	Bank reinforcement works at Twin Sisters bridge	CR1
	Some earth bank reinforcement works and riparian fencing installed on RHB	CR4
	Riparian fencing installed on LHB	CR 8–CR14
	Levee is being installed here with locally excavated material since the survey took place.	CR18–CR23
Recommended measures	Riparian fencing maintenance proposed on RHB	CR46–CR48 CR71–CR74 CR80–CR81

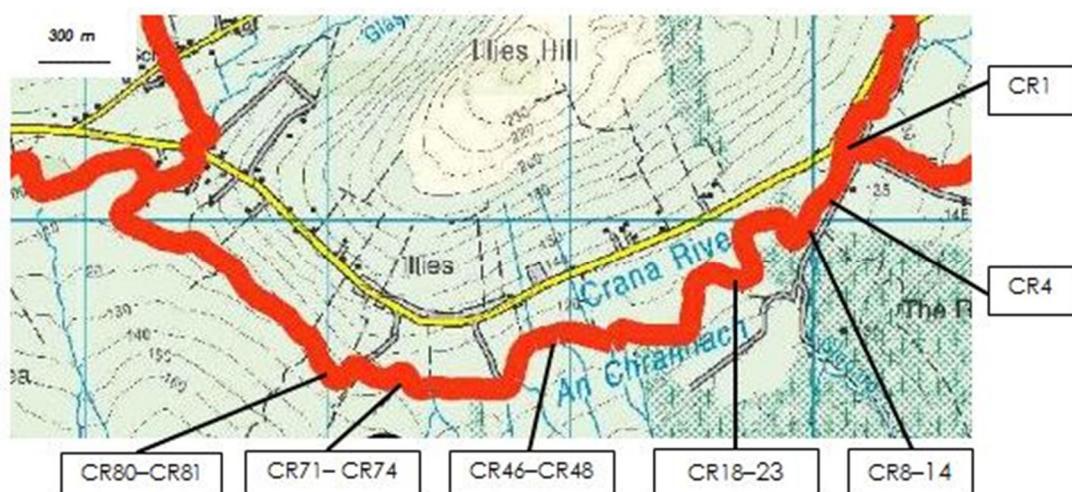


Figure 3 Crana (upper) showing key features identified in the aerial survey.



Figure 4 Twin Sisters bridge showing bank works (CR1).



Figure 5 Installation of levee with locally sourced materials along LHB at CR18–CR23.

4.2.2 Crana (mid): Glashagh to Owenboy confluences (CR107–CR242)

The Crana (mid) appears to be in a good physical state to support salmonid stocks. Channel substrate composition and land use adjacent to the river channel is similar to the Crana (upper). However, tree-lined banks and exposed bedrock were present in extended sections of this river segment (Table 2). Some localised bank reinforcement works have been undertaken within this river segment with more extensive such works evident directly upstream and in the vicinity of the Owenboy confluence (Table 4; Figure 6, Figure 7 and Figure 8). Installation of fencing along exposed areas of the riparian zone is recommended to encourage its natural development and consequently aid long-term bank stability. In addition, fish passage should be assessed at CR144 (Figure 9) and CR 170 (Figure 7).

Table 4 Crana (mid): notable features identified and recommended measures.

Measures	Observations	Image Reference
Measures implemented by landowners in response to the flooding	Bank reinforcement works along riparian zone	CR121– CR123
	Bank reinforcement works on LHB	CR134–CR138
	Rock armour installed on LHB in vicinity of road bridge near soccer pitch	CR143–CR149
	Temporary pipe-culverted bridge and boulder footbridge installed as adjacent bridge collapsed in flood.	CR170
	Bank reinforcement works	CR170–CR175 CR184–CR191
	Extensive bank reinforcement works on LHB	CR239–CR242
Recommended measures	Riparian fencing proposed on both banks where this is not already installed	CR119 –CR136 CR151 –CR154 CR172 –CR178
	Assess if fish passage may be impeded in low to medium flows by bridge apron near soccer pitch	CR144
	Assess if fish passage may be impeded in low to medium flows by temporary pipe-culverted bridge and boulder footbridge. Footbridge should be removed as soon as is feasible.	C170



Figure 6 Crana (mid) showing key features identified in the aerial survey.



Figure 7 Temporary pipe-culverted bridge and boulder footbridge installed as adjacent bridge collapsed in flood (CR 170) with remedial bank stabilisation works present downstream (CR170-175).



Figure 8 Extensive bank reinforcement works on LHB at confluence with Owenboy (CR239-242)



Figure 9 Extensive rock armour installed by soccer pitch (CR144).

4.2.3 Crana (lower): Owenboy confluence to sea point (CR243–CR452)

The Crana (lower) appears to be in a good physical state to support salmonid stocks and facilitate their passage although remnant impacts of the flood (structural damage to weirs and bank walls) remain evident in the Buncrana town area which potentially could somewhat impede fish migration. Land use adjacent to the river is principally agricultural (pasture and grassland) in the upper and mid-portions of this river segment. Overall, the channel substrate is boulder-dominated interspersed with cobble, and exposed bedrock regularly features (Table 2). The river banks are extensively tree-lined and heavily vegetated in stretches, thus providing natural stability to the river channel. In the town area, some low density housing estates back onto largely inaccessible sections of the river channel. The final section of the river flows through semi-natural wooded parkland at Swan Park where an old stone bridge and a number of weirs remain in disrepair since the flood (Figure 11). Preliminary inspections indicate that these appear unlikely to impede fish passage. However, such flood-impacted sections as noted in Table 5 should be assessed further to confirm that fish passage is not impeded. The impact of the flood is also very notable at the Owenboy confluence and remedial bank reinforcement works have been undertaken along the LHB downstream of this. Further such remedial works using locally-sourced stone are evident on the outskirts of the town directly downstream of the new road bridge at Cockhill. In addition, an earthen levee has been constructed along the margin of the GAA pitch which was severely degraded in the flood (Figure 12). Measures such as fencing to facilitate the establishment of mature riparian vegetation in areas where remedial bank reinforcement works or levees have been

installed will be important to further aid the future stability of the associated river channel and fisheries habitat (Table 5; Figure 10).

Table 5 Crana (lower): notable features identified and recommended measures.

Measures	Observations	Image Reference
Measures implemented by landowners in response to the flooding	Bank reinforcement works along LHB of riparian zone (continuation of works noted previously)	CR243– CR247
	Bank reinforcement works on RHB	CR253
	Bank reinforcement works on LHB	CR256–CR258
	Earthen levee along channel at GAA pitch	CR353–CR359
	Some rock armour and remedial bank reinforcement works at Cockhill Bridge	CR363–CR367
Recommended measures	Bank reinforcement works	CR374
	Riparian fencing proposed on LHB bank	CR270 –CR274
	Assess if fish passage may be impeded by channel modification after flooding	CR401 –CR402
	Assess fish passage at damaged weir	CR414
	Assess fish passage at damaged weirs and generally through Swan Park	CR420–CR435

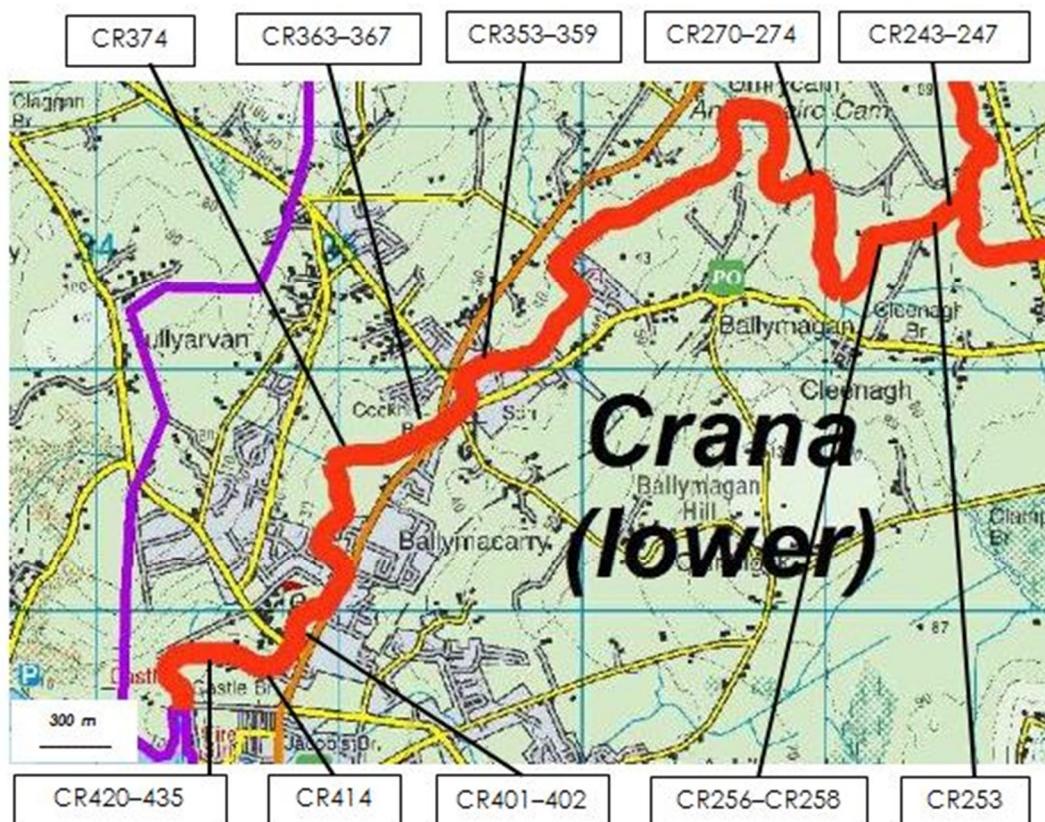


Figure 10 Crana (lower) showing key features identified in the aerial survey.



Figure 11 Structural damage in Swan Park area of Buncrana Town.



Figure 12 Earthen levee along channel at GAA pitch (CR353–CR359).

4.3 Evishbreedy

The Evishbreedy (Owennasop) system was heavily-modified in the early 1990s with the installation of the Fullerton Dam and associated impoundment in its lower reaches. Above this, a high gradient upland system is present which flows through sheep-grazed moorland. The channel substrate is dominated by bedrock and boulders interspersed with gravels (Table 2). The RHB is extensively fenced with some

refencing required since the flooding event. Preliminary results from the CWEF indicate that this stretch contains reasonable stocks of brown trout but salmon appear to be absent presumably as a consequence of the damming of the original channel. No physical fisheries enhancement measures are likely to result in improvements in the carrying capacity of fish stocks in this tributary (Table 6).

Table 6 Evisbreedy: notable features identified and recommended measures.

Measures	Observations	Image Reference
Measures implemented by landowners in response to the flooding	Minor refencing of riparian zone	Refer to interactive map
Recommended measures	No physical fisheries enhancement measures are likely to facilitate improvements in the carrying capacity of fish stocks in this tributary.	

4.4 Glashagh

The Glashagh tributary transitions from a typical upland high gradient system dominated by bedrock and boulders interspersed with some cobbles, gravel and sand to a low gradient system in its lower reaches with a predominant boulder-coble mix interspersed with gravels (Table 2). The upper portion is fenced along its LHB and is principally sheep-grazed moorland while the lower portion is agricultural. In the lower reaches, locally-sourced boulder rock armour has been installed along some of the channel margin (Figure 13; Figure 14) and also in the vicinity of the road bridge (Figure 13; Figure 15). The physical habitat of the river channel is considered adequate to support healthy salmonid stocks and preliminary results from the CWEF indicate that reasonable numbers of juvenile salmon (in lower portion) and trout are present here. No physical fisheries enhancement measures are likely to facilitate improvements in the carrying capacity of fish stocks in this tributary (Table 7).

Table 7 Glashagh: notable features identified and recommended measures.

Measures	Observations	Image Reference
Measures implemented by landowners in response to the flooding	Boulder rock armour installed in the lower portion of the Glashagh	GL21
	Bank reinforcement works	GL29
Recommended measures	No physical fisheries enhancement measures are likely to facilitate improvements in the carrying capacity of fish stocks in this tributary.	

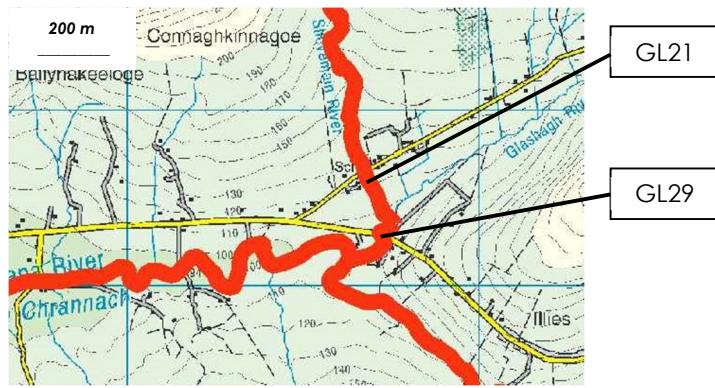


Figure 13 Glashagh showing key features identified in the aerial survey.



Figure 14 Boulder rock armour installed in the lower portion of the Glashagh (at GL21).



Figure 15 Rock armour installed at bridge in lower portion of the Glashagh (GL29).

4.5 Camowen

The Camowen is a typical upland high to moderate gradient system dominated by bedrock and boulders interspersed with some cobbles, gravel and sand. The channel principally flows through sheep-grazed moorland with some farmland present in its lower reaches (Table 2). The RHB is extensively fenced. A likely impediment to migrating salmonids is present c. 200m upstream of the Twin Sisters bridge (Figure 16; Figure 17; CM44). Further assessment of a possible impediment to fish passage here (using SNIFFER or equivalent approach) is recommended (Table 8). Although the Camowen experienced significant flooding in August 2017, no notable impacts to the channel were observed during the aerial survey. No physical fisheries enhancement measures are likely to be beneficial to salmonid fish stocks in this river segment with the exception of improving fish passage if required.

Table 8 Camowen: notable features identified and recommended measures.

Measures	Observations	Image Reference
Measures implemented by landowners in response to the flooding	None observed	
Recommended measures	Assess fish passage	CM44

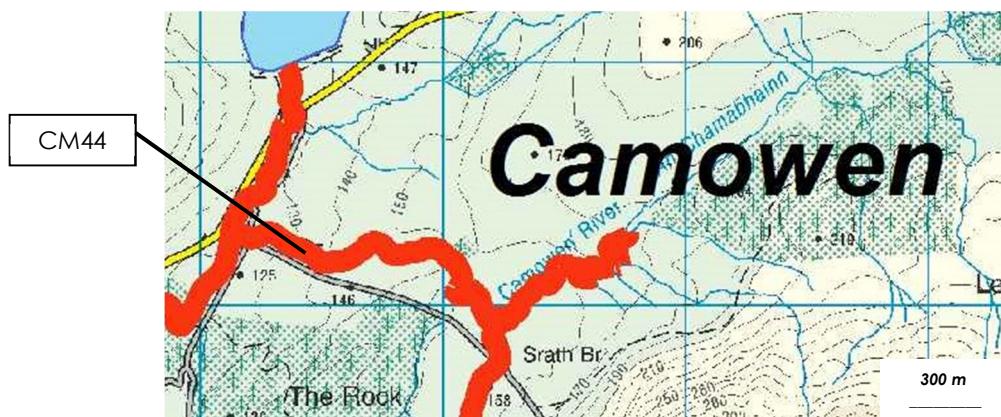


Figure 16 Camowen showing key features identified in the aerial survey.



Figure 17 Potential fish passage impediment on Camowen (CM44).

