

Juvenile Trout and Salmon Monitoring Programme Report

2002 – 2020 Data

Fisheries Directorate, DEFA, Isle of Man Government
February 2023

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1. Executive Summary

Undertaken by the Department of Environment, Food and Agriculture's (DEFA) Fisheries Division, the 'Juvenile Trout and Salmon Monitoring Programme' aims to identify trends in the Manx juvenile population, provide an overview of the status of the population in a catchment, and identify those parts of the system that are under performing. Native salmonids endemic to Manx waters include brown trout and Atlantic salmon. Overall, trout populations appear more resilient to adverse factors to Salmonid population growth including climate change, fish barriers among other influences. Salmon populations appear less resilient, requiring management efforts to assist in their survival. Without aid, the future of Atlantic salmon populations in Manx rivers appears under threat. Adult mortality rates at sea for Manx sea trout and salmon are unknown.

In 2020, salmonid monitoring was conducted on 12 sites targeting brown trout and Atlantic salmon fry (0+ i.e. fish hatched that year) and fish larger than 9cm (>0+ i.e. parr and adults). Brown trout populations remained stable with over 70% of monitored sites showing grades (under the National (England & Wales) Fisheries Classification Scheme - NFCS) within **excellent** to **average** densities. Salmon densities within **excellent** to **average** were achieved by just under 30% of sites.

Over the past 10 years, brown trout populations remained stable with 80% of monitored sites showing grades within **excellent** to **average** densities. Salmon scores within **excellent** to **average** densities were slightly under 40% of sites. Brown trout are generally prevalent with classification scores suggesting resilient populations. This may be attributed to trout greater resilience to environmental changes, competitiveness and the ease of access to spawning grounds that resident trout populations obtain without the need to migrate back to and from the sea.

Atlantic salmon juveniles compete for habitat and food with trout which becomes exacerbated further by low water flows. Susceptible to pollution and habitat disturbance, human activity has also adversely impacted juvenile Salmonid survival (i.e. Riparian strip clearance at the NSC in 2014 may have increased the risk of predation). Seriously impacted by barriers, adult fish passage during migration has been further exacerbated by low and high water flows. The concentration of adult Salmonids at barriers make them vulnerable to predators, poachers and anglers alike. High concentrations of spawning adults within limited spawning habitat create further losses if successful redds are disturbed by other spawning fish, worsened by severe spates (sudden flood waters). Removal of fish barriers will improve resilience, opening up a wider catchment area where suitable spawning grounds can be explored.

The assessment of both population trends against management initiatives has demonstrated positive effects from fish passage improvements (e.g. the Raggatt rock ramp installation in 2009) and stocking measures (e.g. Sulby, Santon Burn and Silver Burn). Ongoing negative impacts from historic barriers to fish passage (e.g. Lady Young's Weir) and climate change (e.g. Storm Desmond in 2015) challenge population resilience. Marine survival rates are a concern throughout the UK and would therefore appear to be a concern to the Isle of Man. The North Atlantic Salmon Conservation Organization's (NASCO) 'Implementation Plan for the period 2019 – 2024' outlines the threats faced by Atlantic salmon in England and Wales, assessing 44 out of 64 rivers (designated as principal salmon rivers) as high risk. NASCO states that environmental changes, particularly in the ocean, may be driving this decline, which has required the adoption of stringent management measures on a wide range of pressures confronting the resource, in order to maximise the number of fish returning to rivers to spawn.

Data on the numbers of adult salmon and sea trout returning to Manx rivers would provide a more accurate indication of both the quality and sustainability of the fishery across the life stages. This would also assist in guiding future management strategies.

Table 1. Number of sites monitored (12 sites in total) ranked by grade in 2020.

Class	Monitored Sites in 2020			
	Trout		Salmon	
	0+ (fry)	>0+ (parr)	0+ (fry)	>0+ (parr)
Excellent	4	0	0	1
Good	2	3	3	0
Average	3	5	0	3
Fair	1	2	4	2
Poor	1	2	3	4
Fishless	0	0	2	2

Table 2. Number of sites monitored ranked by grade since 2010.

Class	Monitored Sites since 2010			
	Trout		Salmon	
	0+ (fry)	>0+ (parr)	0+ (fry)	>0+ (parr)
Excellent	76	17	7	31
Good	54	39	22	26
Average	31	68	22	27
Fair	12	33	18	13
Poor	5	18	51	37
Fishless	0	3	58	44

Cover photos - Top left to right;

A Manx Atlantic Salmon leaping a weir – photo by Brian Walmsley.

DEFA Fisheries Officers sampling restocking efforts at Summerhill Glen after a previous pollution event – photo by Brian Walmsley.

Cover photos - Bottom left to right;

Atlantic salmon ova and alevins at Laxey salmon hatchery – photo by John Ward.

Brown trout sampling – photo by John Ward.

2. Introduction

2.1. Salmonids

2.1.1 Brown Trout and Sea Trout (*Salmo trutta*)

A member of the Salmonidae Family, brown trout are a native to Manx waters and as the name suggests, are brown in colour. Their native geographic range includes parts of northern Africa and Europe. Varying from light silvery brown to the more common golden brown hue, they usually appear to have lighter coloured sides with black or reddish spots, pale belly, reddish-brown fins and a brown back. Depending on habitat, they can camouflage themselves by making their skin lighter or darker in colour to match their surroundings.

Within the brown trout (*Salmo trutta*) species, there are two main ecotypes of trout: brown trout which remain 'resident' in freshwater all their life, whereas sea trout start life in freshwater then migrate to sea to feed before returning to rivers to spawn. Despite their very different life histories, brown trout and sea trout breed together and coexist as juveniles in the same rivers.

After a couple of years, sea trout will begin their migration downstream to the sea, usually from March to June. They become smolts, changing to a silvery colour and undergoing changes in physiology to adapt to life in the sea, where they grow quickly by taking advantage of feeding grounds in coastal waters.



Figure 1. Adult brown trout/Adult sea trout

2.1.2 Atlantic Salmon (*Salmo salar*)

The Atlantic salmon's geographic range includes eastern North America regions, North Atlantic Ocean and rivers around the Atlantic coasts of Europe. While at sea, adult salmon are steel-blue or silver in colour. Salmon that mature after one year at sea are called 'grilse' and usually return to rivers in the summer/autumn. Fewer, older fish that return after multiple winters at sea are often called 'springers' as they may return to rivers in the spring or early summer. Adult salmon lose their fresh appearance as they slowly make their way upstream, becoming dull in colour. Males often develop a hook on their jaw called a 'kype'.

Salmon usually spawn between November and March in gravelly, well-oxygenated rivers. The female salmon beats her tail against the gravel to dig out a shallow nest for eggs called a 'redd'. During spawning, the male fertilise eggs as the female lays them in the redd. Spent fish that make their way downstream to sea after spawning are known as 'kelts'.

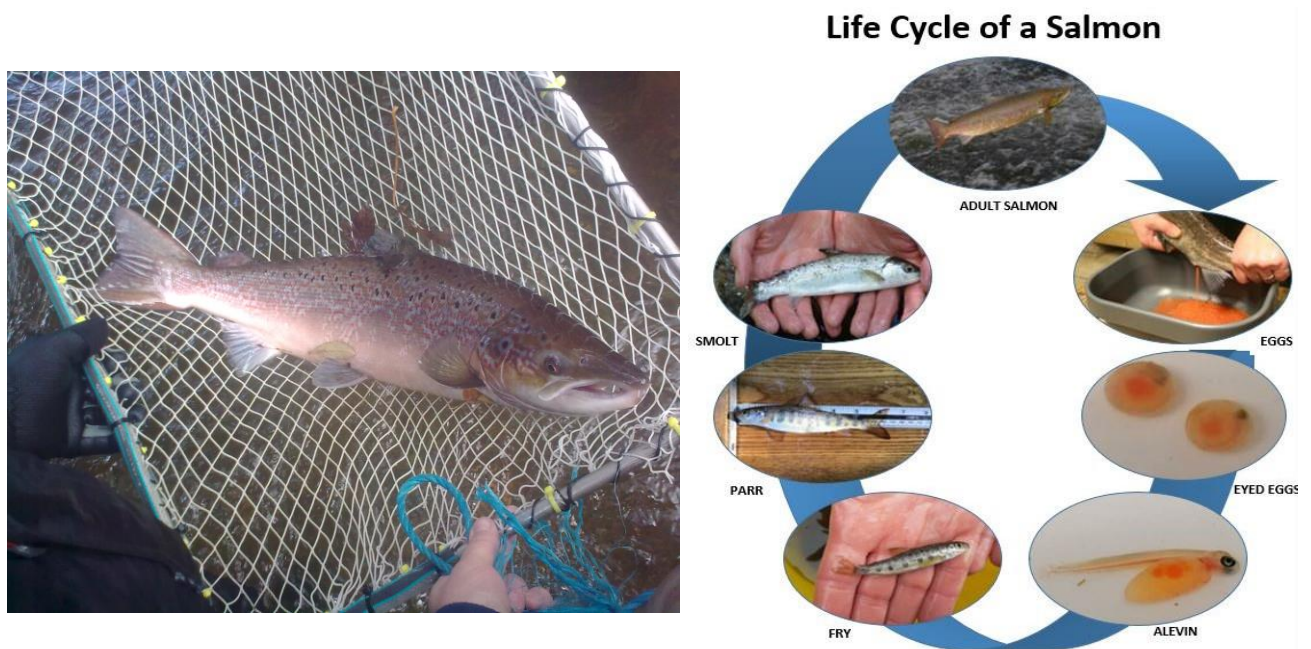


Figure 2. Salmon life cycle

Juvenile salmon usually stay in the river for two to three years. Appearing with an external yolk sac, newly hatched Salmonids are called 'alevins'. These develop into fry in their first year and then into parr in their second year and subsequent years in the river. Appearing similar to juvenile brown trout, fry are generally more silvery in colour. Parr often have well-defined dark blotches called 'parr marks' along their sides. Salmonid fry and parr require rivers with clean, well oxygenated water, cool temperatures, stony river beds and adequate cover provided by aquatic vegetation. Parr feed primarily on freshwater invertebrates.

As salmon parr prepare to migrate to sea from the river, they become 'smolts', turning more silver in appearance and undergoing physiological changes to prepare for saltwater conditions (smoltification). Salmon have a remarkable homing instinct. They migrate from the Isle of Man to their feeding grounds which could potentially be thousands of kilometres away around the Norwegian Sea and the coast of Greenland, before migrating back mostly to the rivers in which they were hatched, to spawn after one or more winters at sea.

2.2. Responsibilities of Fisheries Division

Under the Fisheries Act 2012, the Department of Environment, Food and Agriculture (DEFA/the Department) within the Isle of Man Government has a statutory duty for the "supervision and protection of inland and sea fisheries" and for "fostering the establishment and development of such fisheries."

The Fisheries Division within DEFA has responsibility for the improvement and protection of all freshwater fisheries, the regulation of fishing and the prevention of illegal exploitation. The Fisheries Division also has powers to help ensure the unobstructed migration of salmon, sea trout and eels from the sea to their spawning grounds, to control the movement and introductions of freshwater fish species and to monitor fishing and fish stocks.

The Department is committed to the maintenance and enhancement of the Island's freshwater environment and in the DEFA Department Plan 2022, sets out targets relating to the protection and improvement of freshwater fisheries.

2.3. Monitoring of Salmonids

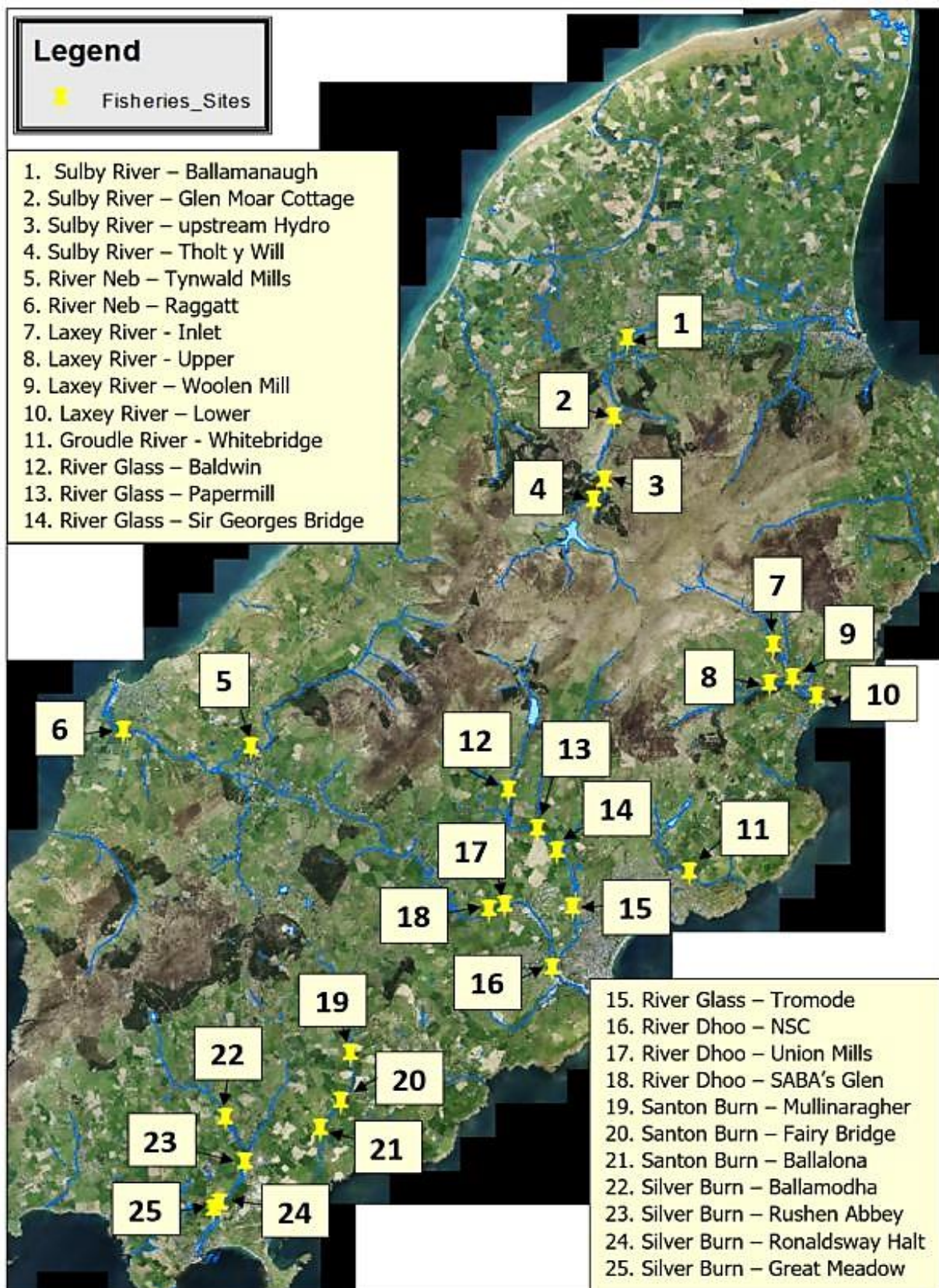
The Inland Fisheries 'Native Freshwater Fisheries Strategy 2015 – 2020' includes the aim: "To determine fish population trends in rivers across the Island with particular regard for the conservation of salmonid stocks and the effectiveness of related management strategies". Maintenance of a monitoring programme is especially important in the light of growing international concerns for the impact of climate change on salmon and sea trout populations. It also enables the Department to assess the success of management initiatives, and recovery following pollution incidents.

