Salmon Watch Ireland

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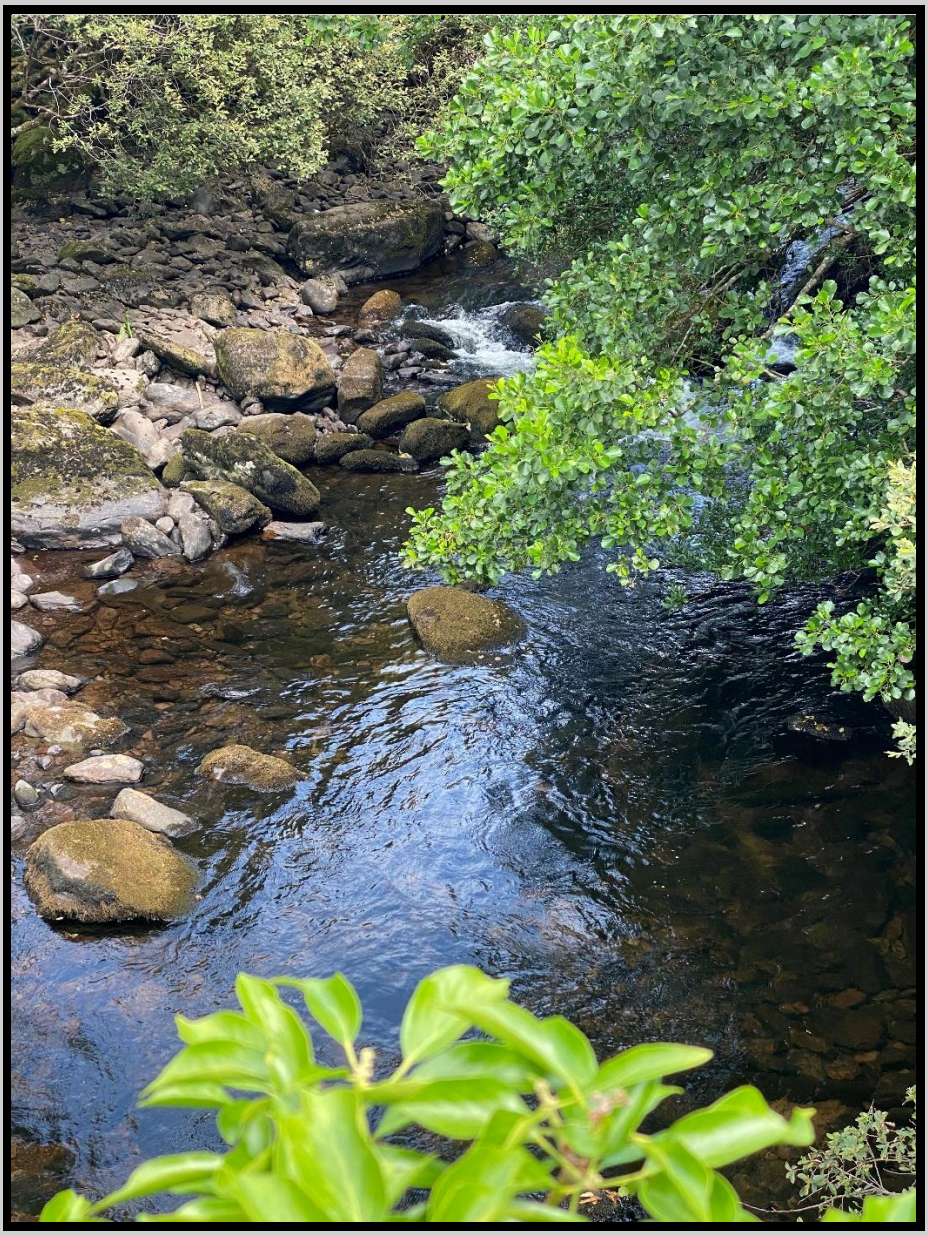
Ireland's Summer Heatwaves: A Wake-Up Call for Wild Atlantic Salmon

Climate Change, Catchment Management and the Future of Wild Atlantic Salmon



Partially Shaded Cummeragh River – Waterville County Kerry

Cool and Oxygenated Exceptionally Low

Introduction.

Ireland's weather is changing before our eyes. The prolonged dry spells, exceptionally warm conditions and increasingly intense rainfall events experienced over recent years are no longer isolated occurrences—they are becoming the new normal. Climate scientists project that these extremes will become more frequent and more severe in the decades ahead.

For Atlantic salmon, these changes represent one of the greatest conservation challenges of our time.

Yet climate change is only part of the story. The vulnerability of Ireland's salmon rivers has been amplified by decades of altered land use, arterial drainage, wetland loss, riparian vegetation removal and increasing nutrient enrichment. Healthy catchments once retained rainfall, filtered sediments and nutrients, moderated river temperatures and sustained flows throughout dry periods. Much of that natural resilience has been lost.