4.6 Meenatomish

The upper Meenatomish is a typical high gradient upland system dominated by bedrock and boulders interspersed with some cobbles, gravel and sand. In its lower portion, it flows through farmland remediated after the flood and sheep-grazed moorland over a boulder-cobble mix with some gravel and sands present (Table 2). Although this tributary experienced significant flooding impacts in August 2017, no notable impacts to the lower portion of the river channel were observed during the aerial survey (Figure 18). However, some bank subsidence is evident further upstream (MT1–MT 4; Figure 19) and downstream of the farm buildings the RHB has been reinforced with natural boulder rock armour and re-fenced (MT15–MT22; Figure 20). The channel is physically in a good state to support salmonid stocks. Thus, no such fisheries restoration measures are likely to be beneficial. As the Meenatomish is a tributary of the Camowen, the potential fish passage impediment on the latter (CM44; Figure 17) will also be relevant to this sub-system (Table 9).

Table 9 Meenatomish: notable features identified and recommended measures.

Measures	Observations	Image Reference
Measures implemented by landowners in response to the flooding	Boulder rock armour installed and refencing on RHB and farmland remediated	MT15–MT22
Recommended measures	No physical fisheries enhancement measures are likely to facilitate improvements in the carrying capacity of fish stocks but assessment of fish passage at impediment in the lower Camowen is recommended.	



Figure 18 Meenatomish showing key features identified in the aerial survey.



Figure 19 Bank subsidence in upper portion of Meenatomish surveyed (MT1–MT4).



Figure 20 Bank reinforcement works along RHB of lower portion of Meenatomish (MT15–MT22).

4.7 Owenboy

The section of the Owenboy surveyed is a low gradient system flowing principally through agricultural pasture grazed by sheep with some areas of rough uncultivated land present. The channel has extensive stretches with a mature and stable riparian zone lined with trees and other vegetation. The channel substrate is principally comprised of cobble interspersed with boulder and gravel and there is generally good instream aquatic plant cover. There are no obvious signs of flood-impact or bank degradation (Table 2) although farmland and associated property were reportedly heavily-impacted by the flood. The physical character of the habitat is considered adequate to support salmonid stocks. The channel would benefit from fencing to facilitate the establishment of mature riparian vegetation and better protect the river from livestock ingress in areas where this is currently absent (Table 10; Figure 21).

Table 10 Owenboy: notable features identified and recommended measures.

Measures	Observations	Image reference
Measures implemented by landowners in response to the flooding	Not apparent from the aerial survey.	OB
Recommended measures	Riparian fencing proposed on LHB bank where this is not already installed	OB12–OB16 OB43–OB49 OB71–OB96 OB117–OB124 OB130–OB143

		OB150–OB168 OB169–OB182
	Riparian fencing proposed on RHB bank where this is not already installed	OB35–OB41 OB60 OB71 OB177–OB186

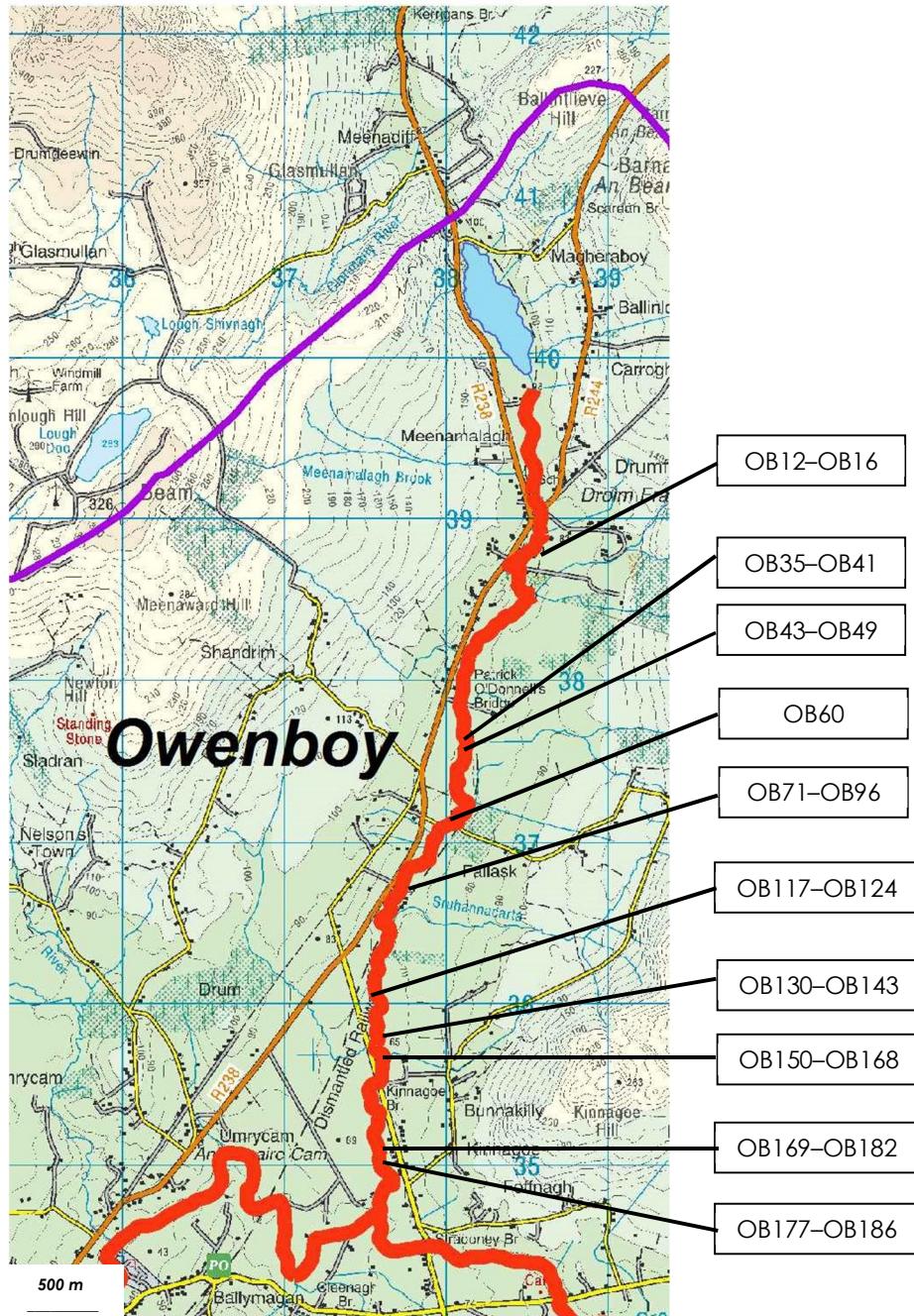


Figure 21 Owenboy showing key features identified in aerial survey.

4.8 Fish stock assessment

Extensive sampling was carried out with a primary focus on juvenile salmon distribution and abundance (CWEF – 5 min sampling), but also accounting for all other species (10-min sampling). Summary preliminary data are presented here (Figure 22, Figure 23 and Figure 24) for salmon and a full report will present a detailed and more considered analysis in due course.

The catchment-wide electrofishing (5-min sampling) results for 2018 (Figure 22) show that salmon fry distribution was confined to the Crana main channel and the Owenboy River. None were recorded in the upper reaches of the main channel (downstream of the Pollan Dam) or in the smaller tributaries (Camowen, Evishbreedy, upper Owenboy or Cashelnacor). Fry abundance (no. fry/5 min) was very satisfactory at sites where salmon fry occurred. The results emphasised the importance of the Crana main channel for salmon fry production.

A comparison with CWEF data from 2009 (Figure 23) shows that salmon fry distribution is similar in 2018. The exception is the Camowen River where no fry were recorded in 2018. Salmon fry abundance is similar at sites where fry recorded.

Salmon parr distribution based CWEF_{10} electrofishing (Figure 24) shows that their distribution is similar to that of salmon fry with parr being recorded in the main channel and the Owenboy. However, parr were also recorded in the Camowen and downstream of the Pollan Dam. Good abundance was recorded in the main channel.

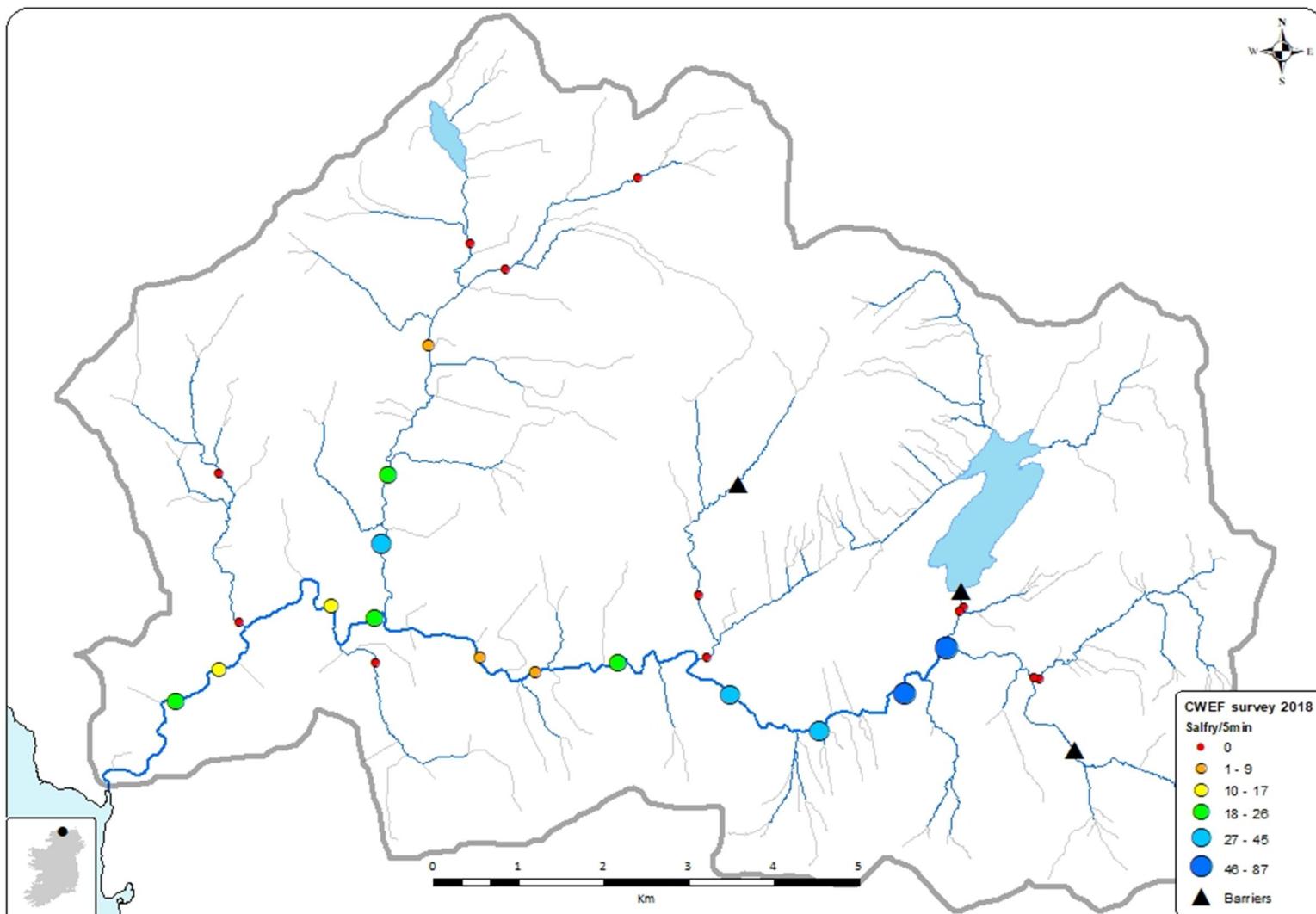


Figure 22 Salmon fry CWEF (no. fry/5-min) in August 2018.

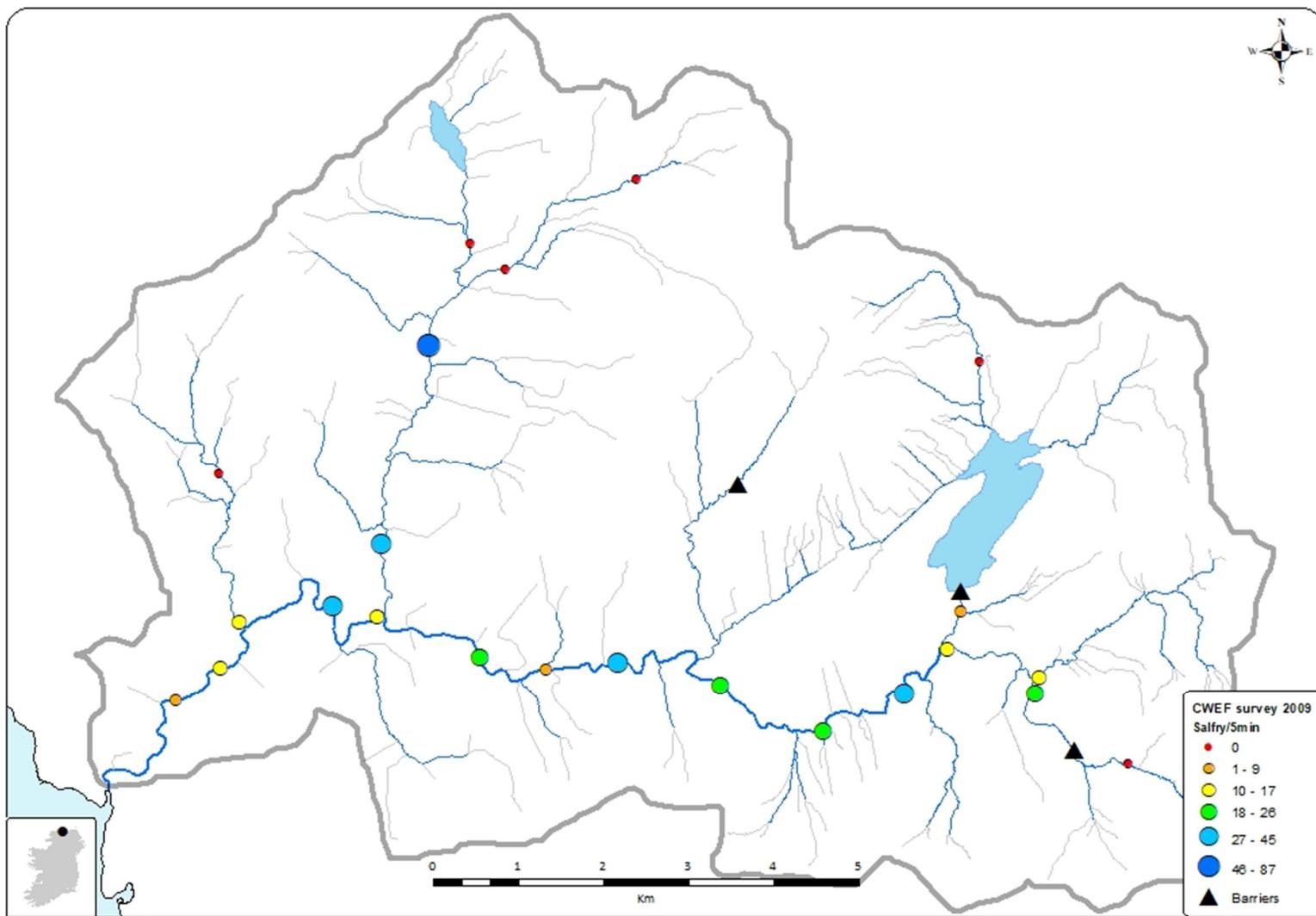


Figure 23 Salmon fry CWEF (no. fry/5-min) in 2009.