A juvenile salmonid monitoring programme was initiated in 2003 leading to the establishment of key sites. This report summarises the results from these sites up to and including the surveys conducted in 2020. While every effort is made to survey sites every year, this is not always possible as the ability to conduct surveys is weather-dependent; hence the relatively small number of sites surveyed during the particularly wet summers of 2008 and 2012.

Without fish counters, essential data on returning adults prevent an understanding of how marine environments are impacting migratory fish species. Atlantic salmon conservation status in Ireland and Scotland has been classified as vulnerable due to a decline in abundance, caused primarily by mortality at sea, habitat loss, barriers to migration, poor water quality, overfishing and sea lice. Fish counters would provide more data.

3. Salmonid Monitoring Sites

Figure 3. Survey sites on Manx rivers (including sites no longer used).



4. Methods

4.1. Survey Technique

Surveys are conducted July to September by electrofishing along a 30m section of stream enclosed by nets and/or natural barriers. Electrofishing involves walking upstream through the site passing a field of electricity into the water which stuns nearby fish and causes a muscle response reaction which forces them to swim towards the source of the current giving the surveyors the opportunity to catch them in nets. The fish soon recover and rarely suffer permanent harm. While only trout and salmon are netted, the presence of other species such as lamprey and eel are noted.

Whenever possible, a second catch run is performed while fish caught on the first run are contained in aerated buckets. The fish are then lightly anaesthetised prior to being identified, counted and measured. Fish with a fork length under 9cm are assumed to be less than 1 year old (0+ yrs), those ≥ 9 cm are assumed to be older ($>0+$ yrs) as outlined by the National (England & Wales) Fisheries Classification Scheme (NFCS) Guidelines. Sampling anomalies are increased in situations where for example; only one catch run was made or nets enclosing the sample area were unable to be set. These are also recorded.

4.2. Analysis of Data

Even when two catch runs are performed, electrofishing rarely results in every fish present in the survey site being caught. At sites which are heavily populated or difficult to survey due to e.g. fast flow or difficult terrain, the actual fish population may be substantially greater than the total catch.

To provide a more accurate assessment of how well populated survey sites are (and whenever two catch runs have been performed in a survey), the estimated total density of fish at the site is presented alongside the density of fish caught. Estimated total densities are calculated using an algorithm employed by the UK [Environment Agency](#), which takes account of the numbers caught on each run and the difference between each catch.

For example, if 70 fish were caught on run 1 of a survey, and only 5 fish on run 2, it would seem likely that most of the fish within the site had been captured. The algorithm in this case would estimate the total population to be 75 fish. However, if 45 fish were caught on run 1 and 30 fish on run 2, it would seem likely that not all of the fish had been captured. In this instance, the algorithm calculates a total population estimate of 116 fish.

Bearing in mind that river conditions can vary substantially from one survey to the next, estimating the total fish population in this way can provide a more reliable indication of changes in populations at a site over a period of years.

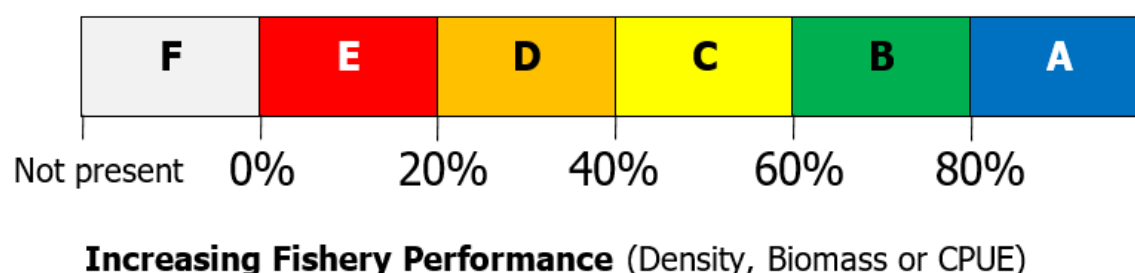
4.3. National Fisheries Classification Scheme

Population densities at each site are graded according to the absolute classifications for abundances of trout and salmon of 0+ and $>0+$ years within the NFCS. This scheme was developed by the National Rivers Authority in 1995 and is based on population data from c1000 sites in England and Wales. As well as providing a means of gauging the quality of a site within any one year, banding the data in this way is also useful when looking for trends of improvement/deterioration as actual densities will naturally fluctuate from year to year. The Institute of Fisheries Management recommend that water courses scoring **poor** may benefit from catch and release angling restrictions.

Table 3. National Fish Classification Scheme Grades.

Grade	Class	Description
A	Excellent	In the top 20% for a fishery of this type
B	Good	In the top 40% for a fishery of this type
C	Average	In the middle 20% of fisheries
D	Fair	In the bottom 40% for a fishery of this type
E	Poor	In the bottom 20% for fishery of this type
F	Fishless	No fish of this type present

Table 4. NFCS class boundaries with percentage of sites show in relation to grade.



5. Stocking

5.1. General Stocking Information

The Department has, for a number of years, stocked rainbow trout from the Cornaa Fish Farm in Maughold to the Island's reservoirs for anglers. Producing approximately 20,000 fish annually, this facility is run by two permanent staff, 365 days of the year, with assistance from DEFA Fishery Officers.

The Department also leases a salmon hatchery facility alongside the Laxey River adjacent to Laxey Flour Mills. Wild adult female and male salmon (brood stock) are caught from a struggling river and manually spawned to produce approximately 20,000 fry, which are released back to the rivers where their parents were captured. The stocking of hatchery reared fish has been used for over a century in the Isle of Man and elsewhere as a management tool designed to enhance fish stocks while improving angling opportunities.

According to best practice recommendations from organisations within the international conglomerate North Atlantic Salmon Conservation Organization - NASCO (including the Environment Agency and CEFAS), mitigating and restorative stocking for wild salmon populations is an approach used as part of England's salmon management strategy. Operating on a policy of 'supportive breeding', newly-hatched fish (alevins) are reared in incubators specially designed to mimic a natural red. Upon reaching the 'swim-up' stage, swimming fry begin to feed and are released in suitable nursery habitat along the appropriate sections of the river. Releasing fry early reduces any influence on their behaviour that might decrease their fitness for survival in the wild. Allowing natural selection to take effect increases individual fish's chances of survival out at sea and encourages their return to the same location within the river.

Sites may be stocked to boost recovery following major pollution incidents or improvements to habitat or in order to overcome 'bottlenecks' in natural recruitment such as where access

for spawning adults to good nursery habitat is limited. A recent example was the relocation of brown trout to the upper Summerhill Glen after a damaging pollution event in 2020.

At present there are limitations to natural recruitment from weirs, which can act as major barriers to upstream migration. Even when not completely impassable, fish may become weakened by their attempts to ascend and use up valuable energy while waiting for suitable flow conditions, during which time they are also increasingly vulnerable to poachers. Even with fish passes, adult numbers may still be so low that stocking upper reaches is required to increase fry populations.

Table 5. Numbers of salmon stocked around the Island since 2002.

River	Site	Salmon Stocking																		
		2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Dhoo	NSC			1,500				3,750												
	Union Mills																			
Glass	Saba's Glen																			
	Tromode			3,000					4,460											
	S.G. Bridge			5,200					6,458											
Groudie	Papermill			3,000				3,750						17,615	6,720				2,800	
	Whitebridge																			
Laxey	Woollen Mills							3,852												
	Lower Glen																			
	Glen Inlet			2,000					5,140							2,500				
	Glen Roy																4,210			
Neb	Upper Glen			5,000				3,852								2,500	4,210		2,400	
	Raggat							4,504	645											
	Tynwald Mills																			
	Glen Helen			15,000					5,007											
Santon Burn	Glen Moorar																			
	Patrick Road							5,000												
	Ballalona																			
	Fairy Bridge																			
Silver Burn	Mullinaragher																			
	Upper Santon									10,000			3,600							
	Great Meadow																			
Sulby	Ronaldsway																			
	Rushen Abbey			1,626																
	Ballamodha	3,000											9,300							
Sulby	Sulby Bridge											3,248								
	G.M. Cottage									3,000						1,700		10,000		10,000
	Upstream HEP											2,820		17,365		1,700		10,000		10,000
	Tholt-y-Will																			
	Ballamanaugh									2,400	850			1,500						
	Glen Auldyn																			

Note: Locations are approximations / Fish numbers are exact totals, approximated for some release site.

Key: Parr Fry

5.2. Impact of Stocking

When calculating the success of a stocking programme on the Island, it is important to factor in that many (possibly the majority) of juvenile salmon starting life in the upper reaches of rivers would likely remain in rivers for three winters. Most Manx salmon tend to spend only one winter at sea, typically returning to their natal river. Any offspring of stocked fry would be expected to be found in summer surveys possibly four but more likely five years after the year in which their parents were originally stocked.

Overall, success has resulted from stocking, factoring in that each river have different reasons for restocking and characteristics to overcome. The following examples summarises the variety of issues established when determining stocking success;

5.2.1. Sulby Glen

Above the Hydro-Electric Power Station (HEP) outlet

The headwaters of the Sulby River were impounded in the early 1980s to create the Island's largest reservoir, resulting in the loss of spawning and nursery areas within the flooded sections and access for fish to areas upstream of the reservoir. The altered hydrology and gravel transferral downstream was expected to alter access to fish migration and recruitment.

For instance, within the residual flow section (upstream of the HEP outlet in Sulby Glen), average winter flows in the river are much lower since Sulby Reservoir was constructed as (with the exception of a fixed compensation flow to the river) water from the tributaries is held back in the reservoir with excess water being piped downstream to the HEP plant. Also, an MSc research study conducted in 2012 concluded that the strength and turbulence of the flow in the river at the HEP outlet (when the turbines are running) may create a barrier to migration upstream at that point. Most salmon running Manx rivers do so in the autumn and would therefore be likely to encounter this stretch of the river during turbine operation. This may lessen the desire for adult salmon to venture upstream of this point to spawn.

The opening of the reservoir in 1983 also caused catastrophic pollution of the river throughout the Glen due to the reservoir excavation works releasing aluminium precipitate, which killed all fish, and most invertebrates, for several miles downstream. Gradual but sustained improvement in water quality has since taken place and the impact of high-aluminium water draining from the dam's foundations no longer appears to be severe through the majority of the Glen section.



The first fry to be caught in a survey above the HEP outlet during a year when fry had not been stocked in this reach was in 2019 five years after the stocking of hatchery-reared fry in 2014. Whilst this may appear to indicate that salmon will ascend the river past the HEP outlet given a strong inclination to do so, it is also possible that the HEP was switched off when their parent fish were running the river as the severe drought of 2018 led to HEP operation being delayed until much later in autumn 2018 than would usually be the case.

Table 6. Salmon stocking results above the Sulby HEP from 2012-2018.

Year surveyed	Stocked salmon fry	Juvenile salmon found in summer surveys		
		Fry	Parr (1+yrs)	Parr (2+yrs)
2012	Yes	Not surveyed		
2013	x	x	Yes	x
2014	Yes	Yes	x	Yes
2015	x	x	Yes	x
2016	Yes	Yes	x	x
2017	x	x	Yes	x
2018	Yes	Yes	x	Yes
2019	x	Yes	Yes	x
2020	Yes	Yes	Yes	Yes

5.2.2. Santon Burn

Above the Santon Fish Pass

A fish pass was installed in March 2009 to enable passage upstream of a large weir near Fairy Bridge. Sea trout began using the weir the following autumn leading to substantial increases in densities of juvenile trout from 2010 onwards. However, the few adult salmon entering the river appeared inclined not to seek the upper waters, which contain several miles of excellent juvenile habitat. Salmon fry bred in the Laxey Hatchery from adults caught downstream of the weir were stocked in the upper reaches of the river (above the highest survey sites) in 2011 and 2013. Fry were subsequently found at the Fairy Bridge in 2015, good densities of fry at Mullinaragher in 2016 with 1 and 2 year old parr at both sites in 2017. 2018 showed fry

at Mullinaragher and a 2 year old parr at the Fairy Bridge. A small number of parr were evident at the Fairy Bridge in 2019.

Table 7. Salmon stocking results above the Santon Fish Pass from 2011-2013.

Year surveyed	Stocked salmon fry	Juvenile salmon found in summer surveys		
		Fry	Parr (1+ysr)	Parr (2+ysr)
2004	x	x	x	x
2006	x	x	x	x
2008	x	x	x	x
2009	x	x	x	x
2010	x	x	x	x
2011	Yes	Yes	x	x
2012	x	x	Yes	x
2013	Yes	x	x	x
2014	x	x	Yes	x
2015	x	Yes	x	x
2016	x	Yes	x	X
2017	x	x	Yes	Yes
2018	x	Yes	x	Yes
2019	x	x	Yes	x
2020	x	x	x	x

5.2.3. Silver Burn

Access by migratory salmonids is hampered by the presence of large weirs at Great Meadow which is passable in a limited range of conditions and Ballasalla (Lady Young's weir) of which the latter being particularly difficult to ascend. The Ballamodha Bridge site was first surveyed in 2013 following the decision to trial stocking of salmon fry in spring of that year to mitigate the severe limitations on natural recruitment caused by the presence of weirs downstream. Approximately 9,300 fry were stocked along a 1.5km section upstream from 0.1km above the site. Some limited remedial work on Lady Young's weir was conducted in summer 2011 to improve fish passage. This was temporary as further damage was caused to these works by frequent floods during 2012.