Climate change has not created these weaknesses—it has exposed and accelerated them.

The future of wild Atlantic salmon will depend not simply on reducing greenhouse gas emissions, but on fundamentally changing how we manage our rivers and the landscapes that feed them.

The Final Journey Home Is Becoming Increasingly Difficult

Adult Atlantic salmon return from the North Atlantic carrying the entire future of their population. Having survived one of the most demanding migrations in the natural world, they depend on cool, well-oxygenated rivers and adequate flows to reach their spawning grounds. Increasingly, these conditions are absent.

During prolonged drought, river levels fall and water temperatures rise. Rather than entering rivers immediately, many salmon remain in estuaries and lower river reaches, waiting for rainfall and cooler conditions.

These delays come at a significant biological cost.

Adult salmon stop feeding sometime prior to arriving at their destination river. Every additional day spent waiting consumes valuable energy reserves needed to complete migration, defend spawning territories and successfully reproduce.

Warm water further increases metabolic demands while simultaneously reducing dissolved oxygen concentrations. Fish become physiologically stressed, migration

Entrance to the Waterville System

Barrier to migration and obvious pinch point for predation of adult salmonids.

slows and reproductive success declines. During prolonged exposure to exceptionally high temperatures, mortality can occur before fish even reach their spawning grounds.

Predation Increases When Rivers Run Low

Climate change is also changing the balance between predators and salmon.

Low river flows concentrate adult salmon within estuaries and lower rivers where they become highly predictable prey. Grey seals and harbour seals quickly learn to exploit these bottlenecks, while dolphins may opportunistically prey on salmon in coastal waters.

Predation is entirely natural and has always formed part of healthy ecosystems.

However, climate change increases the opportunity for predation by forcing salmon to remain exposed for much longer than under natural flow conditions.

For already depleted salmon populations, every additional loss matters.

Juvenile Salmon Face a Hidden Crisis

The effects of drought begin long before salmon return from the sea.

Juvenile salmon may spend up to three years growing within Irish rivers before migrating to sea as smolts.

Density related pressures are exacerbated by low and warm water- Many fry die in these conditions – starvation, predation, disease are all consequences of drought.

These young fish depend upon cool, fast-flowing, well-oxygenated water with abundant shelter and food.

During prolonged drought, their habitat begins to disappear.

Shallow riffles dry out, side channels become disconnected and pools shrink dramatically. Large numbers of juveniles become concentrated into progressively smaller areas where competition for food and shelter intensifies.

At the same time, water temperatures rise.

Warmer water accelerates metabolism, meaning juvenile salmon require more food simply to survive. Unfortunately, drought often reduces the abundance of aquatic insects upon which they depend. Fish therefore experience increasing energy demands while food resources decline.

Warm water also contains less dissolved oxygen. This combination places juveniles under significant physiological stress, reducing growth and weakening their overall condition.

This pool contained a large concentration of fry and on my arrival two natural predators departed – two Grey Herons. Obviously, predation increases with lack of water.

Predation During Drought Can Have Lasting Consequences

Perhaps one of the least appreciated consequences of drought is the dramatic increase in juvenile predation.

Under normal river conditions, young salmon utilise fast currents, submerged vegetation, woody debris, undercut banks and deeper pools to avoid predators.

When rivers shrink, these refuges disappear.

Clear, shallow water allows grey herons, cormorants, goosanders and kingfishers to hunt with far greater efficiency. Otters and predatory fish also benefit as juvenile salmon become concentrated within isolated pools.

Fish weakened by warm water and low oxygen become slower and less able to escape predators.

The result can be substantial losses of juvenile salmon during prolonged periods of drought.

The Impacts Continue Long After Rain Returns

The consequences of one difficult summer do not disappear when river levels recover.

Juveniles that survive periods of drought often grow more slowly and enter winter in poorer condition.

Some delay their migration to sea by an additional year.

Others leave freshwater as smaller smolts with reduced energy reserves.

Scientific research has consistently demonstrated that the size and condition of smolts leaving rivers strongly influences marine survival.

Fish weakened in freshwater are less likely to survive their first months at sea and ultimately less likely to return as spawning adults.

This creates a delayed effect.

Poor juvenile survival today may only become evident one, two or even three years later through reduced adult returns.

Climate change therefore creates a chain of impacts that follows salmon throughout their entire life cycle.

Climate Change Meets Catchment Change

The challenge extends well beyond temperature.

Prolonged drought concentrates nutrients within rivers while intense rainfall following dry periods rapidly transports sediments, phosphorus, nitrogen and organic material from surrounding land into rivers and estuaries.

These nutrient pulses stimulate excessive algal growth, reduce dissolved oxygen concentrations and further degrade already stressed aquatic ecosystems.

Across much of Ireland, decades of arterial drainage, field drainage, wetland loss and land-use intensification have fundamentally altered how catchments respond to rainfall.