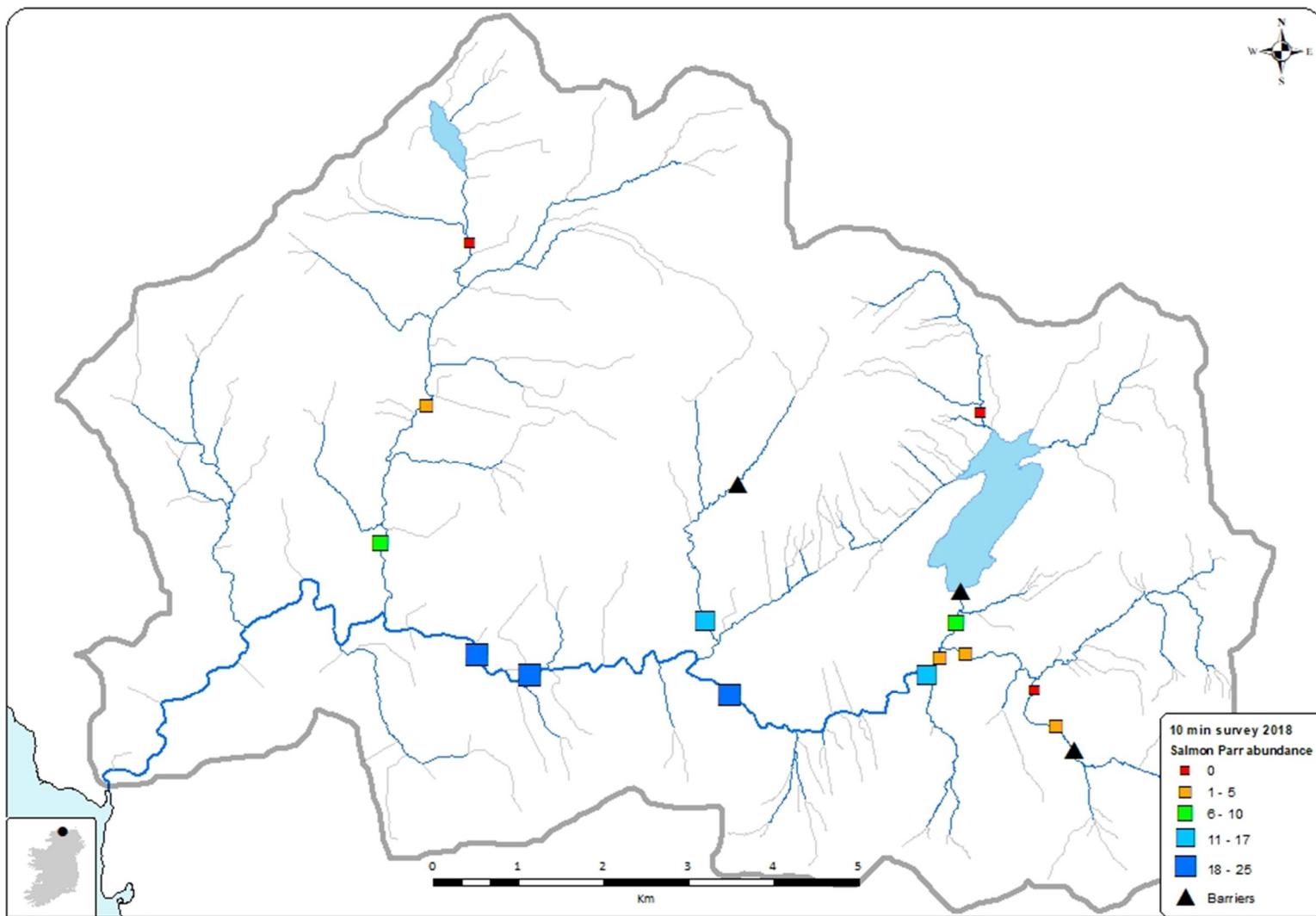


Figure 24 Salmon parr CWEF (no. fry/10-min) in August 2018.

5 Conclusions and recommendations

Previous fish stock assessments carried out in the 1990s by IFI found that the Crana River was a highly productive salmonid spawning and nursery system which supported a productive salmon fishery. One of the main aims of the current study was to establish a post-flooding baseline as a basis for ongoing assessment of whether the salmonid habitat or the salmonid production function of the Crana was impaired or not. This study also serves to provide a framework to parameterise any fisheries function restoration works that might be required.

Although the severe flooding in August 2017 impacted on local communities, property and farmland as well as Crana river system, the aerial survey shows the river system to be in a relatively good physical state capable of supporting healthy stocks of salmon and trout. The extensive tracts of riparian cover along the river corridor post-flood, as evidenced from the drone survey, comprising mature and semi-mature deciduous trees and shrubbery along the main channel and the Owenboy, serve to stabilise the river banks, limit the potential for excessive erosion and provide cover and shade for fish. Preliminary results from the catchment-wide electrofishing assessment indicate that there is a good level of juvenile salmonid production in most sections of the Crana system. The presence of fry of both species indicate that adult salmon and trout spawned successfully in the catchment in winter 2017. The presence of parr of both species indicate that fry and parr, which would have been resident during the flooding event, survived and remain extant. Salmon fry abundance was very satisfactory but further detailed analyses are required and this will be undertaken and reported in due course. Other fish species status will be reported also. Based on this preliminary analysis the Crana production function has not been severely disrupted and it retains significant fish production capacity. Comparisons of fish abundance with previous data are required to provide more precise analysis at channel unit level.

To provide more detailed reach assessments, to assess the departure of hydromorphological features from 'naturalness' and to allow for the assignment of a morphological classification directly related to WFD status i.e. High, Good, Moderate, Poor or Bad, RHAT surveys (NIEA, 2009) may be warranted. The River Hydromorphology Assessment Technique tool is widely used in the UK and also in Ireland in the context of WFD hydromorphological status assignment.

In relation to specifications for restoration works, it is considered prudent to split this potentially broad scope of activity into two discrete areas: (a) instream/channel works and (b) riparian zone works:

Instream works – the fish stock survey suggest that the Crana is currently producing salmon and trout juveniles throughout its extent. Distribution and abundance data compare favorably with previous data. The Crana is a high gradient catchment, with good levels of gravel recruitment, and given its relative stability in terms of fish production, no substantive instream works seem to be warranted. Imposing new channel forms without addressing any processes that drive channel form, including system evolution and the wider watershed is inconsistent with basic geomorphological principles (Kondolf, 1995). In that regard attempting to ‘stabilise’ a natural channel by undertaking instream works is not desirable or warranted in this case. On that basis the system should be allowed to repair itself by the natural processes of river evolution. Instream works should be confined to addressing potential fish barrier issues identified in the report. SNIFFER or equivalent barrier assessments are recommended.

It is recommended that further annual monitoring of juvenile salmonids in the Crana should be undertaken over the next two years to provide additional confidence that a natural rehabilitation approach is most appropriate to maintain healthy stocks. Comparisons of substrate composition at various sites, particularly spawning areas, with similar data from the 1990s are also likely to be informative.

Riparian zone works – a programme to stabilise existing repaired banks using natural or assisted recolonisation techniques may be warranted to prevent sloughing of banks or erosion of soils. Planting of willow slips is a recognised stabilisation technique and should be considered. Extensive fencing of all repaired banks will assist the natural recolonisation process. In addition, the installation of fencing where currently absent may reduce the potential for livestock ingress and thus promote better long-term bank stability. It is recommended that potential capital support mechanisms for riparian landowners to fund such fencing works should be identified.

It is unclear from the aerial survey whether there is a now much lower presence of instream aquatic vegetation since the flooding event. However, if ground surveys show that this is the case, the natural re-establishment of such habitat (e.g aquatic moss dominated) in suitable river sections may also benefit fish stocks. Transferring

moss-covered boulders to sites bereft of such cover may be a useful remedial action and monitoring the success of such an action would be informative.

Although much remedial works have already been undertaken by landowners to address flood damage, awareness of invasive species biosecurity should be promoted amongst such stakeholders to reduce the potential for spread of invasive species. Japanese knotweed and Himalayan balsam are present in localised areas of the Crana catchment. Both would present potentially significant issues for the riparian zone, if they become established, in terms of competition with native riparian species and consequent impacts arising from such change. Stringent measures to control this potential degradation of riparian habitat need to be put in place.

6 References

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7 Acknowledgements

Sincere thanks to the staff of IFI based in Letterkenny for their guidance during the aerial survey work.

8 Appendices

8.1 Appendix 1: R code to generate interactive map of images

```
#R code to put lots of geolocated drone photos into a map which can be viewed from an
#offline web browser and markers can be clicked on to call up photos from each location.
#all photos are in a local folder called "Master" and coded by river and number sequence shot
#(e.g. CM1.JPG = Camowen River 1)
#to transfer via usb between computers I also made a version in a folder called "Master"
#which should be saved directly in the C: drive to use the interactive map offline.

#set working directory
setwd("C:\\ Master")

#Package exifr reads the lat long data from the JPG taken by the drone (must install Perl to
#use this R package; link to install Perl is: https://www.activestate.com/activeperl/downloads)

#install.packages("exifr")

library("exifr")

#read in files and name resulting dataframe cranaimagelist
cranaimagelist <- read_exif("C:/ Master", tags=c("filename", "GPS Latitude", "GPS Longitude" ),
recursive = TRUE, args = NULL,
quiet = TRUE)

#use "dplyr" to clean up dataframe headers and prepare the table with the list of images
#install.packages("dplyr")
library("dplyr")

#add a new column with river name based on site code shorthand code used in the Master
# folder (if desired)
cranaimagelist<-cranaimagelist %>% mutate(River = case_when (
  grepl("CR", FileName) ~ "Crana (main channel)",
  grepl("CM", FileName) ~ "Camowen",
  grepl("OB", FileName) ~ "Owenboy",
  grepl("GL", FileName) ~ "Glashagh",
  grepl("EB", FileName) ~ "Evishbreedy",
  grepl("MT", FileName) ~ "Meenatomish"))

#rename column headers if desired
names(cranaimagelist)[names(cranaimagelist) == 'GPSLatitude'] <- 'Latitude'
names(cranaimagelist)[names(cranaimagelist) == 'GPSLongitude'] <- 'Longitude'
names(cranaimagelist)[names(cranaimagelist) == 'SourceFile'] <- 'File source'
names(cranaimagelist)[names(cranaimagelist) == 'FileName'] <- 'File name'

#checking all is in order with dataframe
print(cranaimagelist)

#reorder columns
cranaimagelist<-cranaimagelist[,c("River", "File name", "Latitude", "Longitude", "File source")]
```

```

#order rows by site and then ascending number
cranaimagelist<-cranaimagelist[!grepl("map", cranaimagelist$`File source`),]
cranaimagelist$order = cranaimagelist$`File source`  

cranaimagelist$order<-gsub("[^0-9]", "", cranaimagelist$order)
cranaimagelist$order <- as.numeric(as.character(cranaimagelist$order))
cranaimagelist<-cranaimagelist[order(cranaimagelist$River, cranaimagelist$order),]
cranaimagelist$order <- NULL

# write csv file (can be used as a basis for a table in report appendix
write.csv(cranaimagelist, file = "Crana image list.csv", row.names = F)

#check that latitude and longitude coordinates look OK
plot(cranaimagelist$Longitude, cranaimagelist$Latitude)
#to make interactive map use the leaflet package

#make file path link to respective jpeg photo in local drive folder
# 1. Copy column and call column link (could use file source column also)
cranaimagelist$link = cranaimagelist$`File source`  
  

#2. Prefix with file:///%s
cranaimagelist <- transform(cranaimagelist, link = sprintf('file:///%s', link))

#3. make file path to call up each image into a clickable html
cranaimagelist$link <- paste0("<a href='",cranaimagelist$link,"'",cranaimagelist$link,"</a>")  

cranaimagelist

#create map using Leaflet
#install.packages("leaflet")
library("leaflet")

mapout <- leaflet(cranaimagelist) %>%
  addProviderTiles("Esri.WorldImagery") %>%
  setView(lng = -7.4, lat = 55.17, zoom = 13) %>%
  addMarkers(lng = cranaimagelist$Longitude, lat = cranaimagelist$Latitude, label =
cranaimagelist$File.name,
  popup=paste("River:", cranaimagelist$River, "<br>",
  "Site code:", cranaimagelist$File.name, "<br>",
  "Latitude:", cranaimagelist$Latitude, "<br>",
  "Longitude:", cranaimagelist$Longitude,"<br>",
  "Image link:", cranaimagelist$link, "<br>"))
options = markerOptions(opacity = 0.9, draggable=T)

#print map in R viewer
mapout

#save map as web page and name it "A1 Crana drone survey map" so it appears as one of the
#first files in the Master folder
library(htmlwidgets)
saveWidget(mapout, file="A1 Crana drone survey map.html")

#web page will have clickable html link in popup to call up images when marker is clicked on
map

```

8.2 Appendix 2: List of validated geo-referenced image files

River	File name	Latitude	Longitude	File source
Camowen	CM1.JPG	55.1514755	-7.289765361	C:/Master/CM1.JPG
Camowen	CM2.JPG	55.15150672	-7.289734667	C:/Master/CM2.JPG
Camowen	CM3.JPG	55.15143106	-7.289923111	C:/Master/CM3.JPG
Camowen	CM4.JPG	55.15105364	-7.290002417	C:/Master/CM4.JPG
Camowen	CM5.JPG	55.15076011	-7.290399667	C:/Master/CM5.JPG
Camowen	CM6.JPG	55.15062042	-7.290676167	C:/Master/CM6.JPG
Camowen	CM7.JPG	55.15057597	-7.291894639	C:/Master/CM7.JPG
Camowen	CM8.JPG	55.15104156	-7.292148583	C:/Master/CM8.JPG
Camowen	CM9.JPG	55.15133117	-7.292572028	C:/Master/CM9.JPG
Camowen	CM10.JPG	55.15295017	-7.294255139	C:/Master/CM10.JPG
Camowen	CM11.JPG	55.15334078	-7.294653611	C:/Master/CM11.JPG
Camowen	CM12.JPG	55.15347728	-7.295127417	C:/Master/CM12.JPG
Camowen	CM13.JPG	55.15340094	-7.295943139	C:/Master/CM13.JPG
Camowen	CM14.JPG	55.15352667	-7.296450194	C:/Master/CM14.JPG
Camowen	CM15.JPG	55.15332486	-7.296607111	C:/Master/CM15.JPG
Camowen	CM16.JPG	55.15309692	-7.297168056	C:/Master/CM16.JPG
Camowen	CM17.JPG	55.15307431	-7.297760583	C:/Master/CM17.JPG
Camowen	CM18.JPG	55.15302281	-7.298272806	C:/Master/CM18.JPG
Camowen	CM19.JPG	55.15295786	-7.298810583	C:/Master/CM19.JPG
Camowen	CM20.JPG	55.15327664	-7.299215083	C:/Master/CM20.JPG
Camowen	CM21.JPG	55.15353078	-7.299600972	C:/Master/CM21.JPG
Camowen	CM22.JPG	55.15370356	-7.299830722	C:/Master/CM22.JPG
Camowen	CM23.JPG	55.15382333	-7.300396583	C:/Master/CM23.JPG
Camowen	CM24.JPG	55.15373764	-7.299293528	C:/Master/CM24.JPG
Camowen	CM25.JPG	55.15384481	-7.299702222	C:/Master/CM25.JPG
Camowen	CM26.JPG	55.15362753	-7.300127333	C:/Master/CM26.JPG
Camowen	CM27.JPG	55.15321978	-7.300487333	C:/Master/CM27.JPG
Camowen	CM28.JPG	55.15299911	-7.301035778	C:/Master/CM28.JPG
Camowen	CM29.JPG	55.15280208	-7.30156425	C:/Master/CM29.JPG
Camowen	CM30.JPG	55.15259192	-7.302144444	C:/Master/CM30.JPG
Camowen	CM31.JPG	55.15247253	-7.302800611	C:/Master/CM31.JPG
Camowen	CM32.JPG	55.15248558	-7.303013167	C:/Master/CM32.JPG
Camowen	CM33.JPG	55.15282758	-7.301490861	C:/Master/CM33.JPG
Camowen	CM34.JPG	55.15252911	-7.302303306	C:/Master/CM34.JPG
Camowen	CM35.JPG	55.15230122	-7.303195472	C:/Master/CM35.JPG
Camowen	CM36.JPG	55.15232203	-7.303803472	C:/Master/CM36.JPG
Camowen	CM37.JPG	55.15247375	-7.304516944	C:/Master/CM37.JPG
Camowen	CM38.JPG	55.15338244	-7.3049945	C:/Master/CM38.JPG
Camowen	CM39.JPG	55.15355686	-7.305533583	C:/Master/CM39.JPG
Camowen	CM40.JPG	55.15372917	-7.306201306	C:/Master/CM40.JPG
Camowen	CM41.JPG	55.15383875	-7.306618222	C:/Master/CM41.JPG
Camowen	CM42.JPG	55.15415547	-7.307209028	C:/Master/CM42.JPG
Camowen	CM43.JPG	55.15426186	-7.307807333	C:/Master/CM43.JPG
Camowen	CM44.JPG	55.15412314	-7.308169639	C:/Master/CM44.JPG
Camowen	CM45.JPG	55.15415142	-7.308693472	C:/Master/CM45.JPG
Camowen	CM46.JPG	55.15427189	-7.309227194	C:/Master/CM46.JPG
Camowen	CM47.JPG	55.15446017	-7.309887667	C:/Master/CM47.JPG
Camowen	CM48.JPG	55.15347975	-7.309240417	C:/Master/CM48.JPG
Crana (main channel)	CR1.JPG	55.15454456	-7.307973139	C:/Master/CR1.JPG
Crana (main channel)	CR2.JPG	55.15396181	-7.3080885	C:/Master/CR2.JPG
Crana (main channel)	CR3.JPG	55.15355364	-7.308336361	C:/Master/CR3.JPG
Crana (main channel)	CR4.JPG	55.15283369	-7.309509806	C:/Master/CR4.JPG