Densities of trout fry ranged predominantly as **good** to **excellent** and trout parr ranged from as **poor** to **good**. Salmon fry were at **average** densities in 2013 (following spring stocking of fry upstream) and 2015, but remained absent until 2018, evidence that wild salmon had returned to spawn, presumably as a result of the 2013 stocking. The presence of small numbers of parr in 2013 demonstrates that adult salmon must have ascended high up the Silver Burn in autumn/winter 2011, indicating that remedial work had assisted fish passage. It appears therefore that there is scope to restore the salmon run in the upper Silver Burn given improvements to fish passage lower down, potentially combined with restoration stocking of fry.

Further downstream at the Rushen Abbey site, small numbers of salmon were found in 2003 (1 parr) and 2004 (3 fry, 9 parr). While the fry were definitely wild fish, it is likely that the parr were releases from the Laxey Salmon Hatchery. After five years of sampling produced no salmon, some fry and parr were caught in 2013, at densities of **average** and **fair** respectively, which may reflect the temporary improvement of fish passage in 2011 and the spring stocking of fry further up the river in 2013. Survival of these fry appears to have been good with parr subsequently found in **average** densities in 2014. Salmon fry and parr were absent from this survey site from 2016 to 2019, indicating that Lady Young's weir continues to hinder fish passage but is occasionally passable by large fish.

Table 8. Salmon stocking results for Silver Burn from 2003-2020.

Ballamodha					Rushen Abbey		
Year surveyed	Stocked salmon fry	Juvenile salmon found in summer surveys			Fry	Parr (1+yrs)	Parr (2+yrs)
		Fry	Parr (1+yrs)	Parr (2+yrs)			
2003	x	Not surveyed			x	Yes	x
2004	x	Not surveyed			Yes	Yes	Yes
2005	x	Not surveyed			x	x	x
2006	x	Not surveyed			x	x	x
2007	x	Not surveyed			x	x	x
2009	x	Not surveyed			x	x	x
2010	x	Not surveyed			x	x	x
2012	x	Not surveyed			Not surveyed		
2013	Yes	Yes	Yes	x	Yes	Yes	Yes
2014	x	x	Yes	x		Yes	x
2015	x	x	x	Yes	Yes	x	x
2016	x	x	x	Yes	x	x	x
2017	x	x	x	Yes	x	x	x
2018	x	Yes	x	x	x	x	x
2019	x	x	x	x	x	x	x
2020	x	x	x	x	Yes	Yes	x

5.2.4. Glass River

Papermill Site (Above the Poyl Breck Weir)

Salmon fry populations fluctuated considerably from **fishless** to **excellent**, with **excellent** densities found in 2014. The fluctuation in populations is likely to reflect the presence of a weir not far downstream from the site, passable only in a very limited range of flows and, due to deterioration, became completely impassable during the autumn/winter of 2008 (the parr found in 2010 were hatchery-reared fish). The Land Drainage Section (then of the DoT) with advice from Inland Fisheries, replaced the main structure with a more easily ascended rock ramp in summer 2009. Improvement by thinning of riparian trees and shrubs was also carried out at this originally heavily shaded site. However, while some salmon fry were seen in the years following the access improvements, numbers remained low, prompting a decision to undertake restoration stocking.

In spring 2014 the River Glass (not far downstream of this site, upstream to Baldwin Village), was stocked with 17,615 salmon fry and it is likely that it is this which led to the dramatic increase to well above average densities of fry found in summer 2014. In spring 2015, a further 6,720 fry were stocked along a similar stretch, and, despite the previously mentioned pollution incident, likely led to the above average densities of 2015. Fry were absent in 2016, then in 2017 and 2018, densities of **average** and **fair** were recorded respectively. A further stocking of c.2,800 fry occurred in 2019 approximately 1.5km upstream of the survey site. **Average** parr densities were recorded the next year although sampling was conducted under high flows with no site restriction nets.

Salmon parr densities similarly fluctuated considerably from **fishless** to **excellent**. Comparing densities of parr with fry from the previous year suggests that survival from fry to parr is good. The high parr densities found in 2006 for example were evidently linked to the high numbers of fry produced the previous year, and survival rates of fry stocked in 2014 and

2015 were evidently very good. This supports visual assessment of this site as providing excellent nursery ground for salmon, providing that accessibility for spawning adults can be maintained. It is intended that restoration stocking will continue until surveys indicate that natural recruitment has recovered to sustainable levels, and that the passability of the weir be further assessed.

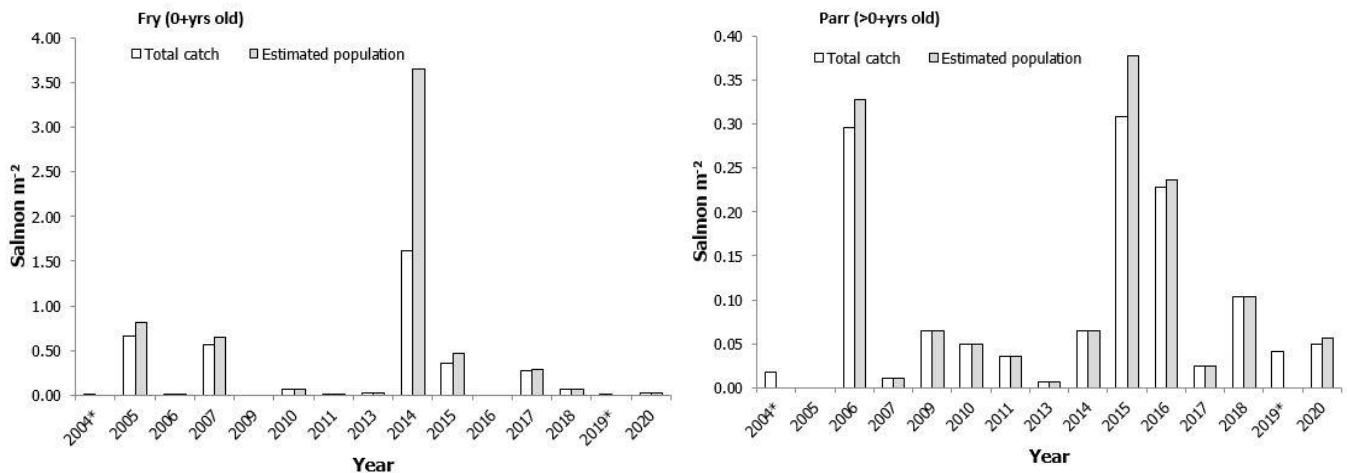


Figure 4. Salmon stocking results for the Papermill site from 2004-2020.

6. Environmental Factors Which Impact Salmonids

6.1. Environmental Parameters on Salmonid Survival

Salmonid populations are subject to environmental conditions that are influenced naturally or by human activity. The resilience of salmonids to these vary depending on the time of year, the duration and severity of the conditions, and secondary impacts as a result of changing conditions.

For example, the Island's rivers are generally spate (i.e. prone to sudden flooding) in nature with gravel/cobble/boulder substrate in most upper to mid sections, slowing as they reach lower regions where silt habitats become more prevalent. Spate river environments are prone to changes however impacts from intensifying forces like climate change and the demands for freshwater by the community, place greater pressures on salmonid populations.

Table 9. Examples of environmental factors impacting Salmonid populations.

Challenging Environmental Conditions.			
Environmental Factors	Natural	Human Made	Secondary Impact
Flow rate Alters water forces, waterlines, barriers and suspended solids.	Climate change causing unseasonal or extreme flooding and drought.	Anthropogenic climate change, water abstraction, Reservoir/hydropower stations, canalisation and drainage.	Barriers to adult fish restrict spawning sites and increase competition for habitat.
Pollution Alters pH and dissolved oxygen.	Polluted leachate through natural sediments and rock.	Polluted spills or runoff, farming activity and sewage leachate.	Pollution may remain in sediments for years.
Riparian Management Alters habitat quality to aquatic organisms, disturbance and erosion issues.	Low light levels from overgrowth reduce food for fish.	More open areas are prone to predation. River works disturb river beds, increase erosion and suspended solids.	Poor riparian management increases erosion, reducing spawning success and habitat.
Competition Alters equal access to habitat as more competitive species dominate.	Competition between fish species.	Habitat reduction from human activity increases competitive pressure.	Declining fish condition increases the risk of disease and predation.
Access Barriers hinder fish passage.	Natural weirs caused by low water levels and natural dams.	Water abstraction reducing water levels, reducing or stopping fish passage.	Habitat reduction increases competition.
Disturbance Alters spawning success, fish passage, erosion increases suspended solids.	High flow rates from flood events, bank damage and fallen trees creating natural impassable dams.	Flood protection, weirs, and canalisation increasing water flows, reducing natural habitats.	Structures within rivers can increase flow rates and erosion. Regular disturbance reduces spawning success.

Table 10. Examples of historic events impacting Salmonid populations.

Events Within Survey Areas	Pollution events Outside Survey Areas	Large In-River Works
1982 Sulby Dam Pollution	2015 Glass River Pollution (West Baldwin tributary)	2019-2020 Glen Auldryn River Flood Protection Works
2015 Storm Desmond	2019 Cringle Reservoir	2020 Pulrose Bridge Flood Protection Works
2018 Drought	2020 Summerhill Glen Pollution	2019-to date Laxey Flood Alleviation Works
	2020 Abbotsway Pollution	
	2022 Groudle Glen Pollution	

Table 11. Parameters of Salmonid survival (Ref Freshwater Biological Association).

Fresh Water Parameters for Salmonids (EU Directive 2006/44/EC)				
Factor	Description		Parameter	
			Low	High
Temperature			-1°C	21.5°C
	Spawning		2°C	10°C
pH	Sudden variation ≤0.5 of a pH		6	9
Dissolved O ₂			<60%	100%
Suspended Solids				≤25mg/L
Chemicals	Ammonia	NH ₃		0.025mg/L
	Chlorine	HOCl		0.005mg/L
	Nitrites	NO ₂		0.01mg/L
	Phosphates	PO ₄		0.2mg/L
	Sulphides	H ₂ S	Total absence	
Hardness of 100mg/L CaCO ₃	Copper	Cu		0.04mg/L
	Zinc	Zn		0.3mg/L
	Aluminium	Al		20µg/L

6.2. Climate Change and Salmonid Survival

We are facing a global climate crisis as temperature increases remain on track to cause significant global social, economic and environmental disruption over the next decades, representing a threat to lives and ways of life. Changes in climatic variables, including rising global temperatures, are also accelerating the ecological crisis which is threatening the biodiversity and ecosystems that support and sustain human life. The impacts of climate change, such as flooding, droughts, unseasonal weather events and rising sea levels are already affecting lives, locally and globally (IOM Climate Change Plan 2022-2027).

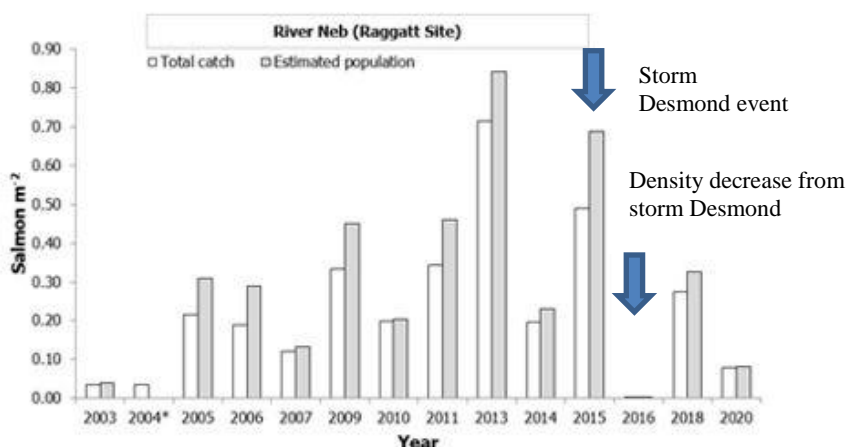
There have been two particularly notable severe weather events in recent years that have impacted the Island's freshwater environments, with evidence indicating a greater impact on Atlantic salmon populations.

6.2.1. Storm Desmond in December 2015

Trout fry populations showed no evidence at most sites of an impact on recruitment in 2016 as a result of this destructive storm event, attributed to trout being able to spawn several weeks earlier. Their eggs would have been more resilient to the disturbance as they would have settled deeper into the gravels over several weeks. Two exceptions were found at Glen Auldyn and the Upper Laxey sites, most likely from heavily constrained channels causing floodwaters to gouge deeper into the gravels.

Figure 5. Impact on fry populations from Storm Desmond 2015.

There was a catastrophic impact on salmon fry populations in the following year at most survey sites, apart from two exceptions at the Sulby Glen (above the HEP) and Santon at the Mullinaragher site. The Sulby Glen had previously been stocked, resulting in **average** fry density, accounting for losses to recruitment from the flood. The Mullinaragher site has a more naturalistic connection to flood plains, allowing the water surge to expand and spread, slowing down the flood and reducing its destructive power on redds. The December 2015 floods coincided with the main salmon spawning period, and salmon eggs were more exposed and in a more delicate condition than those of trout, many of which would have spawned several weeks earlier. In addition, brown and sea trout are more numerous overall than salmon in Manx rivers, and many spawn in small tributaries from which recolonization of impacted areas can take place.



6.2.2. Drought in 2018

Despite several fish rescues conducted across the Island in 2018, there was no immediate evidence of impact on fry densities at the survey sites, however there was some evidence of impact on fish condition. For example, the density of fry and parr at the Sulby Glen, Glen Mooar Cottage (GM Cottage) site was the highest since surveys began, but fish were notably more stunted compared to previous years. This demonstrated how drought can exacerbate competition for resources as receding waterlines constrict fish populations. The impact appears to have also been in the form of restricting access for adult returns of salmon.

Sulby Glen – Below the Hydro-Electric Power station (HEP) outlet

The following bar charts show estimated total densities of juvenile salmon at the survey site behind Glen Mooar Cottage. Substantially greater numbers of fry were stocked through this reach in 2018 and 2020 than in 2012 and 2014.

Figure 6 illustrates the vulnerability of salmon populations to the sort of climatic events predicted to become more frequent due to climate change. Natural recruitment of fry in 2013 was evidently aided by the very wet summer/autumn of the previous year encouraging returning adults to run early and high up Manx rivers. However, the catastrophic floods of Storm Desmond in December 2015 occurred during the main salmon spawning period causing a crash in recruitment of fry to several rivers across the Island (and many in the UK) in 2016. The disappointing densities of fry in 2019 were also not unique to Sulby Glen and are likely to have resulted from the severe and prolonged drought of 2018 reducing the run of adult salmon to Manx rivers that year.