Instead of slowly releasing water throughout summer, many catchments now lose water rapidly following rainfall, leaving rivers increasingly vulnerable during prolonged dry periods.

Healthy floodplains, wetlands and native woodlands once acted as natural sponges.

Much of that resilience has disappeared.

Building Climate-Resilient Catchments

Climate adaptation for wild Atlantic salmon must now become a national priority.

Salmon Watch Ireland believes that protecting and restoring **riparian buffer zones** should become mandatory within river catchments.

Native riparian woodlands provide shade that lowers summer water temperatures, stabilise riverbanks, filter nutrients and sediments before they reach rivers, improve biodiversity and support the aquatic insects upon which juvenile salmon depend.

These benefits are no longer optional—they are essential components of climate adaptation.

Similarly, nutrient management must reflect the realities of a warming climate.

When rivers experience prolonged low flows, their ability to assimilate nutrient inputs declines dramatically. Allowing additional nutrient loading through expanded nitrates derogations risks increasing eutrophication precisely when rivers are least able to cope.

Salmon Watch Ireland believes that increasing nutrient inputs into already vulnerable catchments is incompatible with restoring healthy, climate-resilient river ecosystems.

Catchment drainage practices must also evolve.

Future drainage management should routinely incorporate sediment traps, settlement ponds and other nature-based measures to intercept fine sediments before they reach rivers.

Reducing sediment delivery is critical for protecting spawning gravels and maintaining productive juvenile habitat.

Natural flood management should also become standard practice.

Where appropriate, **leaky dams**, wetland restoration and other water-retention measures can slow the movement of water through catchments, reduce flood peaks, encourage groundwater recharge and sustain river flows during prolonged dry periods.

Managing water where it falls rather than simply draining it away must become central to catchment management.

Restoring Ireland's Spawning Habitat

Many Irish salmon rivers now contain spawning gravels that have become compacted or embedded with fine sediments following decades of drainage, erosion and altered land use.

These gravels are the nursery of the next generation.

When fine sediments clog the spaces between gravel particles, oxygen-rich water can no longer circulate effectively around developing eggs.

Egg survival declines.

Juvenile emergence falls.

Salmon Watch Ireland believes that restoring spawning habitat should become a major national restoration priority.

Existing restoration programmes need to be expanded significantly and delivered across entire catchments rather than through isolated local projects.

There is also a pressing need for robust pilot studies that scientifically evaluate different restoration techniques under Irish conditions.

Every restoration methodology should be carefully monitored so that future investment is guided by evidence rather than assumption.

Where spawning gravels have become extensively compacted, it may be appropriate to investigate carefully controlled mechanical gravel restoration techniques. While such approaches have been used internationally, their effectiveness, environmental impacts

and long-term sustainability require rigorous scientific evaluation before wider adoption in Ireland.

However, restoration cannot succeed if the causes of degradation remain unchanged.

Unless sediment inputs, nutrient pollution, inappropriate drainage practices and unsustainable land management are addressed at source, restored spawning gravels will simply become re-embedded over time.

Habitat restoration must therefore address both the symptoms and the causes of river degradation.

Every Pressure Matters More Than Ever

Climate change has fundamentally altered the context for salmon conservation.

Wild Atlantic salmon are now attempting to survive within river systems that are warmer, more nutrient-enriched and less resilient than at any point in recent history.

This means every additional human pressure becomes increasingly significant.

Habitat degradation.

Pollution.

Sedimentation.

Migration barriers.

Unsustainable water management.

Disease.

Sea lice.

Unsustainable aquaculture practices.

Every avoidable source of mortality reduces the resilience of already vulnerable salmon populations.

The precautionary principle has never been more relevant.

As environmental conditions become increasingly hostile, society has a responsibility to reduce every avoidable pressure that can be managed.

A National Call to Action

The future of wild Atlantic salmon will not be secured by protecting fish alone.

It will depend upon restoring healthy catchments that naturally retain water, moderate temperatures, reduce nutrient and sediment pollution and provide resilient habitats capable of supporting salmon throughout every stage of their life cycle.

This demands integrated action across government departments responsible for agriculture, water quality, climate adaptation, forestry, drainage, planning and fisheries management.

Healthy riparian corridors should become mandatory.

Nutrient loading should be reduced, not increased.

Drainage policy must retain water within catchments rather than simply accelerating its removal.

Spawning habitats must be restored at scale.

Scientific pilot projects should guide future restoration methodologies.

Natural flood management should become commonplace.

Ireland still has the opportunity to build rivers capable of supporting thriving wild Atlantic salmon populations in a changing climate.

But time is rapidly running out.

Climate change is accelerating. The science is clear. Every year of delay makes recovery more difficult and more expensive.

Protecting Atlantic salmon means restoring the resilience of Ireland's rivers. That restoration must begin now, because the decisions we make over the next decade will determine whether future generations inherit rivers that still support wild salmon—or simply remember that they once did.