River	File name	Latitude	Longitude	File source
Crana (main channel)	CR5.JPG	55.15192525	-7.310502222	C:/Master/CR5.JPG
Crana (main channel)	CR6.JPG	55.15152311	-7.310790889	C:/Master/CR6.JPG
Crana (main channel)	CR7.JPG	55.15088642	-7.311802111	C:/Master/CR7.JPG
Crana (main channel)	CR8.JPG	55.15112219	-7.312349833	C:/Master/CR8.JPG
Crana (main channel)	CR9.JPG	55.15131603	-7.312861444	C:/Master/CR9.JPG
Crana (main channel)	CR10.JPG	55.15126081	-7.313377167	C:/Master/CR10.JPG
Crana (main channel)	CR11.JPG	55.15119489	-7.313854806	C:/Master/CR11.JPG
Crana (main channel)	CR12.JPG	55.15107669	-7.314931583	C:/Master/CR12.JPG
Crana (main channel)	CR13.JPG	55.15079589	-7.315046694	C:/Master/CR13.JPG
Crana (main channel)	CR14.JPG	55.15038778	-7.314967167	C:/Master/CR14.JPG
Crana (main channel)	CR15.JPG	55.15006681	-7.314839083	C:/Master/CR15.JPG
Crana (main channel)	CR16.JPG	55.14988753	-7.314730639	C:/Master/CR16.JPG
Crana (main channel)	CR17.JPG	55.14967719	-7.314682417	C:/Master/CR17.JPG
Crana (main channel)	CR18.JPG	55.14950253	-7.314852306	C:/Master/CR18.JPG
Crana (main channel)	CR19.JPG	55.14917958	-7.314649667	C:/Master/CR19.JPG
Crana (main channel)	CR20.JPG	55.14909389	-7.315109722	C:/Master/CR20.JPG
Crana (main channel)	CR21.JPG	55.14917903	-7.315512472	C:/Master/CR21.JPG
Crana (main channel)	CR22.JPG	55.14915164	-7.316008889	C:/Master/CR22.JPG
Crana (main channel)	CR23.JPG	55.14923675	-7.316513944	C:/Master/CR23.JPG
Crana (main channel)	CR24.JPG	55.14945464	-7.316947056	C:/Master/CR24.JPG
Crana (main channel)	CR25.JPG	55.14930631	-7.317377194	C:/Master/CR25.JPG
Crana (main channel)	CR26.JPG	55.14907875	-7.3177585	C:/Master/CR26.JPG
Crana (main channel)	CR27.JPG	55.14909222	-7.318248833	C:/Master/CR27.JPG
Crana (main channel)	CR28.JPG	55.14869611	-7.318108417	C:/Master/CR28.JPG
Crana (main channel)	CR29.JPG	55.1484415	-7.318227917	C:/Master/CR29.JPG
Crana (main channel)	CR30.JPG	55.147714	-7.318626111	C:/Master/CR30.JPG
Crana (main channel)	CR31.JPG	55.14738972	-7.318591472	C:/Master/CR31.JPG
Crana (main channel)	CR32.JPG	55.14716531	-7.318518889	C:/Master/CR32.JPG
Crana (main channel)	CR33.JPG	55.146891	-7.319119083	C:/Master/CR33.JPG
Crana (main channel)	CR34.JPG	55.14688694	-7.319593333	C:/Master/CR34.JPG
Crana (main channel)	CR35.JPG	55.14683553	-7.320156083	C:/Master/CR35.JPG
Crana (main channel)	CR36.JPG	55.14702328	-7.320488778	C:/Master/CR36.JPG
Crana (main channel)	CR37.JPG	55.14702556	-7.321087639	C:/Master/CR37.JPG
Crana (main channel)	CR38.JPG	55.14703092	-7.321648611	C:/Master/CR38.JPG
Crana (main channel)	CR39.JPG	55.14758772	-7.321425639	C:/Master/CR39.JPG
Crana (main channel)	CR40.JPG	55.14740633	-7.322261389	C:/Master/CR40.JPG
Crana (main channel)	CR41.JPG	55.14691361	-7.322860806	C:/Master/CR41.JPG
Crana (main channel)	CR42.JPG	55.146592	-7.323460722	C:/Master/CR42.JPG
Crana (main channel)	CR43.JPG	55.14678444	-7.324016611	C:/Master/CR43.JPG
Crana (main channel)	CR44.JPG	55.14689133	-7.324959028	C:/Master/CR44.JPG
Crana (main channel)	CR45.JPG	55.14707067	-7.3256685	C:/Master/CR45.JPG
Crana (main channel)	CR46.JPG	55.14715192	-7.326457444	C:/Master/CR46.JPG
Crana (main channel)	CR47.JPG	55.14701039	-7.327087222	C:/Master/CR47.JPG
Crana (main channel)	CR48.JPG	55.14697453	-7.327848472	C:/Master/CR48.JPG
Crana (main channel)	CR49.JPG	55.14695422	-7.328508	C:/Master/CR49.JPG
Crana (main channel)	CR50.JPG	55.14695289	-7.328508639	C:/Master/CR50.JPG
Crana (main channel)	CR51.JPG	55.14679639	-7.328959167	C:/Master/CR51.JPG
Crana (main channel)	CR52.JPG	55.14643394	-7.329829111	C:/Master/CR52.JPG
Crana (main channel)	CR53.JPG	55.14604594	-7.329771111	C:/Master/CR53.JPG
Crana (main channel)	CR54.JPG	55.14559869	-7.330002194	C:/Master/CR54.JPG
Crana (main channel)	CR55.JPG	55.14536892	-7.330184722	C:/Master/CR55.JPG
Crana (main channel)	CR56.JPG	55.14511575	-7.330883833	C:/Master/CR56.JPG
Crana (main channel)	CR57.JPG	55.14494083	-7.331655722	C:/Master/CR57.JPG
Crana (main channel)	CR58.JPG	55.14499878	-7.332094556	C:/Master/CR58.JPG
Crana (main channel)	CR59.JPG	55.145085	-7.332585222	C:/Master/CR59.JPG

River	File name	Latitude	Longitude	File source
Crana (main channel)	CR60.JPG	55.14517883	-7.333220972	C:/Master/CR60.JPG
Crana (main channel)	CR61.JPG	55.145065	-7.333636583	C:/Master/CR61.JPG
Crana (main channel)	CR62.JPG	55.14507797	-7.333717861	C:/Master/CR62.JPG
Crana (main channel)	CR63.JPG	55.14516569	-7.334362	C:/Master/CR63.JPG
Crana (main channel)	CR64.JPG	55.14521544	-7.334859639	C:/Master/CR64.JPG
Crana (main channel)	CR65.JPG	55.14516742	-7.335316667	C:/Master/CR65.JPG
Crana (main channel)	CR66.JPG	55.14516903	-7.335318222	C:/Master/CR66.JPG
Crana (main channel)	CR67.JPG	55.14500939	-7.335435417	C:/Master/CR67.JPG
Crana (main channel)	CR68.JPG	55.14532869	-7.335898722	C:/Master/CR68.JPG
Crana (main channel)	CR69.JPG	55.14561833	-7.336157528	C:/Master/CR69.JPG
Crana (main channel)	CR70.JPG	55.14552914	-7.336572306	C:/Master/CR70.JPG
Crana (main channel)	CR71.JPG	55.14544517	-7.337006528	C:/Master/CR71.JPG
Crana (main channel)	CR72.JPG	55.14545219	-7.337341333	C:/Master/CR72.JPG
Crana (main channel)	CR73.JPG	55.14551967	-7.337750028	C:/Master/CR73.JPG
Crana (main channel)	CR74.JPG	55.14615436	-7.338367611	C:/Master/CR74.JPG
Crana (main channel)	CR75.JPG	55.14603836	-7.339325611	C:/Master/CR75.JPG
Crana (main channel)	CR76.JPG	55.14599822	-7.340145833	C:/Master/CR76.JPG
Crana (main channel)	CR77.JPG	55.14574664	-7.340779556	C:/Master/CR77.JPG
Crana (main channel)	CR78.JPG	55.14534531	-7.341113333	C:/Master/CR78.JPG
Crana (main channel)	CR79.JPG	55.14531442	-7.341837778	C:/Master/CR79.JPG
Crana (main channel)	CR80.JPG	55.14577794	-7.342034083	C:/Master/CR80.JPG
Crana (main channel)	CR81.JPG	55.14629414	-7.342537944	C:/Master/CR81.JPG
Crana (main channel)	CR82.JPG	55.14669553	-7.342841889	C:/Master/CR82.JPG
Crana (main channel)	CR83.JPG	55.14681828	-7.343186611	C:/Master/CR83.JPG
Crana (main channel)	CR84.JPG	55.14708786	-7.343728583	C:/Master/CR84.JPG
Crana (main channel)	CR85.JPG	55.14754072	-7.344273333	C:/Master/CR85.JPG
Crana (main channel)	CR86.JPG	55.14793244	-7.344698389	C:/Master/CR86.JPG
Crana (main channel)	CR87.JPG	55.14811242	-7.345363694	C:/Master/CR87.JPG
Crana (main channel)	CR88.JPG	55.14835756	-7.346221278	C:/Master/CR88.JPG
Crana (main channel)	CR89.JPG	55.14857825	-7.346894806	C:/Master/CR89.JPG
Crana (main channel)	CR90.JPG	55.14893722	-7.347274444	C:/Master/CR90.JPG
Crana (main channel)	CR91.JPG	55.14944836	-7.347663306	C:/Master/CR91.JPG
Crana (main channel)	CR92.JPG	55.14987522	-7.348727361	C:/Master/CR92.JPG
Crana (main channel)	CR93.JPG	55.15003228	-7.349070611	C:/Master/CR93.JPG
Crana (main channel)	CR94.JPG	55.15042733	-7.349932028	C:/Master/CR94.JPG
Crana (main channel)	CR95.JPG	55.15066667	-7.350110528	C:/Master/CR95.JPG
Crana (main channel)	CR96.JPG	55.15075719	-7.350879917	C:/Master/CR96.JPG
Crana (main channel)	CR97.JPG	55.15058456	-7.352019972	C:/Master/CR97.JPG
Crana (main channel)	CR98.JPG	55.15082608	-7.352915528	C:/Master/CR98.JPG
Crana (main channel)	CR99.JPG	55.15104886	-7.353610194	C:/Master/CR99.JPG
Crana (main channel)	CR100.JPG	55.15120639	-7.354287472	C:/Master/CR100.JPG
Crana (main channel)	CR101.JPG	55.15124111	-7.355092972	C:/Master/CR101.JPG
Crana (main channel)	CR102.JPG	55.15160406	-7.355566167	C:/Master/CR102.JPG
Crana (main channel)	CR103.JPG	55.15202917	-7.355528528	C:/Master/CR103.JPG
Crana (main channel)	CR104.JPG	55.15195072	-7.354930611	C:/Master/CR104.JPG
Crana (main channel)	CR105.JPG	55.15233439	-7.35432775	C:/Master/CR105.JPG
Crana (main channel)	CR106.JPG	55.15259956	-7.353418611	C:/Master/CR106.JPG
Crana (main channel)	CR107.JPG	55.15299328	-7.35357675	C:/Master/CR107.JPG
Crana (main channel)	CR108.JPG	55.15323964	-7.353721833	C:/Master/CR108.JPG
Crana (main channel)	CR109.JPG	55.15347083	-7.353772611	C:/Master/CR109.JPG
Crana (main channel)	CR110.JPG	55.15380008	-7.354242611	C:/Master/CR110.JPG
Crana (main channel)	CR111.JPG	55.15379844	-7.35424675	C:/Master/CR111.JPG
Crana (main channel)	CR112.JPG	55.15307336	-7.358092333	C:/Master/CR112.JPG
Crana (main channel)	CR113.JPG	55.15281464	-7.358464667	C:/Master/CR113.JPG
Crana (main channel)	CR114.JPG	55.15281508	-7.358805167	C:/Master/CR114.JPG