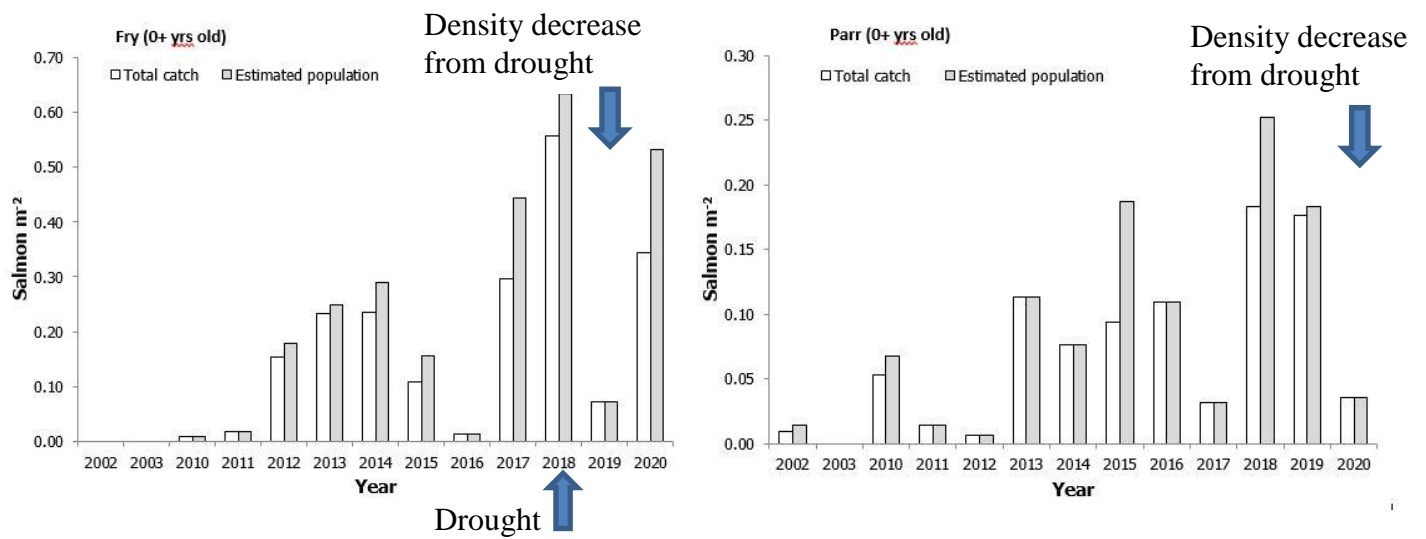


Figure 6. The 2018 drought impact on fry populations at the Glen Mooar Cottage site, Sulby.

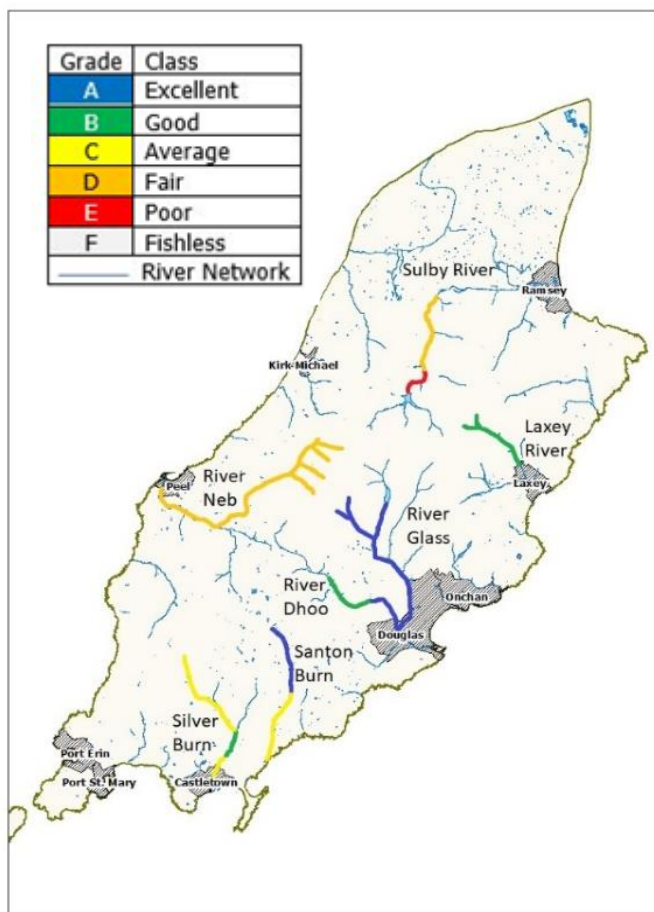
There is a need to increase the resilience of freshwater fish populations by mitigating the impacts of climate change and addressing fish passage issues, improving and conserving habitat for all life stages of fish.

7. River Assessment

The population health is calculated based on the number and size of the Salmonids present within the 30m survey site. The figures below show the health classification based on the NFCS for surveys undertaken in 2020. As not all sites are sampled yearly at sites where a survey was not undertaken in 2020 the health classification from 2019 has been used. The data shown in Appendices 2-5 show where the 2019 data has been used in replacement of a 2020 survey.

7.1. 2020 Island Wide Brown Trout Classification

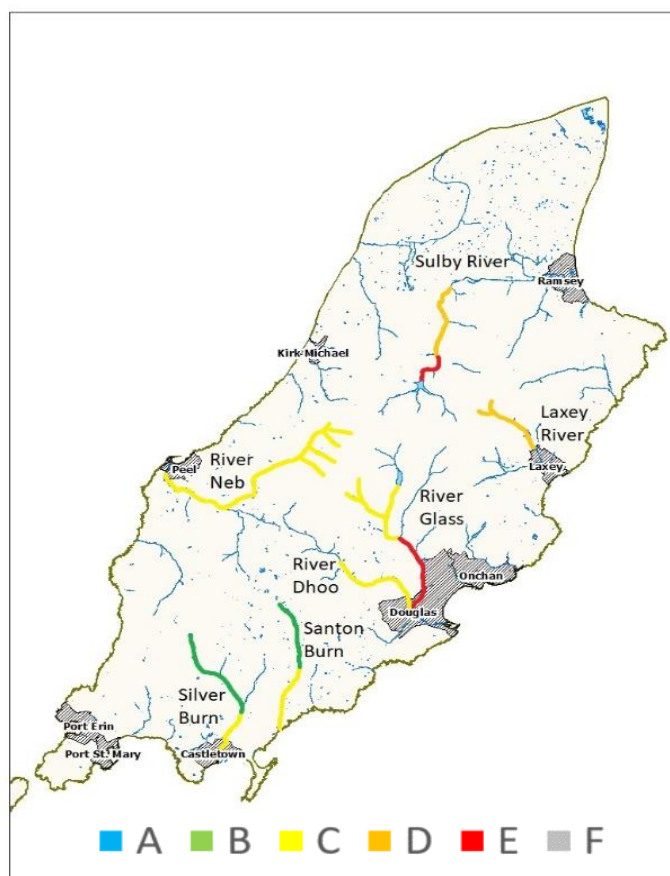
Figure 7. 2020 Trout Fry Abundance.



Recent monitoring has shown that vast majority of rivers have the ability to support juvenile brown trout populations with classifications ranging from **average** to **excellent**. Trout recruitment in 2020 has shown this to be the case with the only exceptions found along the upper Sulby River and one site along the River Neb.

Trout are found throughout all monitored locations even beyond weirs hampering fish passage as trout inhabit and spawn within the same stretch of water without the necessity to migrate to and from the sea (referred to as resident fish). Barriers to fish passage has less of an impact on trout because the majority of populations are determined to be resident fish.

Figure 8. 2020 Trout Parr Abundance.



Results have shown that all our rivers have the ability to support larger brown trout. Population densities generally vary from **average** to **good** densities. The only exceptions to 2020 densities were found along the upper Sulby River and lower Glass River.

River environments required by larger trout include deeper pools, consistent flow rates and provision of cover as protection from predators. A reliable food source of invertebrates, crustaceans and smaller fish are also critical in maintaining trout populations. Territorial, mature trout tend to push smaller fish out of their feeding grounds, lowering densities through competition.

7.2. 2020 Island Wide Salmon Classification

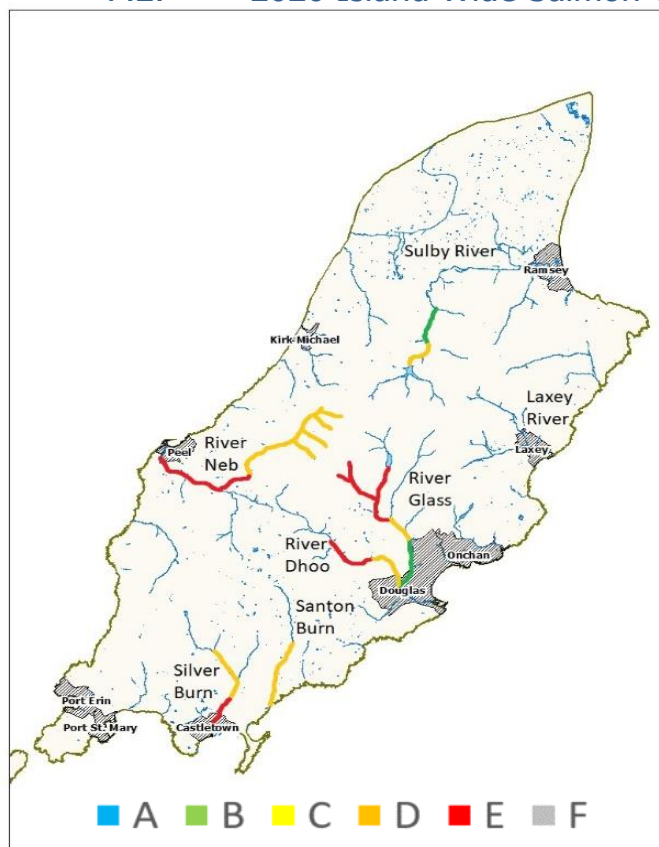


Figure 9. 2020 Salmon Fry Abundance.

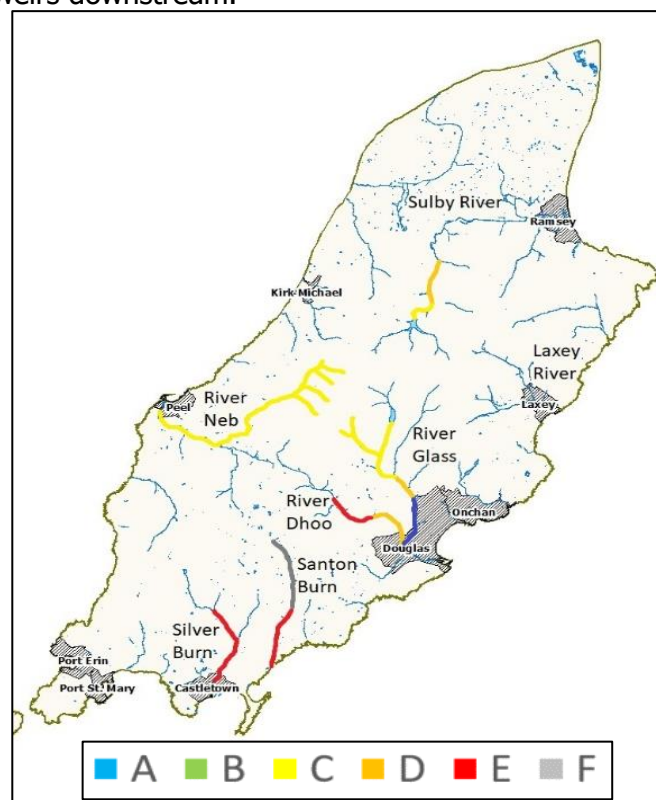
Parr population densities in 2020 were more widely and evenly distributed across river environments (compared to salmon fry) with **poor** to **excellent** densities. Weirs creating fish barriers (as shown in the Santon River catchment) resulted in **fishless** to **poor** densities. An example of salmon able to utilise the full potential of a catchment is found in the Neb River, which had **average** parr populations.

The upper Sulby River scored well along the upper and mid regions, likely due to continuing stocking efforts after a slow recovery from the 1982 Sulby Dam pollution event. Parr densities generally appear to improve from the previous year's fry densities, suggesting that parr populations may move into new locations freely, and that mortality rates are low allowing population density scores to improve.

Juvenile salmon densities are indicative of the number of returning adults making it back to successfully spawn. Comparative trout densities suggest that Manx rivers could support juvenile salmon populations within average to good densities, however salmon recruitment in 2020 has shown populations ranging between **poor** to **good**.

Poor results at the Neb appear to be caused by sampling restrictions from difficult conditions preventing the use of stop nets during the survey. Poor recruitments high up the River Glass may be due to the weir at Poyl Breck hampering the return of spawning adults.

Salmon fry were found at Rushen Abbey at the Silver Burn for the first time in several years most likely due to higher flows in the previous year, aiding fish passage over the weirs downstream.



Several sites grading fishless for salmon were due to the impact caused by weirs that hamper fish passage. Their effects are historically seen within the Santon Burn and Silver Burn, with weirs impeding the migration of migratory fish lower down the river systems. This has prevented Atlantic salmon adults from accessing the full potential of these catchments.

8. 2010 – 2020 Population Health Trends

The data presented in this section takes into account all of the surveys from 2010 – 2020. The pie charts show the percentage of surveys at a specific survey site where each National Fish Classification Scheme (NFCS) grade has been achieved. Some sites are not represented as they have become unsuitable to monitor (e.g the Whitebridge at Groudle, Great Meadow along the Silver Burn and Union Mills along the River Dhoo).