River	File name	Latitude	Longitude	File source
Crana (main channel)	CR115.JPG	55.15265897	-7.359412556	C:/Master/CR115.JPG
Crana (main channel)	CR116.JPG	55.15254358	-7.359738944	C:/Master/CR116.JPG
Crana (main channel)	CR117.JPG	55.15257158	-7.360057139	C:/Master/CR117.JPG
Crana (main channel)	CR118.JPG	55.15246025	-7.360491472	C:/Master/CR118.JPG
Crana (main channel)	CR119.JPG	55.15232964	-7.361034278	C:/Master/CR119.JPG
Crana (main channel)	CR120.JPG	55.15275967	-7.361524722	C:/Master/CR120.JPG
Crana (main channel)	CR121.JPG	55.15324125	-7.361274111	C:/Master/CR121.JPG
Crana (main channel)	CR122.JPG	55.15355322	-7.361518139	C:/Master/CR122.JPG
Crana (main channel)	CR123.JPG	55.15395978	-7.361195694	C:/Master/CR123.JPG
Crana (main channel)	CR124.JPG	55.15411719	-7.361588917	C:/Master/CR124.JPG
Crana (main channel)	CR125.JPG	55.15376883	-7.362602861	C:/Master/CR125.JPG
Crana (main channel)	CR126.JPG	55.15337439	-7.363080694	C:/Master/CR126.JPG
Crana (main channel)	CR127.JPG	55.15312622	-7.363605417	C:/Master/CR127.JPG
Crana (main channel)	CR128.JPG	55.152809	-7.363484722	C:/Master/CR128.JPG
Crana (main channel)	CR129.JPG	55.15291786	-7.364053806	C:/Master/CR129.JPG
Crana (main channel)	CR130.JPG	55.15244206	-7.363939167	C:/Master/CR130.JPG
Crana (main channel)	CR131.JPG	55.15196844	-7.363500667	C:/Master/CR131.JPG
Crana (main channel)	CR132.JPG	55.15154894	-7.363707694	C:/Master/CR132.JPG
Crana (main channel)	CR133.JPG	55.151119	-7.363823	C:/Master/CR133.JPG
Crana (main channel)	CR134.JPG	55.15089019	-7.363939944	C:/Master/CR134.JPG
Crana (main channel)	CR135.JPG	55.15089881	-7.364303806	C:/Master/CR135.JPG
Crana (main channel)	CR136.JPG	55.15095775	-7.365095917	C:/Master/CR136.JPG
Crana (main channel)	CR137.JPG	55.15164586	-7.366228722	C:/Master/CR137.JPG
Crana (main channel)	CR138.JPG	55.15270881	-7.366427167	C:/Master/CR138.JPG
Crana (main channel)	CR139.JPG	55.15298744	-7.366855444	C:/Master/CR139.JPG
Crana (main channel)	CR140.JPG	55.15326178	-7.367284528	C:/Master/CR140.JPG
Crana (main channel)	CR141.JPG	55.15367558	-7.36798275	C:/Master/CR141.JPG
Crana (main channel)	CR142.JPG	55.15247236	-7.368886167	C:/Master/CR142.JPG
Crana (main channel)	CR143.JPG	55.15214831	-7.369247306	C:/Master/CR143.JPG
Crana (main channel)	CR144.JPG	55.15183964	-7.369682472	C:/Master/CR144.JPG
Crana (main channel)	CR145.JPG	55.15171928	-7.370355472	C:/Master/CR145.JPG
Crana (main channel)	CR146.JPG	55.15217947	-7.371227889	C:/Master/CR146.JPG
Crana (main channel)	CR147.JPG	55.15243208	-7.371744278	C:/Master/CR147.JPG
Crana (main channel)	CR148.JPG	55.15214017	-7.3727455	C:/Master/CR148.JPG
Crana (main channel)	CR149.JPG	55.15142619	-7.3726805	C:/Master/CR149.JPG
Crana (main channel)	CR150.JPG	55.15118842	-7.373283278	C:/Master/CR150.JPG
Crana (main channel)	CR151.JPG	55.15159386	-7.372752472	C:/Master/CR151.JPG
Crana (main channel)	CR152.JPG	55.15207328	-7.373821278	C:/Master/CR152.JPG
Crana (main channel)	CR153.JPG	55.15260886	-7.373514333	C:/Master/CR153.JPG
Crana (main channel)	CR154.JPG	55.15300142	-7.37380625	C:/Master/CR154.JPG
Crana (main channel)	CR155.JPG	55.15265661	-7.374725833	C:/Master/CR155.JPG
Crana (main channel)	CR156.JPG	55.15252283	-7.375346028	C:/Master/CR156.JPG
Crana (main channel)	CR157.JPG	55.15252369	-7.37534725	C:/Master/CR157.JPG
Crana (main channel)	CR158.JPG	55.1526295	-7.373993722	C:/Master/CR158.JPG
Crana (main channel)	CR159.JPG	55.15228006	-7.374773583	C:/Master/CR159.JPG
Crana (main channel)	CR160.JPG	55.15198389	-7.375181778	C:/Master/CR160.JPG
Crana (main channel)	CR161.JPG	55.152041	-7.375669361	C:/Master/CR161.JPG
Crana (main channel)	CR162.JPG	55.15209136	-7.376171722	C:/Master/CR162.JPG
Crana (main channel)	CR163.JPG	55.15209256	-7.376719083	C:/Master/CR163.JPG
Crana (main channel)	CR164.JPG	55.15210014	-7.377337556	C:/Master/CR164.JPG
Crana (main channel)	CR165.JPG	55.15205414	-7.377820722	C:/Master/CR165.JPG
Crana (main channel)	CR166.JPG	55.15190647	-7.378398583	C:/Master/CR166.JPG
Crana (main channel)	CR167.JPG	55.15189975	-7.378882472	C:/Master/CR167.JPG
Crana (main channel)	CR168.JPG	55.15189797	-7.379644944	C:/Master/CR168.JPG
Crana (main channel)	CR169.JPG	55.15182506	-7.380233861	C:/Master/CR169.JPG

River	File name	Latitude	Longitude	File source
Crana (main channel)	CR170.JPG	55.15185092	-7.380511028	C:/Master/CR170.JPG
Crana (main channel)	CR171.JPG	55.15185103	-7.380802722	C:/Master/CR171.JPG
Crana (main channel)	CR172.JPG	55.15186986	-7.381005528	C:/Master/CR172.JPG
Crana (main channel)	CR173.JPG	55.15186814	-7.381423806	C:/Master/CR173.JPG
Crana (main channel)	CR174.JPG	55.15197422	-7.381841917	C:/Master/CR174.JPG
Crana (main channel)	CR175.JPG	55.15188483	-7.382278833	C:/Master/CR175.JPG
Crana (main channel)	CR176.JPG	55.15179186	-7.382660139	C:/Master/CR176.JPG
Crana (main channel)	CR177.JPG	55.15167425	-7.383511056	C:/Master/CR177.JPG
Crana (main channel)	CR178.JPG	55.15152028	-7.384323056	C:/Master/CR178.JPG
Crana (main channel)	CR179.JPG	55.15132872	-7.384775611	C:/Master/CR179.JPG
Crana (main channel)	CR180.JPG	55.15118514	-7.385112028	C:/Master/CR180.JPG
Crana (main channel)	CR181.JPG	55.15095331	-7.385368917	C:/Master/CR181.JPG
Crana (main channel)	CR182.JPG	55.15082103	-7.385949278	C:/Master/CR182.JPG
Crana (main channel)	CR183.JPG	55.15059836	-7.386692972	C:/Master/CR183.JPG
Crana (main channel)	CR184.JPG	55.150569	-7.387257833	C:/Master/CR184.JPG
Crana (main channel)	CR185.JPG	55.15077086	-7.387925583	C:/Master/CR185.JPG
Crana (main channel)	CR186.JPG	55.15106858	-7.388187833	C:/Master/CR186.JPG
Crana (main channel)	CR187.JPG	55.15126989	-7.388440306	C:/Master/CR187.JPG
Crana (main channel)	CR188.JPG	55.15146614	-7.388652306	C:/Master/CR188.JPG
Crana (main channel)	CR189.JPG	55.15179567	-7.392451472	C:/Master/CR189.JPG
Crana (main channel)	CR190.JPG	55.15196842	-7.392699306	C:/Master/CR190.JPG
Crana (main channel)	CR191.JPG	55.15235717	-7.392852361	C:/Master/CR191.JPG
Crana (main channel)	CR192.JPG	55.15263547	-7.393069944	C:/Master/CR192.JPG
Crana (main channel)	CR193.JPG	55.15259428	-7.393249389	C:/Master/CR193.JPG
Crana (main channel)	CR194.JPG	55.15277219	-7.39360625	C:/Master/CR194.JPG
Crana (main channel)	CR195.JPG	55.15300783	-7.393903222	C:/Master/CR195.JPG
Crana (main channel)	CR196.JPG	55.15321878	-7.394070833	C:/Master/CR196.JPG
Crana (main channel)	CR197.JPG	55.15329519	-7.393764778	C:/Master/CR197.JPG
Crana (main channel)	CR198.JPG	55.15351917	-7.393591611	C:/Master/CR198.JPG
Crana (main channel)	CR199.JPG	55.15371231	-7.394000083	C:/Master/CR199.JPG
Crana (main channel)	CR200.JPG	55.15391456	-7.394293444	C:/Master/CR200.JPG
Crana (main channel)	CR201.JPG	55.15421511	-7.394272861	C:/Master/CR201.JPG
Crana (main channel)	CR202.JPG	55.15448867	-7.394351694	C:/Master/CR202.JPG
Crana (main channel)	CR203.JPG	55.15473458	-7.394721194	C:/Master/CR203.JPG
Crana (main channel)	CR204.JPG	55.15504003	-7.394936056	C:/Master/CR204.JPG
Crana (main channel)	CR205.JPG	55.15524833	-7.395107333	C:/Master/CR205.JPG
Crana (main channel)	CR206.JPG	55.15537253	-7.395601361	C:/Master/CR206.JPG
Crana (main channel)	CR207.JPG	55.15554444	-7.396006167	C:/Master/CR207.JPG
Crana (main channel)	CR208.JPG	55.15546433	-7.395986806	C:/Master/CR208.JPG
Crana (main channel)	CR209.JPG	55.15549733	-7.396335306	C:/Master/CR209.JPG
Crana (main channel)	CR210.JPG	55.15536592	-7.396538417	C:/Master/CR210.JPG
Crana (main channel)	CR211.JPG	55.1555235	-7.396750389	C:/Master/CR211.JPG
Crana (main channel)	CR212.JPG	55.15515689	-7.397167917	C:/Master/CR212.JPG
Crana (main channel)	CR213.JPG	55.15536064	-7.397205028	C:/Master/CR213.JPG
Crana (main channel)	CR214.JPG	55.155375	-7.397545111	C:/Master/CR214.JPG
Crana (main channel)	CR215.JPG	55.15544708	-7.397944778	C:/Master/CR215.JPG
Crana (main channel)	CR216.JPG	55.15548308	-7.398204111	C:/Master/CR216.JPG
Crana (main channel)	CR217.JPG	55.15538314	-7.398630417	C:/Master/CR217.JPG
Crana (main channel)	CR218.JPG	55.15539364	-7.399054472	C:/Master/CR218.JPG
Crana (main channel)	CR219.JPG	55.15546489	-7.399371889	C:/Master/CR219.JPG
Crana (main channel)	CR220.JPG	55.15547461	-7.398510472	C:/Master/CR220.JPG
Crana (main channel)	CR221.JPG	55.15565319	-7.399639917	C:/Master/CR221.JPG
Crana (main channel)	CR222.JPG	55.15566244	-7.400452667	C:/Master/CR222.JPG
Crana (main channel)	CR223.JPG	55.15569283	-7.401145333	C:/Master/CR223.JPG
Crana (main channel)	CR224.JPG	55.15577692	-7.40167675	C:/Master/CR224.JPG

River	File name	Latitude	Longitude	File source
Crana (main channel)	CR225.JPG	55.15561931	-7.402072167	C:/Master/CR225.JPG
Crana (main channel)	CR226.JPG	55.15539353	-7.402457583	C:/Master/CR226.JPG
Crana (main channel)	CR227.JPG	55.15544764	-7.402960611	C:/Master/CR227.JPG
Crana (main channel)	CR228.JPG	55.15538783	-7.403407056	C:/Master/CR228.JPG
Crana (main channel)	CR229.JPG	55.15560333	-7.403855083	C:/Master/CR229.JPG
Crana (main channel)	CR230.JPG	55.15583517	-7.404191528	C:/Master/CR230.JPG
Crana (main channel)	CR231.JPG	55.15615728	-7.404673083	C:/Master/CR231.JPG
Crana (main channel)	CR232.JPG	55.15617903	-7.405236944	C:/Master/CR232.JPG
Crana (main channel)	CR233.JPG	55.15621022	-7.405910917	C:/Master/CR233.JPG
Crana (main channel)	CR234.JPG	55.15637319	-7.406384222	C:/Master/CR234.JPG
Crana (main channel)	CR235.JPG	55.15627578	-7.406865472	C:/Master/CR235.JPG
Crana (main channel)	CR236.JPG	55.15623347	-7.407345083	C:/Master/CR236.JPG
Crana (main channel)	CR237.JPG	55.15615583	-7.407885778	C:/Master/CR237.JPG
Crana (main channel)	CR238.JPG	55.15611133	-7.408585222	C:/Master/CR238.JPG
Crana (main channel)	CR239.JPG	55.15596461	-7.409088833	C:/Master/CR239.JPG
Crana (main channel)	CR240.JPG	55.15590392	-7.409393722	C:/Master/CR240.JPG
Crana (main channel)	CR241.JPG	55.15590297	-7.40939525	C:/Master/CR241.JPG
Crana (main channel)	CR242.JPG	55.15692883	-7.410959722	C:/Master/CR242.JPG
Crana (main channel)	CR243.JPG	55.15739719	-7.410982806	C:/Master/CR243.JPG
Crana (main channel)	CR244.JPG	55.15787103	-7.410526306	C:/Master/CR244.JPG
Crana (main channel)	CR245.JPG	55.15789469	-7.410937222	C:/Master/CR245.JPG
Crana (main channel)	CR246.JPG	55.15813036	-7.411475917	C:/Master/CR246.JPG
Crana (main channel)	CR247.JPG	55.15794242	-7.41194125	C:/Master/CR247.JPG
Crana (main channel)	CR248.JPG	55.15773194	-7.412293056	C:/Master/CR248.JPG
Crana (main channel)	CR249.JPG	55.15753772	-7.41269325	C:/Master/CR249.JPG
Crana (main channel)	CR250.JPG	55.15741111	-7.413075389	C:/Master/CR250.JPG
Crana (main channel)	CR251.JPG	55.15729144	-7.413569111	C:/Master/CR251.JPG
Crana (main channel)	CR252.JPG	55.15715342	-7.413919861	C:/Master/CR252.JPG
Crana (main channel)	CR253.JPG	55.15711197	-7.414351306	C:/Master/CR253.JPG
Crana (main channel)	CR254.JPG	55.15704561	-7.414847083	C:/Master/CR254.JPG
Crana (main channel)	CR255.JPG	55.15699272	-7.415498083	C:/Master/CR255.JPG
Crana (main channel)	CR256.JPG	55.15693578	-7.415948306	C:/Master/CR256.JPG
Crana (main channel)	CR257.JPG	55.1568545	-7.416665528	C:/Master/CR257.JPG
Crana (main channel)	CR258.JPG	55.15681808	-7.417441389	C:/Master/CR258.JPG
Crana (main channel)	CR259.JPG	55.15657264	-7.417473917	C:/Master/CR259.JPG
Crana (main channel)	CR260.JPG	55.15620897	-7.417455778	C:/Master/CR260.JPG
Crana (main channel)	CR261.JPG	55.15572364	-7.417696528	C:/Master/CR261.JPG
Crana (main channel)	CR262.JPG	55.15525842	-7.418156194	C:/Master/CR262.JPG
Crana (main channel)	CR263.JPG	55.15488544	-7.418613944	C:/Master/CR263.JPG
Crana (main channel)	CR264.JPG	55.15449492	-7.419230278	C:/Master/CR264.JPG
Crana (main channel)	CR265.JPG	55.15488086	-7.420120639	C:/Master/CR265.JPG
Crana (main channel)	CR266.JPG	55.15528803	-7.419715833	C:/Master/CR266.JPG
Crana (main channel)	CR267.JPG	55.15576214	-7.420074972	C:/Master/CR267.JPG
Crana (main channel)	CR268.JPG	55.15613469	-7.42068975	C:/Master/CR268.JPG
Crana (main channel)	CR269.JPG	55.15644783	-7.420572889	C:/Master/CR269.JPG
Crana (main channel)	CR270.JPG	55.15686306	-7.420218861	C:/Master/CR270.JPG
Crana (main channel)	CR271.JPG	55.15729875	-7.42031375	C:/Master/CR271.JPG
Crana (main channel)	CR272.JPG	55.15787689	-7.420298889	C:/Master/CR272.JPG
Crana (main channel)	CR273.JPG	55.15832967	-7.420278694	C:/Master/CR273.JPG
Crana (main channel)	CR274.JPG	55.15869969	-7.420151667	C:/Master/CR274.JPG
Crana (main channel)	CR275.JPG	55.15884036	-7.420971028	C:/Master/CR275.JPG
Crana (main channel)	CR276.JPG	55.15869469	-7.421852806	C:/Master/CR276.JPG
Crana (main channel)	CR277.JPG	55.15854122	-7.422444333	C:/Master/CR277.JPG
Crana (main channel)	CR278.JPG	55.15828725	-7.422655722	C:/Master/CR278.JPG
Crana (main channel)	CR279.JPG	55.15820828	-7.423379639	C:/Master/CR279.JPG

River	File name	Latitude	Longitude	File source
Crana (main channel)	CR280.JPG	55.15846169	-7.424077361	C:/Master/CR280.JPG
Crana (main channel)	CR281.JPG	55.15875328	-7.423990472	C:/Master/CR281.JPG
Crana (main channel)	CR282.JPG	55.159078	-7.423894833	C:/Master/CR282.JPG
Crana (main channel)	CR283.JPG	55.15923311	-7.424236472	C:/Master/CR283.JPG
Crana (main channel)	CR284.JPG	55.15941339	-7.423512056	C:/Master/CR284.JPG
Crana (main channel)	CR285.JPG	55.15985042	-7.423379222	C:/Master/CR285.JPG
Crana (main channel)	CR286.JPG	55.16020058	-7.423301417	C:/Master/CR286.JPG
Crana (main channel)	CR287.JPG	55.16072919	-7.423260472	C:/Master/CR287.JPG
Crana (main channel)	CR288.JPG	55.16091572	-7.422955944	C:/Master/CR288.JPG
Crana (main channel)	CR289.JPG	55.16129408	-7.423269667	C:/Master/CR289.JPG
Crana (main channel)	CR290.JPG	55.16136633	-7.423834	C:/Master/CR290.JPG
Crana (main channel)	CR291.JPG	55.16139597	-7.424560917	C:/Master/CR291.JPG
Crana (main channel)	CR292.JPG	55.16159481	-7.425201917	C:/Master/CR292.JPG
Crana (main channel)	CR293.JPG	55.16173556	-7.426121	C:/Master/CR293.JPG
Crana (main channel)	CR294.JPG	55.16138508	-7.426516167	C:/Master/CR294.JPG
Crana (main channel)	CR295.JPG	55.16102917	-7.426578	C:/Master/CR295.JPG
Crana (main channel)	CR296.JPG	55.1608595	-7.426862444	C:/Master/CR296.JPG
Crana (main channel)	CR297.JPG	55.16052583	-7.426069833	C:/Master/CR297.JPG
Crana (main channel)	CR298.JPG	55.16017642	-7.426238194	C:/Master/CR298.JPG
Crana (main channel)	CR299.JPG	55.15981169	-7.426227167	C:/Master/CR299.JPG
Crana (main channel)	CR300.JPG	55.15962419	-7.426626611	C:/Master/CR300.JPG
Crana (main channel)	CR301.JPG	55.15932386	-7.426967861	C:/Master/CR301.JPG
Crana (main channel)	CR302.JPG	55.15921092	-7.427576667	C:/Master/CR302.JPG
Crana (main channel)	CR303.JPG	55.15905672	-7.428257917	C:/Master/CR303.JPG
Crana (main channel)	CR304.JPG	55.15887917	-7.428826444	C:/Master/CR304.JPG
Crana (main channel)	CR305.JPG	55.15871431	-7.429422056	C:/Master/CR305.JPG
Crana (main channel)	CR306.JPG	55.15857194	-7.430011222	C:/Master/CR306.JPG
Crana (main channel)	CR307.JPG	55.15844208	-7.430589778	C:/Master/CR307.JPG
Crana (main channel)	CR308.JPG	55.15819889	-7.4313105	C:/Master/CR308.JPG
Crana (main channel)	CR309.JPG	55.15802853	-7.431776	C:/Master/CR309.JPG
Crana (main channel)	CR310.JPG	55.15782606	-7.43244425	C:/Master/CR310.JPG
Crana (main channel)	CR311.JPG	55.157769	-7.432844694	C:/Master/CR311.JPG
Crana (main channel)	CR312.JPG	55.15767744	-7.432975722	C:/Master/CR312.JPG
Crana (main channel)	CR313.JPG	55.15727822	-7.435129139	C:/Master/CR313.JPG
Crana (main channel)	CR314.JPG	55.15722353	-7.435426333	C:/Master/CR314.JPG
Crana (main channel)	CR315.JPG	55.15716606	-7.435772583	C:/Master/CR315.JPG
Crana (main channel)	CR316.JPG	55.15684567	-7.435867972	C:/Master/CR316.JPG
Crana (main channel)	CR317.JPG	55.1567685	-7.43600225	C:/Master/CR317.JPG
Crana (main channel)	CR318.JPG	55.15671033	-7.436116222	C:/Master/CR318.JPG
Crana (main channel)	CR319.JPG	55.15660303	-7.4363305	C:/Master/CR319.JPG
Crana (main channel)	CR320.JPG	55.15650358	-7.436567361	C:/Master/CR320.JPG
Crana (main channel)	CR321.JPG	55.15638861	-7.436983139	C:/Master/CR321.JPG
Crana (main channel)	CR322.JPG	55.15621314	-7.437267167	C:/Master/CR322.JPG
Crana (main channel)	CR323.JPG	55.15609044	-7.437522694	C:/Master/CR323.JPG
Crana (main channel)	CR324.JPG	55.15594622	-7.437589528	C:/Master/CR324.JPG
Crana (main channel)	CR325.JPG	55.15583619	-7.437800222	C:/Master/CR325.JPG
Crana (main channel)	CR326.JPG	55.15571278	-7.438042222	C:/Master/CR326.JPG
Crana (main channel)	CR327.JPG	55.15562483	-7.437879528	C:/Master/CR327.JPG
Crana (main channel)	CR328.JPG	55.15550669	-7.437955361	C:/Master/CR328.JPG
Crana (main channel)	CR329.JPG	55.1554365	-7.43766975	C:/Master/CR329.JPG
Crana (main channel)	CR330.JPG	55.15530158	-7.437659083	C:/Master/CR330.JPG
Crana (main channel)	CR331.JPG	55.15518983	-7.437237611	C:/Master/CR331.JPG
Crana (main channel)	CR332.JPG	55.15503139	-7.437113083	C:/Master/CR332.JPG
Crana (main channel)	CR333.JPG	55.15495731	-7.436622167	C:/Master/CR333.JPG
Crana (main channel)	CR334.JPG	55.15487708	-7.436690861	C:/Master/CR334.JPG

River	File name	Latitude	Longitude	File source
Crana (main channel)	CR335.JPG	55.15465467	-7.43643825	C:/Master/CR335.JPG
Crana (main channel)	CR336.JPG	55.15447633	-7.436185667	C:/Master/CR336.JPG
Crana (main channel)	CR337.JPG	55.15419831	-7.436220306	C:/Master/CR337.JPG
Crana (main channel)	CR338.JPG	55.15421214	-7.436548944	C:/Master/CR338.JPG
Crana (main channel)	CR339.JPG	55.15406042	-7.436700778	C:/Master/CR339.JPG
Crana (main channel)	CR340.JPG	55.15417675	-7.437454639	C:/Master/CR340.JPG
Crana (main channel)	CR341.JPG	55.15375136	-7.437153722	C:/Master/CR341.JPG
Crana (main channel)	CR342.JPG	55.15357039	-7.437474556	C:/Master/CR342.JPG
Crana (main channel)	CR343.JPG	55.15348422	-7.43761375	C:/Master/CR343.JPG
Crana (main channel)	CR344.JPG	55.15346453	-7.438101278	C:/Master/CR344.JPG
Crana (main channel)	CR345.JPG	55.15331486	-7.438286028	C:/Master/CR345.JPG
Crana (main channel)	CR346.JPG	55.15314042	-7.438435583	C:/Master/CR346.JPG
Crana (main channel)	CR347.JPG	55.152914	-7.438496222	C:/Master/CR347.JPG
Crana (main channel)	CR348.JPG	55.15370589	-7.437599694	C:/Master/CR348.JPG
Crana (main channel)	CR349.JPG	55.153384	-7.438049944	C:/Master/CR349.JPG
Crana (main channel)	CR350.JPG	55.15264669	-7.438501389	C:/Master/CR350.JPG
Crana (main channel)	CR351.JPG	55.15248114	-7.439259	C:/Master/CR351.JPG
Crana (main channel)	CR352.JPG	55.15247953	-7.440181028	C:/Master/CR352.JPG
Crana (main channel)	CR353.JPG	55.15243633	-7.4409665	C:/Master/CR353.JPG
Crana (main channel)	CR354.JPG	55.1523765	-7.441445528	C:/Master/CR354.JPG
Crana (main channel)	CR355.JPG	55.152178	-7.442181778	C:/Master/CR355.JPG
Crana (main channel)	CR356.JPG	55.15224433	-7.442300861	C:/Master/CR356.JPG
Crana (main channel)	CR357.JPG	55.15204406	-7.442890222	C:/Master/CR357.JPG
Crana (main channel)	CR358.JPG	55.15179133	-7.443979861	C:/Master/CR358.JPG
Crana (main channel)	CR359.JPG	55.15142897	-7.443573806	C:/Master/CR359.JPG
Crana (main channel)	CR360.JPG	55.15111531	-7.443376056	C:/Master/CR360.JPG
Crana (main channel)	CR361.JPG	55.15088122	-7.443289417	C:/Master/CR361.JPG
Crana (main channel)	CR362.JPG	55.15070683	-7.4436375	C:/Master/CR362.JPG
Crana (main channel)	CR363.JPG	55.15050061	-7.44406775	C:/Master/CR363.JPG
Crana (main channel)	CR364.JPG	55.15023036	-7.444564694	C:/Master/CR364.JPG
Crana (main channel)	CR365.JPG	55.14987406	-7.445029722	C:/Master/CR365.JPG
Crana (main channel)	CR366.JPG	55.14969306	-7.445732972	C:/Master/CR366.JPG
Crana (main channel)	CR367.JPG	55.149553	-7.446181361	C:/Master/CR367.JPG
Crana (main channel)	CR368.JPG	55.14932006	-7.446925611	C:/Master/CR368.JPG
Crana (main channel)	CR369.JPG	55.14893003	-7.44863175	C:/Master/CR369.JPG
Crana (main channel)	CR370.JPG	55.14877322	-7.449015528	C:/Master/CR370.JPG
Crana (main channel)	CR371.JPG	55.14862119	-7.449421194	C:/Master/CR371.JPG
Crana (main channel)	CR372.JPG	55.14870175	-7.45003075	C:/Master/CR372.JPG
Crana (main channel)	CR373.JPG	55.14874108	-7.450531528	C:/Master/CR373.JPG
Crana (main channel)	CR374.JPG	55.14874064	-7.450967944	C:/Master/CR374.JPG
Crana (main channel)	CR375.JPG	55.14879786	-7.45154575	C:/Master/CR375.JPG
Crana (main channel)	CR376.JPG	55.14872317	-7.451970806	C:/Master/CR376.JPG
Crana (main channel)	CR377.JPG	55.14867058	-7.452480167	C:/Master/CR377.JPG
Crana (main channel)	CR378.JPG	55.14846619	-7.452888417	C:/Master/CR378.JPG
Crana (main channel)	CR379.JPG	55.14828469	-7.453000389	C:/Master/CR379.JPG
Crana (main channel)	CR380.JPG	55.14805836	-7.452308889	C:/Master/CR380.JPG
Crana (main channel)	CR381.JPG	55.14768628	-7.451772639	C:/Master/CR381.JPG
Crana (main channel)	CR382.JPG	55.14738844	-7.451619139	C:/Master/CR382.JPG
Crana (main channel)	CR383.JPG	55.14706464	-7.451823444	C:/Master/CR383.JPG
Crana (main channel)	CR384.JPG	55.1468135	-7.451768611	C:/Master/CR384.JPG
Crana (main channel)	CR385.JPG	55.1465225	-7.451133611	C:/Master/CR385.JPG
Crana (main channel)	CR386.JPG	55.14615317	-7.451631389	C:/Master/CR386.JPG
Crana (main channel)	CR387.JPG	55.14629425	-7.452605583	C:/Master/CR387.JPG
Crana (main channel)	CR388.JPG	55.14605739	-7.452995278	C:/Master/CR388.JPG
Crana (main channel)	CR389.JPG	55.14591189	-7.453283333	C:/Master/CR389.JPG

River	File name	Latitude	Longitude	File source
Crana (main channel)	CR390.JPG	55.14571292	-7.453313222	C:/Master/CR390.JPG
Crana (main channel)	CR391.JPG	55.14530433	-7.453304972	C:/Master/CR391.JPG
Crana (main channel)	CR392.JPG	55.14496917	-7.452983611	C:/Master/CR392.JPG
Crana (main channel)	CR393.JPG	55.14486758	-7.452565222	C:/Master/CR393.JPG
Crana (main channel)	CR394.JPG	55.14493064	-7.451947333	C:/Master/CR394.JPG
Crana (main channel)	CR395.JPG	55.14480161	-7.451549583	C:/Master/CR395.JPG
Crana (main channel)	CR396.JPG	55.14453047	-7.451176111	C:/Master/CR396.JPG
Crana (main channel)	CR397.JPG	55.14423311	-7.451087306	C:/Master/CR397.JPG
Crana (main channel)	CR398.JPG	55.14367019	-7.452230333	C:/Master/CR398.JPG
Crana (main channel)	CR399.JPG	55.14395106	-7.451825944	C:/Master/CR399.JPG
Crana (main channel)	CR400.JPG	55.14364075	-7.452226083	C:/Master/CR400.JPG
Crana (main channel)	CR401.JPG	55.143366	-7.452505278	C:/Master/CR401.JPG
Crana (main channel)	CR402.JPG	55.14322553	-7.452807278	C:/Master/CR402.JPG
Crana (main channel)	CR403.JPG	55.14138172	-7.455377222	C:/Master/CR403.JPG
Crana (main channel)	CR404.JPG	55.14155289	-7.455163389	C:/Master/CR404.JPG
Crana (main channel)	CR405.JPG	55.14168281	-7.454764528	C:/Master/CR405.JPG
Crana (main channel)	CR406.JPG	55.14197011	-7.4547885	C:/Master/CR406.JPG
Crana (main channel)	CR407.JPG	55.14229769	-7.454685556	C:/Master/CR407.JPG
Crana (main channel)	CR408.JPG	55.14255167	-7.454630167	C:/Master/CR408.JPG
Crana (main channel)	CR409.JPG	55.14279272	-7.454287833	C:/Master/CR409.JPG
Crana (main channel)	CR410.JPG	55.14131503	-7.458274083	C:/Master/CR410.JPG
Crana (main channel)	CR411.JPG	55.14114317	-7.457805472	C:/Master/CR411.JPG
Crana (main channel)	CR412.JPG	55.14105967	-7.457569639	C:/Master/CR412.JPG
Crana (main channel)	CR413.JPG	55.14099644	-7.457195028	C:/Master/CR413.JPG
Crana (main channel)	CR414.JPG	55.14099625	-7.456693	C:/Master/CR414.JPG
Crana (main channel)	CR415.JPG	55.14098511	-7.456351667	C:/Master/CR415.JPG
Crana (main channel)	CR416.JPG	55.14107917	-7.456037167	C:/Master/CR416.JPG
Crana (main channel)	CR417.JPG	55.14114828	-7.455899972	C:/Master/CR417.JPG
Crana (main channel)	CR418.JPG	55.14125283	-7.455682306	C:/Master/CR418.JPG
Crana (main channel)	CR419.JPG	55.14139269	-7.455371444	C:/Master/CR419.JPG
Crana (main channel)	CR420.JPG	55.14119422	-7.4553455	C:/Master/CR420.JPG
Crana (main channel)	CR421.JPG	55.14125708	-7.457917361	C:/Master/CR421.JPG
Crana (main channel)	CR422.JPG	55.14133344	-7.457814639	C:/Master/CR422.JPG
Crana (main channel)	CR423.JPG	55.14131297	-7.458363694	C:/Master/CR423.JPG
Crana (main channel)	CR424.JPG	55.14160672	-7.458535722	C:/Master/CR424.JPG
Crana (main channel)	CR425.JPG	55.14154483	-7.458946667	C:/Master/CR425.JPG
Crana (main channel)	CR426.JPG	55.14153158	-7.459334139	C:/Master/CR426.JPG
Crana (main channel)	CR427.JPG	55.14142028	-7.459797528	C:/Master/CR427.JPG
Crana (main channel)	CR428.JPG	55.14163217	-7.460637194	C:/Master/CR428.JPG
Crana (main channel)	CR429.JPG	55.14157858	-7.460948944	C:/Master/CR429.JPG
Crana (main channel)	CR430.JPG	55.14151806	-7.461346917	C:/Master/CR430.JPG
Crana (main channel)	CR431.JPG	55.14144886	-7.461608028	C:/Master/CR431.JPG
Crana (main channel)	CR432.JPG	55.14166064	-7.461925222	C:/Master/CR432.JPG
Crana (main channel)	CR433.JPG	55.14149517	-7.462214222	C:/Master/CR433.JPG
Crana (main channel)	CR434.JPG	55.14134939	-7.46307325	C:/Master/CR434.JPG
Crana (main channel)	CR435.JPG	55.14131739	-7.463145917	C:/Master/CR435.JPG
Crana (main channel)	CR436.JPG	55.14131825	-7.463146028	C:/Master/CR436.JPG
Crana (main channel)	CR437.JPG	55.14126578	-7.462078944	C:/Master/CR437.JPG
Crana (main channel)	CR438.JPG	55.14132164	-7.4611555	C:/Master/CR438.JPG
Crana (main channel)	CR439.JPG	55.14160964	-7.460239722	C:/Master/CR439.JPG
Crana (main channel)	CR440.JPG	55.14157475	-7.459975167	C:/Master/CR440.JPG
Crana (main channel)	CR441.JPG	55.14146581	-7.459209417	C:/Master/CR441.JPG
Crana (main channel)	CR442.JPG	55.14108822	-7.458443333	C:/Master/CR442.JPG
Crana (main channel)	CR443.JPG	55.14081547	-7.457759028	C:/Master/CR443.JPG
Crana (main channel)	CR444.JPG	55.14079767	-7.457733861	C:/Master/CR444.JPG