8.1. 0+ Years - Trout Fry

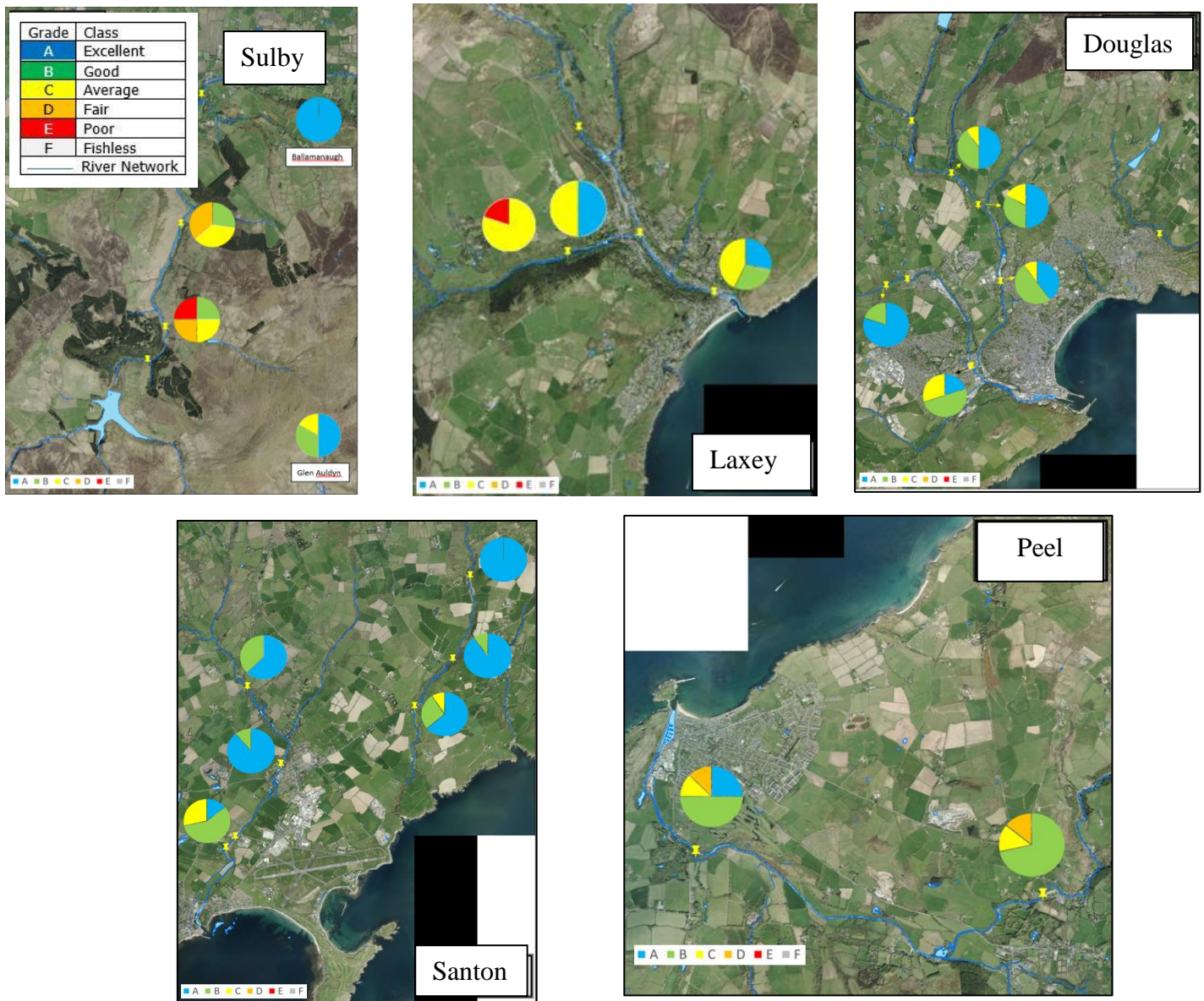


Figure 11. 2010-20 Trout Fry Abundance.

Trout fry are well represented throughout all monitored catchments as habitats are ideal and resident populations have the ability to spawn without the need to migrate. Stable populations throughout the Island consistently score **good** to **excellent** densities. Smaller water courses such as the Ballamanaugh stream in Sulby, seem ideal for trout fry as they are less turbulent with more scope for protection from predators. The Glen Auldyn and the Upper Laxey survey sites showed an impact from Storm Desmond in 2016 due to constrained channels.

Strong trout fry populations provide a greater chance that large trout populations will thrive in the future. The competitive force of such healthy densities are high, making the survival of other fish species with similar habitat preferences more challenging. Such healthy populations suggest that the Island's stream environments are able to sustain **average** to **good** densities of salmonid juveniles.

8.2. >0+ Years - Trout Parr

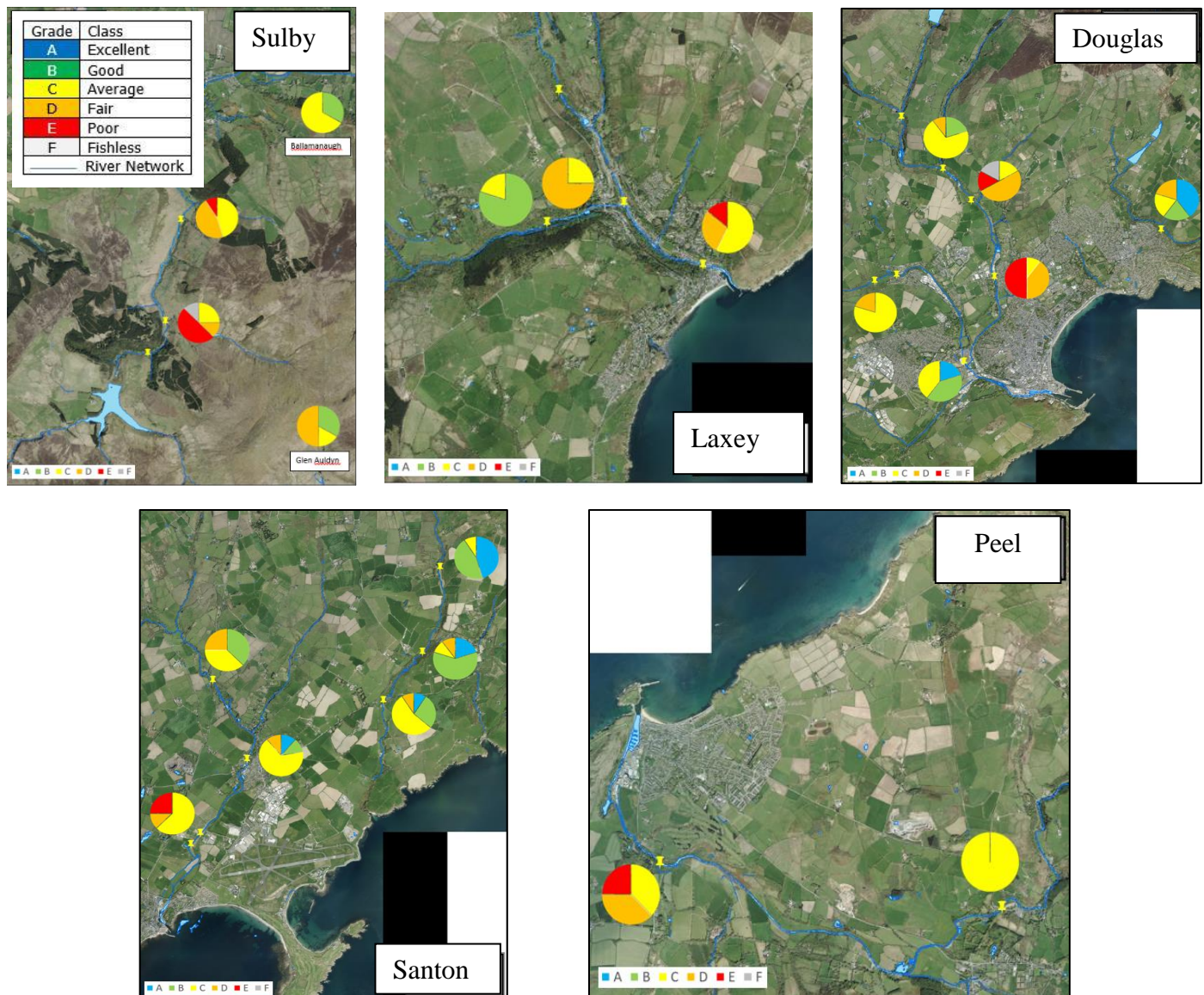


Figure 12. 2010-20 Larger Trout Abundance.

Data on trout parr populations over the previous 10 year period show they are generally well represented across the Island, consistently scoring **fair** to **excellent** densities. This is most likely due to better riparian habitats allowing cover from predators and protection from more variable water flows.

Low Salmonid population densities (apart from trout parr) at the top of the river at the Tholt y Will site may be due to a variety of reasons but likely to also be recovering from the 1982 pollution event caused by the Sulby Dam construction, where high concentrations of sediment contaminated with metals (Aluminium) discharged downstream (Galtress, K; 2005).

Consistently lower densities within the mid region of the River Glass likely a result of salmon parr outcompeting trout parr, together with the scarcity of habitat for older larger trout at the Tromode survey site. Noticeably, both river systems are subject to variable flow rates, exacerbated by compensation flow alteration from mains water supply demands.

Stretches of river where density trends vary between salmon and trout populations, clearly demonstrated fish passage issues within the Santon Catchment. Both the Silver Burn and Santon Burn have stable trout numbers, consistently scoring **average** to **excellent** densities. Resident trout residing above known weirs that hamper fish passage successfully spawn, dominating the available habitat and competing against other fish species with similar preferences.

8.3. 0+ Years - Salmon Fry

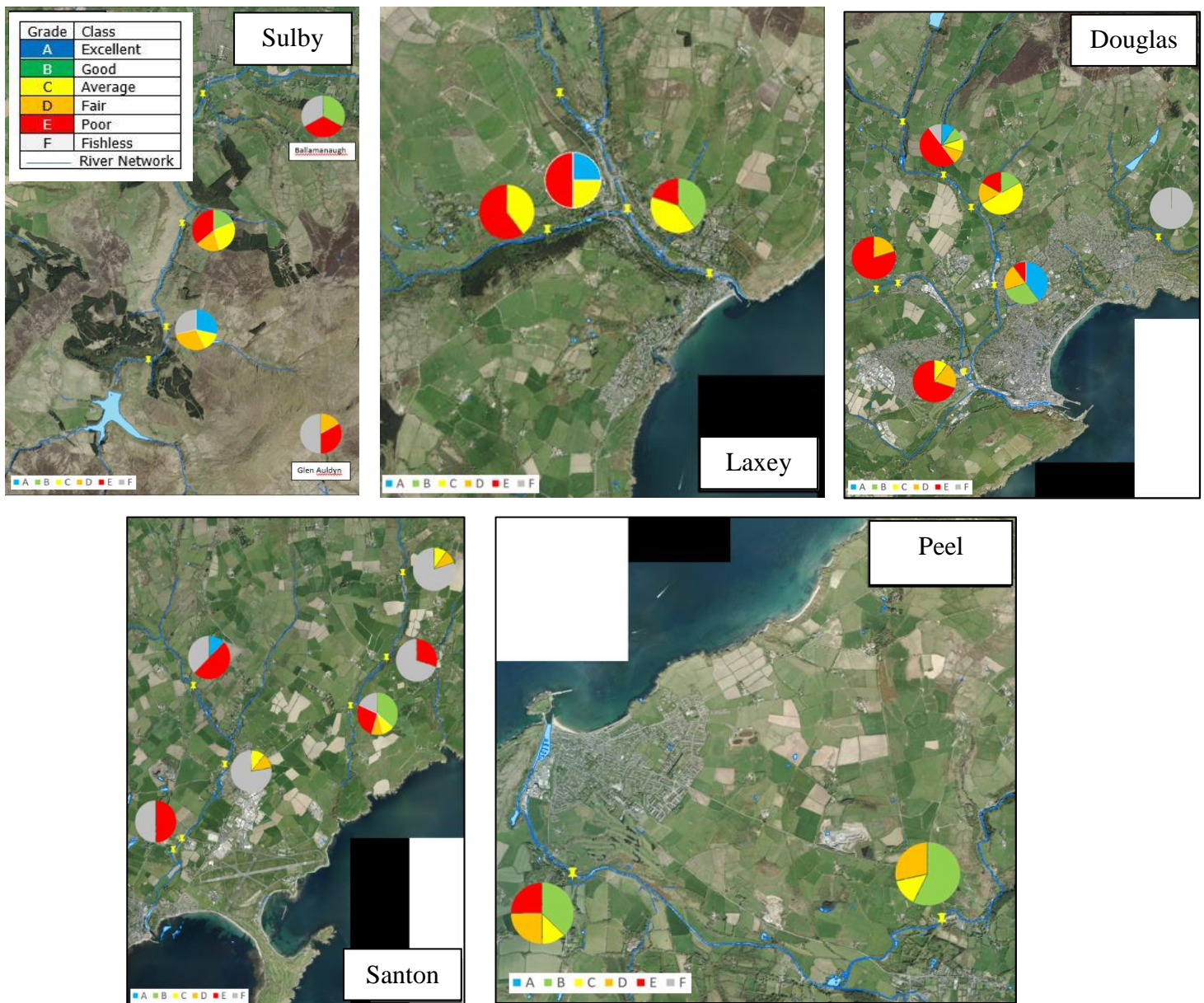


Figure 13. 2010-20 Salmon Fry Abundance.

Atlantic salmon fry are represented throughout all monitored catchments with population density scores varying over the previous 10 year period.

With stocking beginning in the Sulby River in 2011 within the upper catchment (addressing the 1982 pollution event during the Sulby Dam construction), fry densities regularly fluctuate reflecting the stocking initiatives. Connection to artificial compensation flows may also be exacerbating these fluctuations. More stable populations in Sulby were recorded at the GM Cottage site. The Ballamanaugh population fluctuations results from susceptibility to drying out and restricting access to adult salmon. The Glen Auldyn River's constrained channels, allow floodwater to rip deeper into the gravels, further impacting later spawning salmon redds when compared to trout.

Data from the Laxey catchment widely ranges from **poor** to **excellent** suggesting significant disturbance and varying adult returns impacting on the stability of fry populations. The Woollen Mills and Lower Glen weirs create issues with fish passage during low flows for returning adult salmon. The Laxey Glen weir has also been assessed by external consultants as being passable only under a limited range of flow conditions. Stocking incentives have been employed periodically in upper regions of the Laxey River to improve adult returns to these regions. Low flows impact spawning adult's access to areas above the two weirs. More stable fry populations inhabit mid sections while lower sections are consistently poor, most likely due to spawning grounds being less suitable as spawning grounds.

The Douglas catchment densities widely range from **poor** to **excellent** suggesting significant disturbance and varying adult returns impacting on the stability of fry populations. The River Glass is able to support salmon fry well above average densities however the Papermill site consistently shows highly fluctuating populations. Low water flows restrict the availability of catchment area to migrating adult salmon, reducing spawning range and habitat. Below this site, a weir is also likely to hamper fish passage during low flows. This system is also connected to artificial compensation flows from the Baldwin Reservoir, exacerbating the issues fluctuating water levels cause. Lower sections have more resilience to low flows as water, held in reserve in deeper pools provides refuge and flow. Lower sections are consistently well populated with salmon fry. A preference on habitat suitability, the River Dhoo monitoring sites generally show fry densities being diametrically opposed to parr densities when compared. Susceptible to habitat disturbance and human activity, riparian strip clearance at the National Sports Centre in 2014 may have also increased the risk of predation as parr populations dipped.