River	File name	Latitude	Longitude	File source
Crana (main channel)	CR445.JPG	55.14079975	-7.457740639	C:/Master/CR445.JPG
Crana (main channel)	CR446.JPG	55.14165728	-7.458964917	C:/Master/CR446.JPG
Crana (main channel)	CR447.JPG	55.14156342	-7.459057222	C:/Master/CR447.JPG
Crana (main channel)	CR448.JPG	55.14156189	-7.459028611	C:/Master/CR448.JPG
Crana (main channel)	CR449.JPG	55.14155994	-7.459030389	C:/Master/CR449.JPG
Crana (main channel)	CR450.JPG	55.14154803	-7.459299611	C:/Master/CR450.JPG
Crana (main channel)	CR451.JPG	55.1415375	-7.459264056	C:/Master/CR451.JPG
Crana (main channel)	CR452.JPG	55.14153897	-7.459281472	C:/Master/CR452.JPG
Evishbreedy	EB1.JPG	55.18675111	-7.301980722	C:/Master/EB1.JPG
Evishbreedy	EB2.JPG	55.18840403	-7.303722917	C:/Master/EB2.JPG
Evishbreedy	EB3.JPG	55.18831675	-7.303518139	C:/Master/EB3.JPG
Evishbreedy	EB4.JPG	55.18824894	-7.303190333	C:/Master/EB4.JPG
Evishbreedy	EB5.JPG	55.18812797	-7.302922806	C:/Master/EB5.JPG
Evishbreedy	EB6.JPG	55.18795383	-7.302735556	C:/Master/EB6.JPG
Evishbreedy	EB7.JPG	55.18775897	-7.302611528	C:/Master/EB7.JPG
Evishbreedy	EB8.JPG	55.18750319	-7.3024475	C:/Master/EB8.JPG
Evishbreedy	EB9.JPG	55.18721792	-7.302278444	C:/Master/EB9.JPG
Evishbreedy	EB10.JPG	55.18689583	-7.302079194	C:/Master/EB10.JPG
Evishbreedy	EB11.JPG	55.18671511	-7.301958583	C:/Master/EB11.JPG
Evishbreedy	EB12.JPG	55.18651747	-7.301740083	C:/Master/EB12.JPG
Evishbreedy	EB13.JPG	55.18651294	-7.301735639	C:/Master/EB13.JPG
Evishbreedy	EB14.JPG	55.18616967	-7.301526194	C:/Master/EB14.JPG
Evishbreedy	EB16.JPG	55.1855135	-7.301538889	C:/Master/EB16.JPG
Evishbreedy	EB17.JPG	55.18512417	-7.301273306	C:/Master/EB17.JPG
Evishbreedy	EB18.JPG	55.18477803	-7.301306222	C:/Master/EB18.JPG
Evishbreedy	EB19.JPG	55.18445314	-7.3010945	C:/Master/EB19.JPG
Evishbreedy	EB20.JPG	55.18412733	-7.301261028	C:/Master/EB20.JPG
Evishbreedy	EB21.JPG	55.18427803	-7.3014555	C:/Master/EB21.JPG
Evishbreedy	EB22.JPG	55.18410594	-7.301236389	C:/Master/EB22.JPG
Evishbreedy	EB23.JPG	55.18376586	-7.301171972	C:/Master/EB23.JPG
Evishbreedy	EB24.JPG	55.18339186	-7.301070083	C:/Master/EB24.JPG
Evishbreedy	EB25.JPG	55.18304603	-7.300985028	C:/Master/EB25.JPG
Evishbreedy	EB28.JPG	55.18252744	-7.301373222	C:/Master/EB28.JPG
Evishbreedy	EB29.JPG	55.18150294	-7.301140194	C:/Master/EB29.JPG
Evishbreedy	EB30.JPG	55.18086744	-7.300953167	C:/Master/EB30.JPG
Evishbreedy	EB31.JPG	55.18036161	-7.300847083	C:/Master/EB31.JPG
Evishbreedy	EB32.JPG	55.18008706	-7.300761472	C:/Master/EB32.JPG
Evishbreedy	EB33.JPG	55.18008489	-7.300759028	C:/Master/EB33.JPG
Evishbreedy	EB34.JPG	55.15659592	-7.304822833	C:/Master/EB34.JPG
Evishbreedy	EB35.JPG	55.15621964	-7.305407083	C:/Master/EB35.JPG
Evishbreedy	EB36.JPG	55.15567525	-7.305479361	C:/Master/EB36.JPG
Evishbreedy	EB37.JPG	55.15533164	-7.305536444	C:/Master/EB37.JPG
Evishbreedy	EB38.JPG	55.15489308	-7.306118778	C:/Master/EB38.JPG
Evishbreedy	EB39.JPG	55.15440853	-7.306394194	C:/Master/EB39.JPG
Evishbreedy	EB40.JPG	55.15468311	-7.307762889	C:/Master/EB40.JPG
Evishbreedy	EB41.JPG	55.15468183	-7.307762111	C:/Master/EB41.JPG
Evishbreedy	EB42.JPG	55.15443044	-7.307943778	C:/Master/EB42.JPG
Evishbreedy	EB43.JPG	55.15426281	-7.308973389	C:/Master/EB43.JPG
Evishbreedy	EB44.JPG	55.15390611	-7.309569667	C:/Master/EB44.JPG
Evishbreedy	EB45.JPG	55.15343356	-7.309906722	C:/Master/EB45.JPG
Glashagh	GL1.JPG	55.16450619	-7.353787111	C:/Master/GL1.JPG
Glashagh	GL2.JPG	55.16448608	-7.353772722	C:/Master/GL2.JPG
Glashagh	GL3.JPG	55.16404544	-7.353555278	C:/Master/GL3.JPG
Glashagh	GL4.JPG	55.16366983	-7.353793917	C:/Master/GL4.JPG
Glashagh	GL5.JPG	55.16364319	-7.355289944	C:/Master/GL5.JPG

River	File name	Latitude	Longitude	File source
Glashagh	GL6.JPG	55.16330636	-7.355936333	C:/Master/GL6.JPG
Glashagh	GL7.JPG	55.16291564	-7.355213917	C:/Master/GL7.JPG
Glashagh	GL8.JPG	55.16250608	-7.354770083	C:/Master/GL8.JPG
Glashagh	GL9.JPG	55.16219869	-7.353907556	C:/Master/GL9.JPG
Glashagh	GL10.JPG	55.16169631	-7.35331425	C:/Master/GL10.JPG
Glashagh	GL11.JPG	55.161432	-7.352490639	C:/Master/GL11.JPG
Glashagh	GL12.JPG	55.16104444	-7.352044	C:/Master/GL12.JPG
Glashagh	GL13.JPG	55.16049283	-7.352495306	C:/Master/GL13.JPG
Glashagh	GL14.JPG	55.16038017	-7.353906778	C:/Master/GL14.JPG
Glashagh	GL15.JPG	55.15984253	-7.354007639	C:/Master/GL15.JPG
Glashagh	GL16.JPG	55.15923156	-7.354129333	C:/Master/GL16.JPG
Glashagh	GL17.JPG	55.1589155	-7.353602083	C:/Master/GL17.JPG
Glashagh	GL18.JPG	55.15844067	-7.353408222	C:/Master/GL18.JPG
Glashagh	GL19.JPG	55.15787506	-7.353481306	C:/Master/GL19.JPG
Glashagh	GL20.JPG	55.15736625	-7.353506889	C:/Master/GL20.JPG
Glashagh	GL21.JPG	55.15656392	-7.35192475	C:/Master/GL21.JPG
Glashagh	GL22.JPG	55.15861358	-7.353005833	C:/Master/GL22.JPG
Glashagh	GL23.JPG	55.15803186	-7.352471667	C:/Master/GL23.JPG
Glashagh	GL24.JPG	55.15725439	-7.351766694	C:/Master/GL24.JPG
Glashagh	GL25.JPG	55.15659953	-7.351094444	C:/Master/GL25.JPG
Glashagh	GL26.JPG	55.1558945	-7.350452889	C:/Master/GL26.JPG
Glashagh	GL27.JPG	55.15544264	-7.350084667	C:/Master/GL27.JPG
Glashagh	GL28.JPG	55.15496981	-7.349882306	C:/Master/GL28.JPG
Glashagh	GL29.JPG	55.15469925	-7.350173694	C:/Master/GL29.JPG
Glashagh	GL30.JPG	55.15428233	-7.350259444	C:/Master/GL30.JPG
Glashagh	GL31.JPG	55.15422669	-7.350353778	C:/Master/GL31.JPG
Glashagh	GL32.JPG	55.15422828	-7.350341222	C:/Master/GL32.JPG
Meenatomish	MT1.JPG	55.14385728	-7.283782056	C:/Master/MT1.JPG
Meenatomish	MT2.JPG	55.14225622	-7.282956389	C:/Master/MT2.JPG
Meenatomish	MT3.JPG	55.14273803	-7.283254778	C:/Master/MT3.JPG
Meenatomish	MT4.JPG	55.14326633	-7.28413425	C:/Master/MT4.JPG
Meenatomish	MT5.JPG	55.14385428	-7.284431889	C:/Master/MT5.JPG
Meenatomish	MT6.JPG	55.14419325	-7.284788528	C:/Master/MT6.JPG
Meenatomish	MT7.JPG	55.14467186	-7.285280389	C:/Master/MT7.JPG
Meenatomish	MT8.JPG	55.14524083	-7.285822	C:/Master/MT8.JPG
Meenatomish	MT9.JPG	55.14552006	-7.286668778	C:/Master/MT9.JPG
Meenatomish	MT10.JPG	55.14587128	-7.286879083	C:/Master/MT10.JPG
Meenatomish	MT11.JPG	55.14628047	-7.287165306	C:/Master/MT11.JPG
Meenatomish	MT12.JPG	55.14663936	-7.287629139	C:/Master/MT12.JPG
Meenatomish	MT13.JPG	55.14658806	-7.288237833	C:/Master/MT13.JPG
Meenatomish	MT14.JPG	55.14659017	-7.288393333	C:/Master/MT14.JPG
Meenatomish	MT15.JPG	55.14641139	-7.287781444	C:/Master/MT15.JPG
Meenatomish	MT16.JPG	55.14604792	-7.288151389	C:/Master/MT16.JPG
Meenatomish	MT17.JPG	55.14555922	-7.288035556	C:/Master/MT17.JPG
Meenatomish	MT18.JPG	55.14562447	-7.288625028	C:/Master/MT18.JPG
Meenatomish	MT19.JPG	55.14577025	-7.289595306	C:/Master/MT19.JPG
Meenatomish	MT20.JPG	55.14585519	-7.290354111	C:/Master/MT20.JPG
Meenatomish	MT21.JPG	55.1457095	-7.291198583	C:/Master/MT21.JPG
Meenatomish	MT22.JPG	55.14580772	-7.291942167	C:/Master/MT22.JPG
Meenatomish	MT23.JPG	55.14623522	-7.292457083	C:/Master/MT23.JPG
Meenatomish	MT24.JPG	55.14680767	-7.292884639	C:/Master/MT24.JPG
Meenatomish	MT25.JPG	55.14674544	-7.293375028	C:/Master/MT25.JPG
Meenatomish	MT26.JPG	55.14722119	-7.293279528	C:/Master/MT26.JPG
Meenatomish	MT27.JPG	55.14775797	-7.292944472	C:/Master/MT27.JPG
Meenatomish	MT28.JPG	55.14820278	-7.292642278	C:/Master/MT28.JPG

River	File name	Latitude	Longitude	File source
Meenatomish	MT29.JPG	55.148387	-7.292795139	C:/Master/MT29.JPG
Meenatomish	MT30.JPG	55.14862922	-7.292221083	C:/Master/MT30.JPG
Meenatomish	MT31.JPG	55.14881908	-7.291767	C:/Master/MT31.JPG
Meenatomish	MT32.JPG	55.14895625	-7.291459583	C:/Master/MT32.JPG
Meenatomish	MT33.JPG	55.14920494	-7.291262667	C:/Master/MT33.JPG
Meenatomish	MT34.JPG	55.14953439	-7.291424333	C:/Master/MT34.JPG
Meenatomish	MT35.JPG	55.14980219	-7.291612361	C:/Master/MT35.JPG
Meenatomish	MT36.JPG	55.150048	-7.291858528	C:/Master/MT36.JPG
Meenatomish	MT37.JPG	55.15028992	-7.291686389	C:/Master/MT37.JPG
Owenboy	OB1.JPG	55.19847492	-7.394967611	C:/Master/OB1.JPG
Owenboy	OB2.JPG	55.1981705	-7.395667917	C:/Master/OB2.JPG
Owenboy	OB3.JPG	55.1974965	-7.395325528	C:/Master/OB3.JPG
Owenboy	OB4.JPG	55.197114	-7.395159	C:/Master/OB4.JPG
Owenboy	OB5.JPG	55.19683831	-7.394655944	C:/Master/OB5.JPG
Owenboy	OB6.JPG	55.19641833	-7.394525556	C:/Master/OB6.JPG
Owenboy	OB7.JPG	55.19506247	-7.3947395	C:/Master/OB7.JPG
Owenboy	OB8.JPG	55.1947285	-7.394835444	C:/Master/OB8.JPG
Owenboy	OB9.JPG	55.19411481	-7.395223278	C:/Master/OB9.JPG
Owenboy	OB10.JPG	55.19359583	-7.395164889	C:/Master/OB10.JPG
Owenboy	OB11.JPG	55.19277561	-7.395471806	C:/Master/OB11.JPG
Owenboy	OB12.JPG	55.19277594	-7.395471056	C:/Master/OB12.JPG
Owenboy	OB13.JPG	55.19277603	-7.395470194	C:/Master/OB13.JPG
Owenboy	OB14.JPG	55.19250219	-7.395713694	C:/Master/OB14.JPG
Owenboy	OB15.JPG	55.19215647	-7.396090306	C:/Master/OB15.JPG
Owenboy	OB16.JPG	55.191786	-7.396458417	C:/Master/OB16.JPG
Owenboy	OB17.JPG	55.1917845	-7.396460583	C:/Master/OB17.JPG
Owenboy	OB18.JPG	55.19006711	-7.401213333	C:/Master/OB18.JPG
Owenboy	OB19.JPG	55.18968078	-7.401328806	C:/Master/OB19.JPG
Owenboy	OB20.JPG	55.18967608	-7.401324583	C:/Master/OB20.JPG
Owenboy	OB21.JPG	55.18918206	-7.401937194	C:/Master/OB21.JPG
Owenboy	OB22.JPG	55.18879531	-7.402006139	C:/Master/OB22.JPG
Owenboy	OB23.JPG	55.18837747	-7.402593278	C:/Master/OB23.JPG
Owenboy	OB24.JPG	55.18796167	-7.402531028	C:/Master/OB24.JPG
Owenboy	OB25.JPG	55.18761322	-7.4025945	C:/Master/OB25.JPG
Owenboy	OB26.JPG	55.18761222	-7.402595222	C:/Master/OB26.JPG
Owenboy	OB27.JPG	55.18725228	-7.40266325	C:/Master/OB27.JPG
Owenboy	OB28.JPG	55.18699831	-7.402803194	C:/Master/OB28.JPG
Owenboy	OB29.JPG	55.18673831	-7.402903972	C:/Master/OB29.JPG
Owenboy	OB30.JPG	55.1864355	-7.402875361	C:/Master/OB30.JPG
Owenboy	OB31.JPG	55.18619236	-7.40286575	C:/Master/OB31.JPG
Owenboy	OB32.JPG	55.18594014	-7.402382	C:/Master/OB32.JPG
Owenboy	OB33.JPG	55.185358	-7.402415528	C:/Master/OB33.JPG
Owenboy	OB34.JPG	55.18512086	-7.402485861	C:/Master/OB34.JPG
Owenboy	OB35.JPG	55.1849095	-7.402630722	C:/Master/OB35.JPG
Owenboy	OB36.JPG	55.18465675	-7.402735444	C:/Master/OB36.JPG
Owenboy	OB37.JPG	55.18450047	-7.402591639	C:/Master/OB37.JPG
Owenboy	OB38.JPG	55.18432153	-7.402619778	C:/Master/OB38.JPG
Owenboy	OB39.JPG	55.18409558	-7.402798694	C:/Master/OB39.JPG
Owenboy	OB40.JPG	55.184	-7.402412111	C:/Master/OB40.JPG
Owenboy	OB41.JPG	55.18399706	-7.402416222	C:/Master/OB41.JPG
Owenboy	OB42.JPG	55.18375156	-7.402428556	C:/Master/OB42.JPG
Owenboy	OB43.JPG	55.18328008	-7.402095389	C:/Master/OB43.JPG
Owenboy	OB44.JPG	55.18288242	-7.402288361	C:/Master/OB44.JPG
Owenboy	OB45.JPG	55.18268853	-7.402521694	C:/Master/OB45.JPG
Owenboy	OB46.JPG	55.1821705	-7.402555917	C:/Master/OB46.JPG

River	File name	Latitude	Longitude	File source
Owenboy	OB47.JPG	55.18210314	-7.402837861	C:/Master/OB47.JPG
Owenboy	OB48.JPG	55.18179928	-7.403227639	C:/Master/OB48.JPG
Owenboy	OB49.JPG	55.18165542	-7.403178028	C:/Master/OB49.JPG
Owenboy	OB50.JPG	55.18164647	-7.403145639	C:/Master/OB50.JPG
Owenboy	OB51.JPG	55.18110575	-7.401328972	C:/Master/OB51.JPG
Owenboy	OB52.JPG	55.18037522	-7.402383583	C:/Master/OB52.JPG
Owenboy	OB53.JPG	55.18009483	-7.402702667	C:/Master/OB53.JPG
Owenboy	OB54.JPG	55.17999597	-7.403518	C:/Master/OB54.JPG
Owenboy	OB55.JPG	55.17978825	-7.403408444	C:/Master/OB55.JPG
Owenboy	OB56.JPG	55.17966939	-7.402766444	C:/Master/OB56.JPG
Owenboy	OB57.JPG	55.17956892	-7.403701139	C:/Master/OB57.JPG
Owenboy	OB58.JPG	55.17970531	-7.404204417	C:/Master/OB58.JPG
Owenboy	OB59.JPG	55.17964083	-7.404663389	C:/Master/OB59.JPG
Owenboy	OB60.JPG	55.17956322	-7.405058889	C:/Master/OB60.JPG
Owenboy	OB61.JPG	55.17948867	-7.405503556	C:/Master/OB61.JPG
Owenboy	OB62.JPG	55.17917464	-7.405471528	C:/Master/OB62.JPG
Owenboy	OB63.JPG	55.17869294	-7.405373806	C:/Master/OB63.JPG
Owenboy	OB64.JPG	55.17843569	-7.405838056	C:/Master/OB64.JPG
Owenboy	OB65.JPG	55.17814283	-7.405757806	C:/Master/OB65.JPG
Owenboy	OB66.JPG	55.17789322	-7.406113	C:/Master/OB66.JPG
Owenboy	OB67.JPG	55.17768714	-7.406352583	C:/Master/OB67.JPG
Owenboy	OB68.JPG	55.17744267	-7.406284889	C:/Master/OB68.JPG
Owenboy	OB69.JPG	55.17743869	-7.407025111	C:/Master/OB69.JPG
Owenboy	OB70.JPG	55.17732678	-7.407128917	C:/Master/OB70.JPG
Owenboy	OB71.JPG	55.17728564	-7.407484417	C:/Master/OB71.JPG
Owenboy	OB72.JPG	55.17719764	-7.4081845	C:/Master/OB72.JPG
Owenboy	OB73.JPG	55.17722192	-7.408508972	C:/Master/OB73.JPG
Owenboy	OB74.JPG	55.17712578	-7.408860111	C:/Master/OB74.JPG
Owenboy	OB75.JPG	55.17688053	-7.409163694	C:/Master/OB75.JPG
Owenboy	OB76.JPG	55.17677369	-7.408970417	C:/Master/OB76.JPG
Owenboy	OB77.JPG	55.17695375	-7.408257694	C:/Master/OB77.JPG
Owenboy	OB78.JPG	55.17679556	-7.4086075	C:/Master/OB78.JPG
Owenboy	OB79.JPG	55.17657836	-7.408702333	C:/Master/OB79.JPG
Owenboy	OB80.JPG	55.17617481	-7.408528639	C:/Master/OB80.JPG
Owenboy	OB81.JPG	55.17597861	-7.40876225	C:/Master/OB81.JPG
Owenboy	OB82.JPG	55.17569944	-7.408972	C:/Master/OB82.JPG
Owenboy	OB83.JPG	55.17555469	-7.409306306	C:/Master/OB83.JPG
Owenboy	OB84.JPG	55.17564181	-7.409615667	C:/Master/OB84.JPG
Owenboy	OB85.JPG	55.17545789	-7.409740694	C:/Master/OB85.JPG
Owenboy	OB86.JPG	55.17539428	-7.409442889	C:/Master/OB86.JPG
Owenboy	OB87.JPG	55.17525278	-7.409509778	C:/Master/OB87.JPG
Owenboy	OB88.JPG	55.17516975	-7.409327389	C:/Master/OB88.JPG
Owenboy	OB89.JPG	55.175057	-7.409437806	C:/Master/OB89.JPG
Owenboy	OB90.JPG	55.17487981	-7.409486806	C:/Master/OB90.JPG
Owenboy	OB91.JPG	55.17485675	-7.409842361	C:/Master/OB91.JPG
Owenboy	OB92.JPG	55.17470811	-7.410127778	C:/Master/OB92.JPG
Owenboy	OB93.JPG	55.17463225	-7.410620083	C:/Master/OB93.JPG
Owenboy	OB94.JPG	55.17443861	-7.411047056	C:/Master/OB94.JPG
Owenboy	OB95.JPG	55.17441728	-7.41062275	C:/Master/OB95.JPG
Owenboy	OB96.JPG	55.17424628	-7.410306694	C:/Master/OB96.JPG
Owenboy	OB97.JPG	55.17409536	-7.409826861	C:/Master/OB97.JPG
Owenboy	OB98.JPG	55.17384253	-7.409856583	C:/Master/OB98.JPG
Owenboy	OB99.JPG	55.17359506	-7.410097667	C:/Master/OB99.JPG
Owenboy	OB100.JPG	55.17341114	-7.410116	C:/Master/OB100.JPG
Owenboy	OB101.JPG	55.17311922	-7.410133972	C:/Master/OB101.JPG

River	File name	Latitude	Longitude	File source
Owenboy	OB102.JPG	55.17309853	-7.410347861	C:/Master/OB102.JPG
Owenboy	OB103.JPG	55.1729245	-7.410617556	C:/Master/OB103.JPG
Owenboy	OB104.JPG	55.17279822	-7.410859167	C:/Master/OB104.JPG
Owenboy	OB105.JPG	55.17252278	-7.411036139	C:/Master/OB105.JPG
Owenboy	OB106.JPG	55.17227456	-7.411262361	C:/Master/OB106.JPG
Owenboy	OB107.JPG	55.17195	-7.411108694	C:/Master/OB107.JPG
Owenboy	OB108.JPG	55.17170644	-7.411043667	C:/Master/OB108.JPG
Owenboy	OB109.JPG	55.17145436	-7.411280694	C:/Master/OB109.JPG
Owenboy	OB110.JPG	55.17127517	-7.41152775	C:/Master/OB110.JPG
Owenboy	OB111.JPG	55.17102844	-7.411496	C:/Master/OB111.JPG
Owenboy	OB112.JPG	55.17092861	-7.411454944	C:/Master/OB112.JPG
Owenboy	OB113.JPG	55.17001603	-7.411303056	C:/Master/OB113.JPG
Owenboy	OB114.JPG	55.16978844	-7.41083425	C:/Master/OB114.JPG
Owenboy	OB115.JPG	55.1697835	-7.410498917	C:/Master/OB115.JPG
Owenboy	OB116.JPG	55.16967206	-7.410252	C:/Master/OB116.JPG
Owenboy	OB117.JPG	55.16951303	-7.410336361	C:/Master/OB117.JPG
Owenboy	OB118.JPG	55.16932325	-7.410683528	C:/Master/OB118.JPG
Owenboy	OB119.JPG	55.16917931	-7.410840583	C:/Master/OB119.JPG
Owenboy	OB120.JPG	55.16903333	-7.411166861	C:/Master/OB120.JPG
Owenboy	OB121.JPG	55.16909864	-7.41182425	C:/Master/OB121.JPG
Owenboy	OB122.JPG	55.16887772	-7.411694361	C:/Master/OB122.JPG
Owenboy	OB123.JPG	55.16861967	-7.411627722	C:/Master/OB123.JPG
Owenboy	OB124.JPG	55.16846222	-7.411406472	C:/Master/OB124.JPG
Owenboy	OB125.JPG	55.16842739	-7.410846972	C:/Master/OB125.JPG
Owenboy	OB126.JPG	55.16825372	-7.410722722	C:/Master/OB126.JPG
Owenboy	OB127.JPG	55.16808286	-7.410928056	C:/Master/OB127.JPG
Owenboy	OB128.JPG	55.16806503	-7.411680111	C:/Master/OB128.JPG
Owenboy	OB129.JPG	55.16803403	-7.4119745	C:/Master/OB129.JPG
Owenboy	OB130.JPG	55.16783944	-7.411621	C:/Master/OB130.JPG
Owenboy	OB131.JPG	55.16770356	-7.411443417	C:/Master/OB131.JPG
Owenboy	OB132.JPG	55.16764092	-7.411114444	C:/Master/OB132.JPG
Owenboy	OB133.JPG	55.16740233	-7.411006056	C:/Master/OB133.JPG
Owenboy	OB134.JPG	55.16733358	-7.411576389	C:/Master/OB134.JPG
Owenboy	OB135.JPG	55.16720492	-7.411851889	C:/Master/OB135.JPG
Owenboy	OB136.JPG	55.16706453	-7.412009889	C:/Master/OB136.JPG
Owenboy	OB137.JPG	55.16685192	-7.41124875	C:/Master/OB137.JPG
Owenboy	OB138.JPG	55.1667235	-7.411031167	C:/Master/OB138.JPG
Owenboy	OB139.JPG	55.16678089	-7.410743389	C:/Master/OB139.JPG
Owenboy	OB140.JPG	55.16689744	-7.410239667	C:/Master/OB140.JPG
Owenboy	OB141.JPG	55.16693489	-7.409842833	C:/Master/OB141.JPG
Owenboy	OB142.JPG	55.16638025	-7.410564972	C:/Master/OB142.JPG
Owenboy	OB143.JPG	55.16620331	-7.410659889	C:/Master/OB143.JPG
Owenboy	OB144.JPG	55.16607772	-7.410889111	C:/Master/OB144.JPG
Owenboy	OB145.JPG	55.16582778	-7.410874528	C:/Master/OB145.JPG
Owenboy	OB146.JPG	55.16560078	-7.410914	C:/Master/OB146.JPG
Owenboy	OB147.JPG	55.16539106	-7.410857194	C:/Master/OB147.JPG
Owenboy	OB148.JPG	55.16522644	-7.410875694	C:/Master/OB148.JPG
Owenboy	OB149.JPG	55.16546656	-7.410558972	C:/Master/OB149.JPG
Owenboy	OB150.JPG	55.16538478	-7.410927806	C:/Master/OB150.JPG
Owenboy	OB151.JPG	55.16538633	-7.411263944	C:/Master/OB151.JPG
Owenboy	OB152.JPG	55.16542558	-7.411596028	C:/Master/OB152.JPG
Owenboy	OB153.JPG	55.16522383	-7.411864583	C:/Master/OB153.JPG
Owenboy	OB154.JPG	55.16501131	-7.412114361	C:/Master/OB154.JPG
Owenboy	OB155.JPG	55.16483553	-7.41213725	C:/Master/OB155.JPG
Owenboy	OB156.JPG	55.16468553	-7.411963056	C:/Master/OB156.JPG

River	File name	Latitude	Longitude	File source
Owenboy	OB157.JPG	55.16459014	-7.411770444	C:/Master/OB157.JPG
Owenboy	OB158.JPG	55.16444192	-7.411845472	C:/Master/OB158.JPG
Owenboy	OB159.JPG	55.164275	-7.411863611	C:/Master/OB159.JPG
Owenboy	OB160.JPG	55.16409742	-7.411999333	C:/Master/OB160.JPG
Owenboy	OB161.JPG	55.16401439	-7.411777056	C:/Master/OB161.JPG
Owenboy	OB162.JPG	55.16389511	-7.411472417	C:/Master/OB162.JPG
Owenboy	OB163.JPG	55.16380731	-7.411267111	C:/Master/OB163.JPG
Owenboy	OB164.JPG	55.16366336	-7.411001694	C:/Master/OB164.JPG
Owenboy	OB165.JPG	55.16356789	-7.411168833	C:/Master/OB165.JPG
Owenboy	OB166.JPG	55.16336833	-7.411243833	C:/Master/OB166.JPG
Owenboy	OB167.JPG	55.16324242	-7.411279972	C:/Master/OB167.JPG
Owenboy	OB168.JPG	55.163081	-7.411193833	C:/Master/OB168.JPG
Owenboy	OB169.JPG	55.16305808	-7.411051667	C:/Master/OB169.JPG
Owenboy	OB170.JPG	55.16292864	-7.411177	C:/Master/OB170.JPG
Owenboy	OB171.JPG	55.16277947	-7.411353944	C:/Master/OB171.JPG
Owenboy	OB172.JPG	55.16273689	-7.411546556	C:/Master/OB172.JPG
Owenboy	OB173.JPG	55.16259453	-7.411602056	C:/Master/OB173.JPG
Owenboy	OB174.JPG	55.1624405	-7.411720889	C:/Master/OB174.JPG
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Owenboy	OB176.JPG	55.16217408	-7.411566389	C:/Master/OB176.JPG
Owenboy	OB177.JPG	55.16202819	-7.411376861	C:/Master/OB177.JPG
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Owenboy	OB179.JPG	55.16172964	-7.411069361	C:/Master/OB179.JPG
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Owenboy	OB184.JPG	55.16102528	-7.411154333	C:/Master/OB184.JPG
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Owenboy	OB187.JPG	55.16093133	-7.411150722	C:/Master/OB187.JPG