The Santon catchment recorded **fishless** to **poor** salmon fry densities consistently over the ten years, consistent with historical fish passage issues from weirs. Stocking attempts provided some assistance as wild spawned fish coincide with the timing of hatchery releases.

Results from the River Neb in Peel generally show stable, consistent populations of juvenile salmon along the length of the catchment. No fish passage issues allow salmon to use the full catchment potential although this wasn't always the case. In 2009, the Raggatt weir was replaced with a rock ramp, which not only improved passage for all freshwater fish species but allowed easier access to excellent fish nursery ground. This may have influenced a general improvement in juvenile salmon densities at this site since that year.

8.4. >0+ Years - Salmon Parr

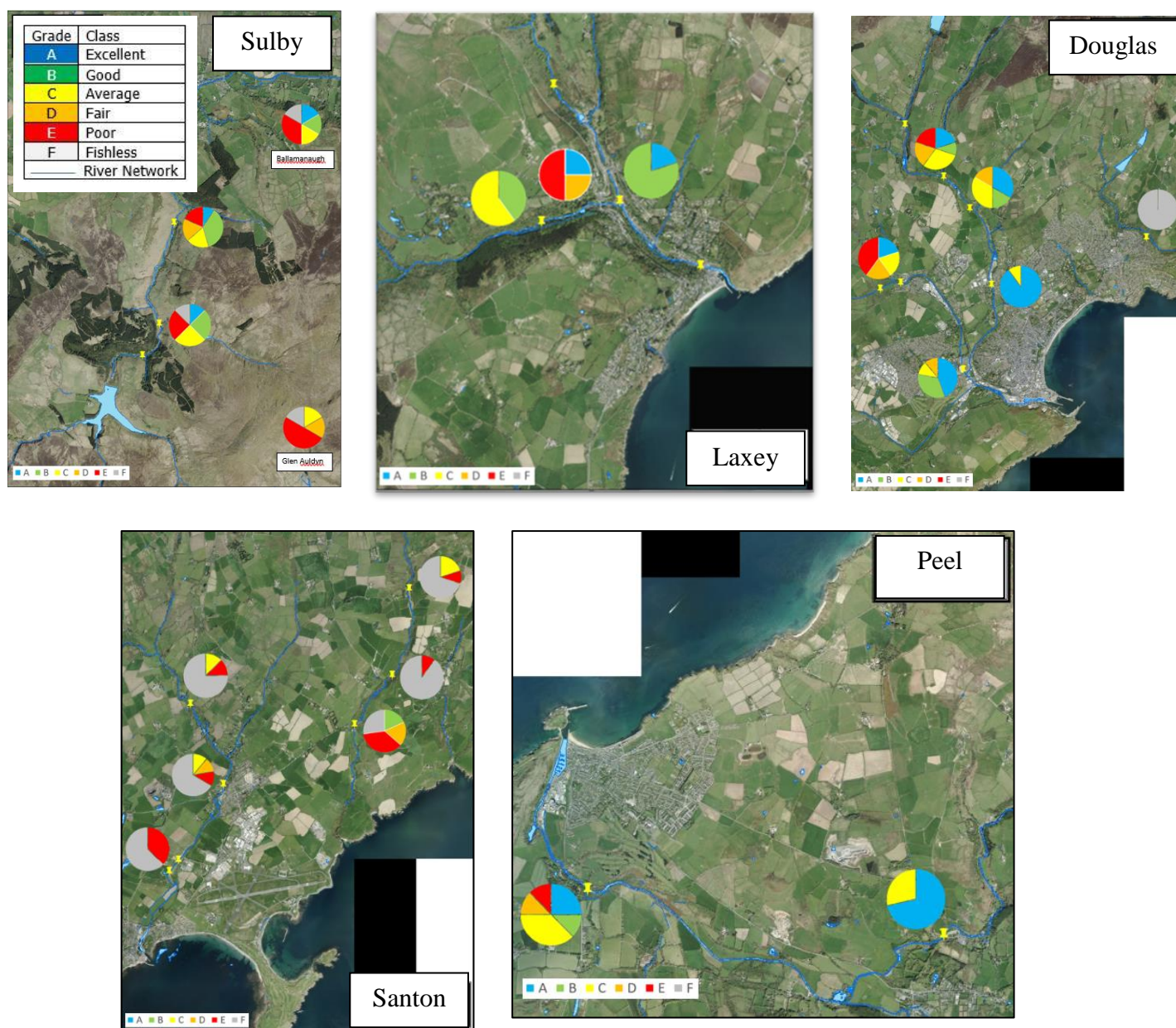


Figure 14. 2010-20 Salmon Parr Abundance.

Atlantic salmon parr are represented throughout all monitored catchments with population density scores varying over the previous 10 year period. Parr populations fluctuate biannually between upper and lower sections of the Sulby River in opposing fluctuations with juvenile populations, a result of stocking. When compared to the previous year's fry populations, parr densities at survey sites are proving to be robust, typically maintaining or improving their densities. Parr in the Ballamanaugh and Glen Auldyn River parr populations reflect the individual characteristics of these water courses, as explained previously. Before surveys ceased at both sites in 2017, stocking efforts coincide with adults returning in subsequent years.

Mid to upper stretches of the Laxey River hold healthy populations of parr, in contrast with lower sections which appear less desirable. Upper populations are robust in that their population health and has greatly improved when compared to fry densities from the previous year. This is possibly due to low mortality rates and fish moving into the survey area. Since

2017, Laxey Glen Inlet results record ranging densities possibly caused by access issues, especially during low flows. Stocking between 2009, 2016/17 and 2019 assisted salmon resilience. The harmful impact from storm Desmond on upper section fry densities was not reflected in parr populations within the same site. This may be as a result of parr resilience to flooding and movements into the area.

At the Papermill site along the upper River Glass, parr populations fluctuated while lower sections of the river maintained more consistent, higher densities, coinciding with fry populations. Flow rates and weir interference to fish passage are most likely the cause. Parr densities at the Papermill site generally improve when compared to the previous year's fry densities. This could be due to low mortality rates or more parr moving into the area. Healthy parr populations are seen consistently in lower regions of the River Dhoo. The upper Saba's Glen site recorded parr fluctuations but this may be a result of migration occurring during monitoring periods.

As fish passage is hampered at the Santon Burn fish pass, the Ballalona site has shown parr populations with **above average** densities suggesting that parr may move downstream and spawning may occur lower down the catchment. Parr were found in healthy numbers above the fish pass in 2012/14, a result from previous stocking during 2011 and 2013. The healthy 2017 parr densities however were from returning adult salmon movement above the fish pass (due to high flows). This was likely to be previously stocked salmon returning along with wild salmon. This was despite Storm Desmond's impact.

Returning adult salmon along the Silver Burn, must navigate around two weirs that hamper fish passage. Stocking of the upper regions, near the Ballamodha site in 2013 provided evidence of adult returns resulting from this as fry were seen in 2018. Both rivers within the Santon catchment show the impact that weirs create in hampering fish passage.

Results from the River Neb generally show stable, consistent parr populations along the length of the catchment. With no fish passage issues, salmon are able to utilise the full potential of habitat available to them. Limited stocking efforts were made in 2008 to 2009 which were shown to boost parr populations. Drought and low water flows have not notably impacted parr densities.

9. Angler Catch Returns

In 2003, a catch return scheme was introduced, whereby anglers fishing watercourses for salmon and sea trout were asked to complete and return a catch form at the end of the season. It was widened in 2010 to include data on catches of non-migratory trout. The scheme has provided very useful information, such as indicating an increase in the practice of catch and release. The value of catch return data is compromised due to the following reasons;

- the proportion of licence holders submitting a return is consistently low,
- Results may well reflect type, degree and distribution of fishing effort more so than the quality of the various river's salmon and sea trout runs (e.g. high rainfall years limit opportunities for fishing).
- The level of detail currently requested regarding catches limits the data's usefulness as does the low numbers of returned forms, making any conclusions on trends unreliable.

Whilst the number of angler catch return forms received remains low, it is evident that some anglers enjoy very successful fishing in Manx rivers.

10. Conclusions

In 2020, salmonid monitoring was conducted on 12 sites, targeting brown trout and Atlantic salmon fish populations. Brown trout populations had remained stable with over 70% of monitored sites being within **average** to **excellent** densities. Salmon densities within **average** to **excellent** were found in just under 30% of sites. Over the past 10 years, brown trout populations remained stable with 80% of monitored sites showing densities within **average** to **excellent** however salmon scores within **average** to **excellent** densities were slightly under 40% of sites.

The Salmonid Monitoring Programme has provided evidence that trout populations (although prevalent), are also vulnerable to competition, natural events, human made factors, and subsequent secondary impacts, as are salmon populations. Resident trout populations provide a level of resilience against the risks that migration poses to salmon and sea trout both out at sea and to returning adults. The timing of climatic events provided evidence that Salmonid eggs are vulnerable to disturbance, shown by low salmon egg survival rates in some rivers after the catastrophic flood event of December 2015. Juvenile Salmonid populations are prone to the effects of low water flows, drought and disturbance within rivers as this intensifies inter and intra specific competition and increases the risk of predation, including from larger fish.

Trout populations appear more resilient to adverse factors to Salmonid populations including fish barriers, climate change among other influences. Salmon populations appear less resilient, requiring management efforts to assist in their survival. Without aid, the future of Atlantic salmon populations in Manx rivers appears under threat. The prediction of some scientists that extreme weather events will become more frequent due to climate change emphasises the importance of addressing issues such as land management and safe fish passage in order to boost the resilience and thereby aid the sustainability of Salmonid populations on the Isle of Man. NASCO states that environmental changes, particularly in the ocean, may be driving the international decline of Atlantic salmon, which has required the adoption of stringent management measures on a wide range of pressures confronting the resource, in order to maximise the number of fish returning to rivers to spawn.

The Department has responsibility for the improvement and protection of all freshwater fisheries, the regulation of fishing and the prevention of illegal exploitation. DEFA Fisheries Division also has powers to help ensure the unobstructed migration of salmon, sea trout and eels from the sea to their spawning grounds, to control the movement and introductions of freshwater fish species and to monitor fishing and fish stocks. DEFA Fisheries will develop the Island's 'Native Freshwater Fisheries Strategy' to guide management of Manx freshwater fish populations on recommendation from local reports (such as the 'Juvenile Trout and Salmon Monitoring Programme Report-2002-2020 Data') and on advice from international organisations.

11. Further Work

Short Term Goals (next 2 Years)

- Supportive breeding and stocking of salmon fry should continue to be targeted to areas where either anthropogenic impacts cannot otherwise currently be mitigated or where restoration stocking is deemed beneficial following improvements to fish passage. Stocking should be avoided in areas, where the impact of dry summers on juvenile mortality appears to be severe, e.g. Ballamanaugh River.
- Use the data presented in this report to inform future river works programmes and educate contractors on the reasons for protecting the watercourses whilst work is being undertaken.
- Work with other Government Departments to raise awareness of the potential ecological consequences of river bank management and how the practices should be improved to minimising the impact of vegetation control on salmonid populations and the spread of non-native invasive plants.
- Santon Burn fish pass – restoration efforts are required as the fish pass has recently become impassable due to natural water course changes.

Long Term Goals

- Pursue the resourcing of fish counters for all monitored rivers to collect more accurate data on returning adult sea trout and salmon. Evidence may point oceanic factors impacting the numbers of returning adult which would directly impact spawning intensity and success.
- The monitoring programme should be reviewed and revised to enable (while being mindful of resource constraints), more in-depth investigation of a number of issues that have so far been revealed; for example
 - Poor salmonid densities in the vicinity of the Manx Utilities water treatment works at the bottom of Sulby River.
 - Poor natural recruitment of salmon in the West Baldwin leg of the River Glass.
- Undertake a strategic approach (where resources allow) towards generating a presence/absence assessment for salmonids at various locations including some of the smaller watercourses.
- Opportunities to improve fish passage on the Island's salmon rivers should be explored
 - Liaise with Manx Utilities to ensure that forthcoming renovation of the weir near the Woollen Mills on the Laxey River results in easier passage for salmon and trout
 - potential to install a pre-barrage at Lady Young's weir on the Silver Burn
 - Identify other watercourses with weirs that hamper fish passage and discuss with the necessary teams on how to install a fish passage to enable migrating salmon to return to their spawning grounds.
- Work with the Environmental Protection Unit and Flood Risk to raise the awareness of the risks with vegetation being disposed of inappropriately next to or in watercourses. A publicity campaign is planned for the spring which will outline the legislation, risks and where to appropriately dispose of grass cuttings and shrubs.
- Look to manage salmon angling practices to assist consistently **poor** scoring populations (such as catch and release restrictions). Public consultation on any mitigating strategy and amendment to Inland Fisheries Regulations 2017 will be sought for any implementation.
- Consideration of a 'Freshwater Fisheries Management Board' as a non-statutory advisory Board functioning much the same as the Scallop Management Board (SMB) does.

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13. Appendices

13.1. Appendix 1 – List of Sampling Sites

River	Site	X	Y
River Dhoo	NSC	236585	475862
River Dhoo	Union Mills	235248	477730
River Dhoo	SABA's Glen	234796	477603
River Glass	Sir George's Bridge	236739	479296
River Glass	Tromode	237178	477670
Laxey River	Woollen Mills	243413	484408
Laxey River	Laxey Glen, Lower	244103	483856
River Neb	Raggatt	224459	482856
River Neb	Tynwald Mills	228063	482395
Santon Burn	Ballalona	230000	471147
Santon Burn	Mullinaragher	230887	473372
Santon Burn	Fairy Bridge	230615	471967
Silver Burn	Ballamoda Bridge	227383	471471
Silver Burn	Great Meadow	227008	468769
Silver Burn	Rushen Abbey	227891	470196
Silver Burn	Ronaldsway Halt	227157	468961
Sulby River	Lower Ballamanaugh	238712	494401
Laxey River	Laxey Glen Inlet	242847	485395
River Glass	Baldwin Village	235344	481093
Groudle River	Whitebridge	240515	478748
River Glass	Papermill	235346	481099
Laxey River	Laxey Glen, Upper	242742	484227
Sulby River	Glen Mooar Cottage	238344	492064
Sulby River	Tholt-y-Will	237775	489652
Sulby River	Upstream Hydro	238095	490211

13.2. Appendix 2 – 0+ Years Trout Population Health Summary

See Section 5.3 for more information on the National Fish Classification (NFC) Scheme.

River	Site	0+ yrs Trout - Yearly Grade using NFC Scheme																		
		2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Dhoo	NSC	-	C	A	D	C	B	-	C	B	C	B	B	B	B	C	A	-	C	A
	Union Mills	-	B	C	C	D	C	-	C	B	C	B	-	-	-	-	-	-	-	-
	Saba's Glen	-	-	-	-	-	-	-	-	-	-	-	A	A	A	A	-	-	B	-
Glass	Tromode	-	C	C	B	A	A	-	C	C	A	-	A	A	B	B	B	B	B	A
	S. G. Bridge	-	-	-	B	-	B	-	C	B	A	-	A	B	-	-	-	A	C	-
	Papermill	-	-	D	A	B	C	-	B	A	B	-	A	A	C	B	B	A	B	A
Groudle	Whitebridge	-	B	A	B	B	A	A	B	A	A	A	B	A	-	-	-	-	-	-
Laxey	Woollen Mills	-	D	C	B	A	C	-	F	B	C	-	C	-	-	-	-	-	-	-
	Lower Glen	-	-	-	D	A	-	-	C	A	B	-	A	C	C	-	-	-	-	-
	Glen Inlet																B	C	C	B
	Upper Glen													C	C	E	C	C	-	-
Neb	Raggat	-	C	C	B	C	B	-	C	B	B	-	C	A	A	B	-	B	-	D
	Tynwald Mills	-	D	B	B	-	B	-	D	B	C	-	B	B	-	B	B	-	D	-
Santon Burn	Ballalona	-	B	A	A	-	A	-	B	A	A	B	A	A	B	A	A	A	B	C
	Fairy Bridge	-	-	-	-	-	-	A	B	A	B	A	A	A	A	A	A	A	A	-
	Mullinaragher	-	-	C	-	B	-	-	B	A	A	A	A	A	A	A	A	A	A	A
	Upper Santon													C	B	B	B	-	-	-
Silver Burn	Great Meadow	-	-	-	-	B	C	-	D	A	D	-	-	-	-	-	-	-	-	-
	Ronaldsway	-	-	-	-	-	-	-	-	-	-	-	B	B	B	C	B	A	B	C
	Rushen Abbey	-	C	D	A	A	B	-	B	A	-	-	A	A	A	A	A	A	A	B
	Ballamodha	-	-	-	-	-	-	-	-	-	-	-	B	B	A	A	A	A	B	C
Sulby	W.T. works	-	-	-	-	-	-	-	-	-	-	-	E	E	D	-	-	-	-	-
	G. M. Cottage	D	D	-	-	-	-	-	-	B	B	D	C	D	D	C	C	B	C	D
	Upstream HEP	-	-	-	-	-	-	-	-	-	-	-	B	D	C	C	D	B	E	E
	Tholt-y-Will	C	E	F	E	E	D	-	E	-	-	D	-	-	-	-	-	-	-	-
	Ballamanaugh	-	B	C	A	A	B	A	B	-	A	A	A	A	A	A	-	-	-	-
	Glen Auldyn	-	A	A	B	A	A	B	B	A	A	B	A	-	B	C	-	-	-	-

Sampling anomaly applies (refer 'Survey Technique')

13.3. Appendix 3 – >0+ Years Trout Population Health Summary

River	Site	>0+ yrs Trout - Yearly Grade using NFC Scheme																		
		2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Dhoo	NSC	-	A	B	A	A	C	-	B	B	C	C	B	A	A	B	B	-	C	C
	Union Mills	-	B	B	A	A	A	-	A	A	A	B	-	-	-	-	-	-	-	-
	Saba's Glen	-	-	-	-	-	-	-	-	-	-	-	B	C	C	C	-	-	C	-
Glass	Tromode	-	E	E	C	D	E	-	D	D	E	-	C	D	D	D	E	E	E	E
	S. G. Bridge	-	-	-	D	-	C	-	D	F	E	-	D	D	-	-	-	C	D	-
	Papermill	-	-	D	D	C	D	-	E	D	C	-	C	B	C	C	C	B	C	C
Groudle	Whitebridge	-	B	C	A	A	B	B	C	D	C	B	A	A	-	-	-	-	-	-
Laxey	Woollen Mills	-	B	B	B	A	B	-	C	C	B	-	B	-	-	-	-	-	-	-
	Lower Glen	-	-	-	B	C	-	-	E	E	C	-	C	C	D	-	-	-	-	-
	Glen Inlet																D	C	D	D
	Upper Glen													B	B	B	C	B	-	-
Neb	Raggat	-	B	C	B	D	C	-	C	C	C	-	D	E	D	D	-	E	-	C
	Tynwald Mills	-	C	C	C	-	B	-	C	C	C	-	C	C	-	C	C	-	C	-
Santon Burn	Ballalona	-	D	C	C	-	C	-	B	D	B	C	A	B	C	C	C	C	B	C
	Fairy Bridge	-	-	-	-	-	-	C	B	B	B	B	B	A	B	A	B	C	D	-
	Mullinaragher	-	-	C	-	E	-	-	D	C	A	A	B	A	B	A	B	B	A	B
	Upper Santon													A	A	B	B	-	-	-
Silver Burn	Great Meadow	-	-	-	-	C	C	-	C	C	B	-	-	-	-	-	-	-	-	-
	Ronaldsway	-	-	-	-	-	-	-	-	-	-	-	E	C	C	C	C	D	E	C
	Rushen Abbey	-	C	C	D	B	C	-	C	A	-	-	C	C	C	C	D	C	C	B
	Ballamodha	-	-	-	-	-	-	-	-	-	-	-	B	D	D	C	C	B	C	B
Sulby	W.T. works	-	-	-	-	-	-	-	-	-	-	-	F	E	E	-	-	-	-	-
	G. M. Cottage	B	C	-	-	-	-	-	-	C	E	C	C	C	D	D	D	C	D	D
	Upstream HEP	-	-	-	-	-	-	-	-	-	-	-	D	C	E	F	E	C	E	E
	Tholt-y-Will	C	C	C	D	E	E	-	D	-	-	B	-	-	-	-	-	-	-	-
	Ballamanaugh	-	A	C	A	C	C	B	C	-	C	B	B	C	C	C	-	-	-	-
	Glen Auldyn	-	A	D	A	D	D	E	C	D	D	C	B	-	D	B	-	-	-	-

13.4. Appendix 4 – 0+ Years Salmon Population Health Summary

River	Site	0+ yrs Salmon - Yearly Grade using NFC Scheme																		
		2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Dhoo	NSC	-	E	E	E	D	A	-	B	E	C	E	E	E	E	E	D	-	E	D
	Union Mills	-	E	E	E	F	F	-	E	E	F	D	-	-	-	-	-	-	-	-
	Saba's Glen	-	-	-	-	-	-	-	-	-	-	-	E	E	E	D	-	-	E	-
Glass	Tromode	-	C	D	B	A	A	-	B	A	A	-	A	B	A	E	C	B	C	B
	S.G. Bridge	-	-	-	C	-	A	-	D	B	C	-	E	C	-	-	-	C	D	-
	Papermill	-	-	E	B	E	B	-	F	E	E	-	E	A	B	F	C	D	E	E
Groudle	Whitebridge	-	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	-	-	-
Laxey	Woollen Mills	-	E	F	E	F	F	-	F	F	F	-	F	-	-	-	-	-	-	-
	Lower Glen	-	-	-	C	D	-	-	D	B	B	-	E	C	C	-	-	-	-	-
	Glen Inlet	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	E	E	B
	Upper Glen	-	-	-	-	-	-	-	-	-	-	-	-	E	C	E	C	E	-	-
Neb	Raggat	-	E	E	C	C	D	-	B	D	B	-	B	D	B	E	-	C	-	E
	Tynwald Mills	-	B	E	D	-	B	-	D	B	B	-	B	B	-	D	C	-	D	-
Santon Burn	Ballalona	-	E	F	D	-	B	-	B	B	F	D	E	E	B	E	F	F	E	D
	Fairy Bridge	-	-	-	-	-	-	F	F	F	F	F	F	F	E	F	F	F	F	-
	Mullinaragher	-	-	F	-	F	-	-	F	F	E	F	F	F	F	C	F	C	F	F
	Upper Santon	-	-	-	-	-	-	-	-	-	-	-	-	F	F	F	F	-	-	-
Silver Burn	Great Meadow	-	-	-	-	F	E	-	E	F	E	-	-	-	-	-	-	-	-	-
	Ronaldsway	-	-	-	-	-	-	-	-	-	-	-	E	F	E	F	F	F	F	E
	Rushen Abbey	-	F	E	F	F	F	-	F	F	-	-	C	F	E	F	F	F	F	D
	Ballamodha	-	-	-	-	-	-	-	-	-	-	-	C	F	F	F	F	E	F	F
Sulby	W.T. works	-	-	-	-	-	-	-	-	-	-	-	E	E	E	-	-	-	-	-
	G.M. Cottage	F	F	-	-	-	-	-	E	E	D	C	C	C	D	E	C	B	E	B
	Upstream HEP	-	-	-	-	-	-	-	-	-	-	-	F	A	F	C	-	A	D	D
	Tholt-y-Will	F	F	F	F	F	F	-	F	-	-	F	-	-	-	-	-	-	-	-
	Ballamanaugh	-	C	F	F	C	D	D	E	-	E	F	B	F	B	E	-	-	-	-
	Glen Auldyn	-	F	F	F	E	D	F	E	F	E	F	D	-	F	F	-	-	-	-

Note: stocking marked with outline



Sampling anomaly applies (refer 'Survey Technique')



13.5. Appendix 5 - >0+ Years Salmon Population Health Summary

River	Site	>0+ yrs Salmon - Yearly Grade using NFC Scheme																		
		2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Dhoo	NSC	-	B	D	C	A	B	-	A	A	A	A	A	A	C	B	B	-	B	D
	Union Mills	-	F	F	E	F	F	-	E	B	E	F	-	-	-	-	-	-	-	-
	Saba's Glen	-	-	-	-	-	-	-	-	-	-	-	A	C	D	E	-	-	E	-
Glass	Tromode	-	D	C	B	A	A	-	A	A	A	-	A	A	A	A	C	A	A	A
	S.G. Bridge	-	-	-	B	-	E	-	A	C	B	-	A	C	-	-	--	A	D	-
	Papermill	-	-	E	F	A	E	-	C	C	D	-	E	C	A	A	E	B	D	C
Groudle	Whitebridge	-	F	F	F	F	F	F	F	F	F	F	F	F	F	F	-	-	-	-
Laxey	Woollen Mills	-	D	E	E	E	E	-	B	E	E	-	F	-	-	-	-	-	-	-
	Lower Glen	-	-	-	A	A	-	-	A	B	A	-	B	B	B	-	-	-	-	-
	Glen Inlet	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	E	B	D	E
	Upper Glen	-	-	-	-	-	-	-	-	-	-	-	-	C	C	B	C	B	-	-
Neb	Raggat	-	E	E	C	E	D	-	B	A	C	-	B	A	D	C	-	E	-	C
	Tynwald Mills	-	B	A	B	-	A	-	B	A	A	-	A	A	-	A	C	-	C	-
Santon Burn	Ballalona	-	F	C	F	-	F	-	E	B	B	E	C	B	E	B	D	F	F	E
	Fairy Bridge	-	-	-	-	-	-	F	F	F	F	E	F	F	E	F	D	E	F	-
	Mullinaragher	-	-	F	-	F	-	-	F	F	F	D	F	F	F	F	C	F	F	F
	Upper Santon	-	-	-	-	-	-	-	-	-	-	-	-	C	E	-	F	-	-	-
Silver Burn	Great Meadow	-	-	-	-	E	F	-	D	E	F	-	-	-	-	-	-	-	-	-
	Ronaldsway	-	-	-	-	-	-	-	-	-	-	-	E	E	F	E	F	F	F	E
	Rushen Abbey	-	E	E	F	F	F	-	F	F	-	-	D	C	F	F	F	F	F	E
	Ballamodha	-	-	-	-	-	-	-	-	-	-	-	E	A	E	E	E	F	F	F
Sulby	W.T. works	-	-	-	-	-	-	-	-	-	-	-	C	E	E	-	-	-	-	-
	G.M. Cottage	E	F	-	-	-	-	-	-	C	E	E	B	C	B	B	D	A	B	D
	Upstream HEP	-	-	-	-	-	-	-	-	-	-	-	C	E	B	F	B	E	A	C
	Tholt-y-Will	F	F	F	F	F	F	-	F	-	-	F	-	-	-	-	-	-	-	-
	Ballamanaugh	-	E	C	E	F	E	E	E	-	E	A	E	B	F	C	-	-	-	-
	Glen Auldyn	-	F	E	E	D	E	D	E	E	D	C	E	-	E	F	-	-	-	-

13.6. Appendix 6 - >0+ Years Salmon – Grade Change compared to Previous Year Fry Density

River	Site	>0+ yrs Salmon - Grade Change from Previous Year Fry Density											Average Score
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
Dhoo	NSC	A+	A++++	A++++	A++++	A++++	C++	B+++	B+++	-	B	D+	A
	Union Mills	B+++	E*	F*	-	-	-	-	-	-	-	-	D
	Saba's Glen	-	-	-	A	C++	D+	E*	-	-	E	-	D
Glass	Tromode	A+	A*	-	A	A*	A+	A*	C++	A++	A+	A++	A
	S.G. Bridge	C	B*	-	A	C++	-	-	--	A	D-	-	B
	Papermill	C	D+	-	E	C++	A	A+	E+	B+	D*	C++	C
Groudle	Whitebridge	F*	F*	F*	F*	F*	F*	F*	-	-	-	-	F
Laxey	Woollen Mills	E+	E+	-	F	-	-	-	-	-	-	-	E
	Lower Glen	B++	A+	-	B	B+++	B+	-	-	-	-	-	B
	Glen Inlet								E	B	D	E	D
	Upper Glen	-	-	-	-	C	C++	B+	C++	B+	-	-	C
Neb	Raggat	A+	C+	-	B	A+	D*	C-	-	E	-	C	C
	Tynwald Mills	A+++	A+	-	A	A+	-	A	C	-	C	-	B
Santon Burn	Ballalona	B*	B*	E+	C+	B+++	E*	B*	D+	F*	F*	E*	D
	Fairy Bridge	F*	F*	E+	F*	F*	E+	F -	D+	E+	F*	-	F
	Mullinaragher	F*	F*	D+	F*	F*	F*	F*	C*	F*	F --	-	F
	Upper Santon	-	-	-	-	C	E+	-	F*	-	-	-	E
Silver Burn	Great Meadow	E*	F*	-	-	-	-	-	-	-	-	-	E
	Ronaldsway	-	-	-	E	E*	F*	E*	F*	F*	F*	E	E
	Rushen Abbey	F*	-	-	D	C*	F*	F -	F*	F*	F*	E	E
	Ballamodha	-	-	-	E	A++	E+	E+	E+	F*	F -	F*	E
Sulby	W.T. works	-	-	-	C	E*	E*	-	-	-	-	-	E
	G.M. Cottage	C	E*	E*	B++	C*	B+	B++	D+	A++	B*	D+	C
	Upstream HEP	-	-	-	C	E+	B -	F*	B+	E	A*	C+	C
	Tholt-y-Will	-	-	F	-	-	-	-	-	-	-	-	F
	Ballamanaugh	-	E	A++++	E+	B*	F*	C -	-	-	-	-	C
	Glen Auldyn	E*	D++	C++	E+	-	E	F*	-	-	-	-	E
Significant Events							Desmond Storm				Drought		

Key		
Increasing Density	Same	Decreasing Densities
The number of + or - indicates the number of grades changed.		

Note:

Grade Change Trends;

- are not representative of direct fry to 1st year Parr population changes as Parr may spend up to 3 years in river catchments.
- Will include Parr movement into sites. Lower sections may also hold migrating smolt. Fry tend to remain near their spawning sites.
- grades represent river holding capacity rather than numbers of Parr.

13.7. Appendix 7 – Salmon Density Scores (m²)

Salmon Fry Raw Data/100m (0+ Salmon)																																					
Sulby Catchment				Laxey Catchment								Douglas Catchment								Santon Catchment												Peel Catchment					
River	Sulby			Laxey								Douglas								Santon Burn				Silver Burn				Neb									
Location	Glen Moar Cottage	Upstream HEP	Tholt-y-Will	Wollen Mills	Lower Glen	Glen Inlet	Upper Glen	NSC	Union Mills	Saba's Glen	Tromode	Sir George's Bridge	Paper Mill	Ballalona	Fairy Bridge	Mullinaragher	Upper Santon	Great Meadow	Ronaldsway	Rushen Abbey	Ballamodha	Raggart	Tynwald Mills														
Grid Ref				SC 434 844	SC 430 842	SC 429 854		SC 356 760	SC 354 777	SC 348 776	SC 372 771	SC 367 793		SC 299 710				SC 270 688		SC 278 702		SC 244 828	SC 281 824														
	Total Catch	Est	Total Catch	Est	Total Catch	Est	Total Catch	Est	Total Catch	Est	Total Catch	Est	Total Catch	Est	Total Catch	Est	Total Catch	Est	Total Catch	Est	Total Catch	Est	Total Catch	Est													
2002	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0														
2003	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.4	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0														
2004	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.2	0.0	2.7	0.0	0.0	0.0	0.0	0.0	0.0														
2005	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.4	28.2	0.0	0.0	0.0	0.0	6.4	0.0	0.8	0.8	0.0	0.0	0.0	0.0	0.0														
2006	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.6	20.3	0.0	0.0	0.0	9.1	9.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0														
2007	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	56.5	86.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0														
2008	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0														
2009	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.0	15.3	0.0	0.0	0.0	0.0	47.0	5.0	6.0	0.0	0.0	0.0	0.0	0.0														
2010	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	58.9	75.0	0.0	0.0	0.0	7.0	7.0	1.9	1.9	0.0	0.0	0.0	0.0	0.0														
2011	1.9	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	60.8	72.5	0.0	0.0	0.0	29.0	33.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0														
2012	15.4	17.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.1	6.1	10.5	10.5	0.0	0.0	0.0	0.0	0.0														
2013	23.4	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.2	7.2	0.0	0.0	0.0	5.8	6.7	0.0	0.0	2.6	2.6	111.5	151.3	6.7														
2014	23.4	29.0	86.9	107.7	0.0	0.0	0.0	0.0	0.0	20.4	23.7	0.0	0.0	3.7	2.0	2.0	0.0	0.0	4.3	4.3	38.5	46.5	32.1														
2015	10.9	15.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	23.9	33.9	0.0	0.0	20.5	24.0	0.9	0.9	0.0	0.0	6.4	6.4	76.3	95.0														
2016	1.3	1.3	33.8	36.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.9	3.4	3.4	0.0	0.0	16.1	19.4	8.3	8.3														
2017	29.7	44.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	38.8	0.0	18.1	25.4	13.7	17.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0														
2018	55.7	63.4	133.3	222.9	0.0	0.0	0.0	0.0	0.0	5.6	5.6	4.6	4.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0														
2019	7.2	7.2	10.5	11.4	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.0	0.0	0.9	0.9	0.0	0.0	6.0	6.0	37.3	43.3	15.7	0.0														
2020	34.5	53.2	21.6	22.2	0.0	0.0	0.0	0.0	0.0	29.5	45.1	0.0	0.0	12.8	12.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0														

Note: Algorithmic density calculations include: Total Catch - the density on all fish caught. Est - the estimated population including variation between two samples.

Salmon Parr Raw Data/100m (>0+ Salmon)																																					
Sulby Catchment				Laxey Catchment								Douglas Catchment								Santon Catchment												Peel Catchment					
River	Sulby			Laxey								Douglas								Santon Burn				Silver Burn				Neb									
Location	Glen Moar Cottage	Upstream HEP	Tholt-y-Will	Wollen Mills	Lower Glen	Glen Inlet	Upper Glen	NSC	Union Mills	Saba's Glen	Tromode	Sir George's Bridge	Paper Mill	Ballalona	Fairy Bridge	Mullinaragher	Upper Santon	Great Meadow	Ronaldsway	Rushen Abbey	Ballamodha	Raggart	Tynwald Mills														
Grid Ref				SC 434 844	SC 430 842	SC 429 854		SC 356 760	SC 354 777	SC 348 776	SC 372 771	SC 367 793		SC 299 710				SC 270 688		SC 278 702		SC 244 828	SC 281 824														
	Total Catch	Est	Total Catch	Est	Total Catch	Est	Total Catch	Est	Total Catch	Est	Total Catch	Est	Total Catch	Est	Total Catch	Est	Total Catch	Est	Total Catch	Est	Total Catch	Est	Total Catch	Est													
2002	0.91	1.44	0.00	0	0	0	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0														
2003	0.00	0.00	0.00	0	0	0	0	3.99	3.99	0.00	0	0	0	15.49	0	0.00	0	0	0	0.00	0	0.00	0														
2004	0.00	0	0.00	0.00	0	0	0	2.86	2.86	0.00	0.00	0.00	0	4.17	0	0.00	0	0	0	0.00	0	0.00	0														
2005	0.00	0	0.00	0.00	0	0	0	0.74	0.74	32.78	0	0	0	5.36	0	0.75	0.75	0	0	0.00	0.00	0.00	0.00														
2006	0.00	0	0.00	0.00	0	0	0	2.31	2.31	24.64	27.54	0.00	0.00	0	28.28	28.28	0.00	0.00	0	0.65	0.65	0.00	0.00														
2007	0.00	0	0.00	0.00	0	0	0	0.65	0.65	0.00	0.00	0.00	0	17.74	18.55	0.00	0.00	0	0.00	0.00	0.00	0.00															
2008	0.00	0	0.00	0.00	0	0	0	0.00	0	0.00	0.00	0.00	0	0.00	0	0.00	0.00	0	0.00	0.00	0.00	0.00															
2009	0.00	0	0.00	0.00	0	0	0	15.38	17.19	19.77	20.34	0.00	0.00	0	37	38	3	3	0	32.75	35.89	23.94	26.60														
2010	5.31	6.76	0.00	0.00	0	0	0	2.69	2.69	14.44	14.44	0.00	0.00	0	30	32	11.88	15.63	0	18.46	24.50	8.65	8.65														
2011	1.42	1.42	0.00	0.00	0	0	0	0.57	0.57	30.99	31.58	0.00	0.00	0	36	36	1.74	1.74	0	24.83	52.10	17.05	18.89														
2012	0.62	0.62	0.00	0.00	0	0	0	0.00	0	0.00	0.00	0.00	0	0.00	0	0.00	0.00	0	0.00	0	0.00	0.00															
2013	11.29	11.29	8.97	8.97	0	0	0	0.00	0.00	11.38	13.77	0.00	0.00	0	47.50	49.17	0.00	0.00	45.69	50	41.03	43.59	23.89														
2014	7.586	7.586	0.77	0.77	0	0	0	0.00	0	17.10	17.11	0	7.362	7.975	29	29	0.00	0.00	5.22	5.22	31.92	34.23	6.84														
2015	9.38	18.75	13.17	14.15	0	0	0	0.00	0	10.56	11.11	0.00	0.00	5.263	5.263	5.36	5.36	0.00	0.00	3.2	3.2	20.33	22.41														
2016	10.97	10.97	0.00	0.00	0	0	0	0.00	0	0.00	0.00	0.00	0.00	11.52	12.57	12.61	12.61	0.00	0.00	2.151	2.151	36.96	39.13														
2017	3.165	3.165	9.524	10	0	0	0	0.00	0	0.00	0.00	2.353	8.808	8.871	9.677	0.00	0.00	0	0	8.14	0	0.00	0.00														
2018	18.32	25.19	1.042	1.042	0	0	0	0.00	0	0.00	0.00	17.32	17.88	13.4	13.4	0	0	0.00	0.00	0	0	0.00	0.00														
2019	17.65	18.3	24.56	28.95	0	0	0	0.00	0	0.00	0.00	3.763	4.301	0	14.53	14.53	0.00	0.00	2.239	2.239	49.21	53.97															
2020	3.509	3.509	5.263	7.602	0	0	0	0.00	0	0.00	0.00	1.156	1.156	0	3.419	3.419	0.00	0.00	0	0	19.2	20															

13.8. Appendix 8 – Trout Density Scores (m²)

[illegible]

13.9. Appendix 9 – Density Score Conversion Table (100m²)

Salmonid Abundance Score (Values are No. 100m ²)						
	Classification					
Species Group	A	B	C	D	E	F
Level One						
0+ Brown/Sea trout	38	17	8	3		0
>0+ Brown/Sea trout	21	12	5	2		0
0+ Salmon	86	45	23	9		0
>0+ Salmon	19	10	5	3		0
>0+ Rainbow trout	2	0.5	0.2	0.1		0

13.10. Appendix 10 – Angler Catch Returns (2003-2020)

Summary of data from catch return scheme for 'Other Waters' angling licences 2003 to 2020. Data on brown and rainbow trout have only been requested since 2010. Percentages are rounded to nearest whole number.

		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Licences sold		567	515	492	582	542	504	557	458	473	390	314	262	269	258	258	234	276	214
Catch returns submitted		56 10%	98 19%	142 29%	137 24%	152 28%	37 7%	127 23%	42 9%	26 6%	15 4%	7 2%	8 3%	15 6%	12 5%	12 5%	10 4%	4 1%	5 2%
Salmon	Caught	3	45	21	47	17	90	42	40	86	4	1	2	3	7	4	1	0	1
	Returned	1 33%	15 33%	10 48%	14 30%	8 47%	45 50%	22 52%	28 70%	73 85%	2 50%	0 0%	1 50%	0 0%	5 71%	3 75%	1 100%	-	1 100%
	Best river	Sulby	Glass	Laxey	Glass	Glass	Glass	Glass	Glass	Glass	Neb	Neb	Neb	Sulby	Glass	Neb	Neb	-	Silver burn
	Best month	May/ Sep	Oct	Oct	Oct	Oct	Oct	Aug	Oct	Oct	Apr	Oct	Oct	Oct	Oct	Oct	Oct	-	May
	Best method	Spin	Worm	Worm	Worm	Worm	Worm	Worm	Worm	Fly	Worm/ Fly	Spin	Worm/ Spin	Spin	Spin	Spin	worm	-	Fly
Sea trout	Caught	69	128	104	117	69	89	132	61	43	26	14	31	54	32	53	17	18	23
	Returned	49 71%	87 68%	70 67%	97 83%	47 68%	69 78%	96 73%	49 80%	34 79%	19 73%	13 93%	24 77%	48 89%	27 84%	45 85%	14 82%	18 100%	21 91%
	Best river	Neb	Neb	Sulby	Neb	Neb	Neb	Neb	Neb	Neb	Neb	Neb	Neb	Neb	Sulby	Sulby	Sulby	Neb	Neb
	Best month	Aug	Oct	Oct	Oct	Aug	Sep	Aug	Oct	Aug	Aug	Oct	Aug	Aug/ Sep	Aug	Aug	Aug	Aug	Sep
	Best method	Fly	Spin	Worm	Fly	Fly	Spin	Fly	Fly	Fly	Fly	Spin	Fly	Fly	Fly	Fly	Fly	Fly	Fly
Brown trout	Caught	-	-	-	-	-	-	-	5	108	14	14	162	474	122	141	31	53	16
	Returned	-	-	-	-	-	-	-	5 100%	105 97%	13 93%	14 100%	161 99%	436 92%	92 75%	25 18%	10 32%	38 72%	13 81%
	Best river	-	-	-	-	-	-	-	Neb	Neb	Neb	Neb	Neb	Neb	Silver Burn	Silver Burn	Glass	Silver Burn	Silver Burn
	Best month	-	-	-	-	-	-	-	Jul	Aug	Apr	Oct	May	Aug	May	Sept	Oct	July	May
	Best method	-	-	-	-	-	-	-	Fly	Fly	Fly	Spin	Fly	Fly	Fly	Fly	Fly	Fly	Fly
Rainbow trout	Caught	-	-	-	-	-	-	-	29	1	0	0	0	0	14	0	0	0	0
	Returned	-	-	-	-	-	-	-	2 7%	1 100%	-	-	-	-	14 100%	-	-	-	-
	Best river	-	-	-	-	-	-	-	Groudie	Silver Burn	-	-	-	-	Cornaa	-	-	-	-
	Best month	-	-	-	-	-	-	-	Apr	Apr	-	-	-	-	Apr	-	-	-	-
	Best method	-	-	-	-	-	-	-	Worm	Fly	-	-	-	-	Fly	-	-	-	-